

**Diamond**

**2018**



**Jubilee**

**2019**

FACULTY MEMBERS - PROFILE

# DEPARTMENTS

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[Department of Aerospace Engineering](#)

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[Department of Applied Mechanics](#)

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[Department of Biotechnology](#)

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[Department of Chemical Engineering](#)

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[Department of Chemistry](#)

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[Department of Civil Engineering](#)

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[Department of Computer Science & Engineering](#)

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[Department of Electrical Engineering](#)

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[Department of Engineering Design](#)

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[Department of Humanities and Social Science](#)

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[Department of Management Studies](#)

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[Department of Metallurgical and Materials Engineering](#)

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INDIVIDUAL FACULTY PROFILE

# DEPARTMENT OF AEROSPACE ENGINEERING

# LIST OF FACULTY

[Amit Kumar](#)

[Bharath M Govindarajan \(Profile yet to be uploaded\)](#)

[Bhaskar K](#)

[Joel George M](#)

[Luoyi Tao](#)

[Mahesh S](#)

[Manikandan Mathur](#)

[Murthy H.S.N](#)

[Muruganandam T.M](#)

[Nagabhushana Rao Vadlamani](#)

[Nagendra Gopal K.V](#)

[Nandan Kumar Sinha](#)

[Rajesh G](#)

[Ramakrishna M](#)

[Ramakrishna P.A](#)

[Ranjith M](#)

[Sameen A](#)

[Santanu Ghosh](#)

[Satadal Ghosh](#)

[Satya R Chakravarthy](#)

[Senthil Murugan M \(Profile yet to be uploaded\)](#)

[Shankar Ghosh](#)

[Shantanu Shashikant Mulay \(Profile yet to be uploaded\)](#)

[Shyam Keralavarma](#)

[Sriram P \(Profile yet to be uploaded\)](#)

[Sriram Rengarajan](#)

[Sujith R.I](#)

[Sunetra Sarkar](#)

[Velmurugan R](#)



Dr. AMIT KUMAR

PhD, Case Western Reserve University, USA

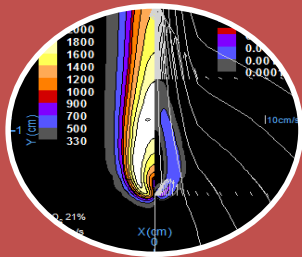
Professor, Department of Aerospace Engineering

044-2257-4019; amitk@ae.iitm.ac.in

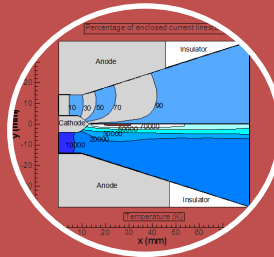
<http://www.ae.iitm.ac.in/~amitk>



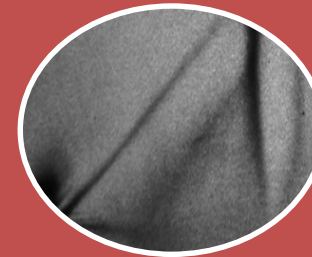
- Combustion: Fire Safety Research on earth and in space (microgravity)
- Propulsion: Rocket and spacecraft propulsion, Electric propulsion



Modeling of spreading flames over solid fuels and their extinction in space and in normal gravity environments



Numerical modeling of a Magneto Plasma Dynamic (MPD) thruster



A study on the shock pattern over an obstruction in a rectangular channel at high subsonic flows to understand Deflagration to Detonation (DDT) phenomena

**FIRE SCIENCE AND PROPULSION**



# Dr. K.BHASKAR

## PhD, IIT, Madras

Professor, Dept. of Aerospace Engg.

044-2257-4010; kbhas@iitm.ac.in

<http://www.iitm.ac.in/~kbhas/kbhas.htm>



- *Beams, Plates and Shells/ Statics, Dynamics and Stability*
- *Three-dimensional Analysis using Theories of Isotropic/Anisotropic Elasticity*
- *Theoretical Modelling of Composite Laminates*

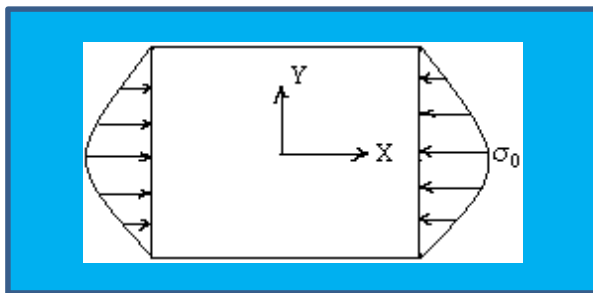
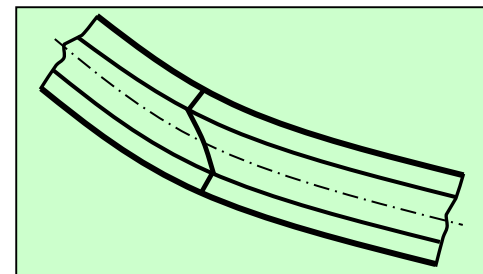


Plate buckling under non-uniform compression



A zigzag type higher-order laminate model



# Dr. Joel George M

PhD, Indian Institute of Science, Bangalore  
Assistant Professor, Department of Aerospace Engineering  
044-2257-4006; [joel@ae.iitm.ac.in](mailto:joel@ae.iitm.ac.in)



- Navigation, guidance, and control of aerospace vehicles
- Flight dynamics
- Multi-agent systems theory as applied to multiple Unmanned Aerial Vehicle missions

Immediate objectives include setting up a multi-vehicle facility,  
with quad-rotor platforms, to develop and test various  
decentralized control and estimation algorithms



Dr. Luoyi Tao

PhD, University of Pittsburgh, USA

Professor, Department of Aerospace Engineering

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<http://www.ae.iitm.ac.in/people/faculty/luoyi.html>



- Continuum Mechanics: Issues on the foundation of constitutive theory
- Turbulence Modeling: Application of information theory, optimal control and optimization
- Interested in mathematical model construction and analysis of (physical) systems and processes within the constraint of information/data availability.





**Dr. S. Mahesh**

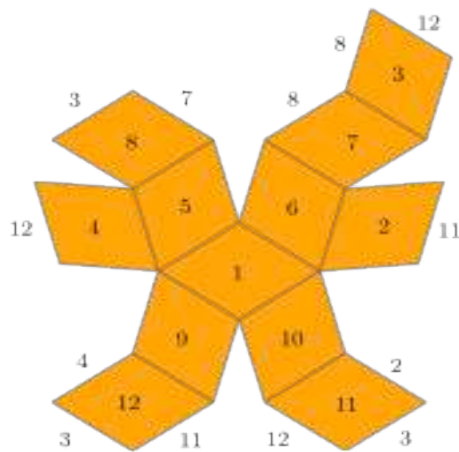
Ph. D., Cornell University  
Professor, Dept. of Aerospace Engg.  
044-2257-4008; smahesh@iitm.ac.in  
<http://www.ae.iitm.ac.in/~smahesh/>



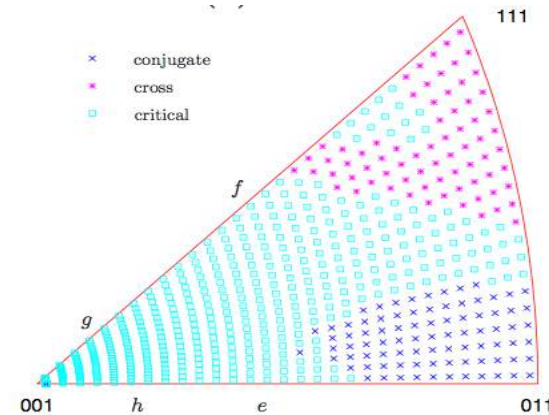
## RESEARCH INTERESTS

- Solid mechanics analysis of aerospace materials.
- Plasticity, fracture, and creep modeling and experimentation.

### SOME RECENT RESEARCH PROBLEMS



Micromechanical modeling  
of creep rupture in steels



Continuum model of substructure  
formation during plastic deformation



Dr. Manikandan Mathur

PhD, Massachusetts Institute of Technology, USA

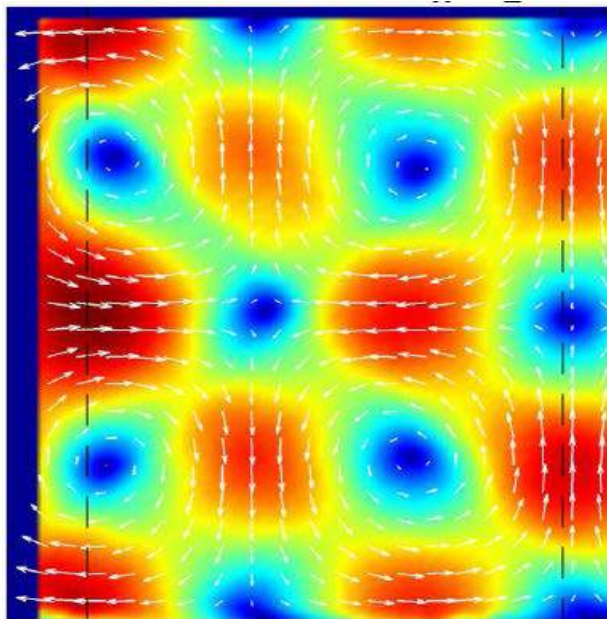
Professor, Department of Aerospace Engineering

044-2257-4025; manims@ae.iitm.ac.in

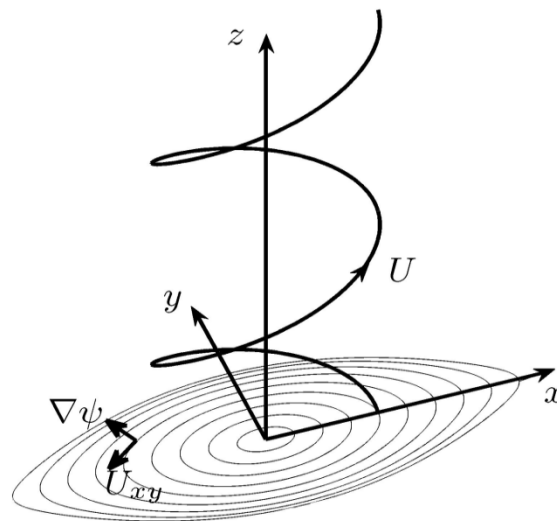
<https://sites.google.com/site/mathur2m/>



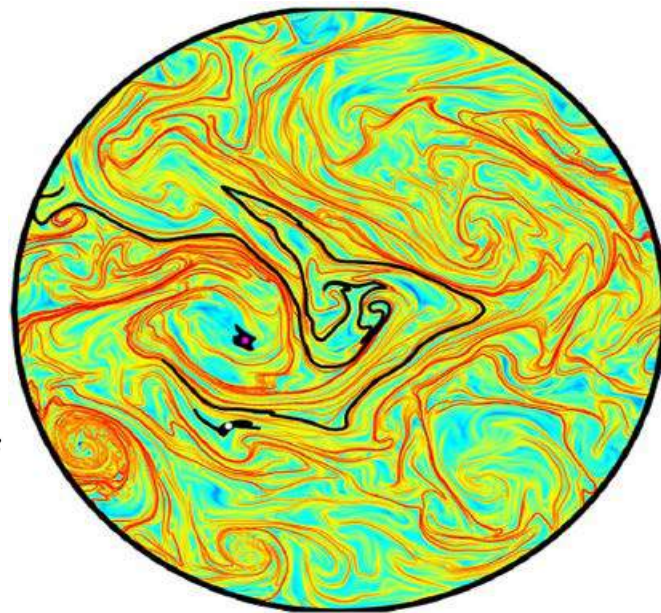
- Rotating and Stratified Flows – Bistability, Internal Gravity Waves,
- Vortex Stability – Non-parallel flows, Compressible flows, Magnetohydrodynamics
- Lagrangian Coherent Structures (LCS) – Mixing of passive and diffusive tracers



Internal waves in the lab



A swirling jet



Mixing in Turbulence

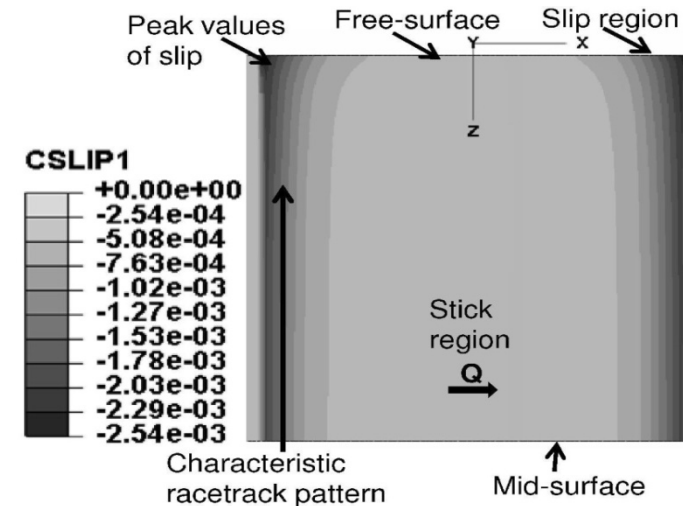
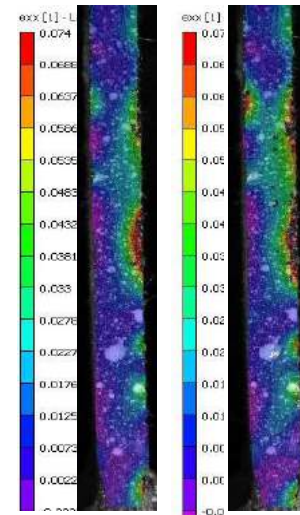
# Dr. Murthy H S N (PhD - Purdue)



**Interests:** Damage mechanisms in metals & composites (fatigue & fracture), contact mechanics & tribology, fretting, constitutive modeling of visco-elastic materials

## **Currently Working on:**

1. Damage evolution around machined holes in composites due to fatigue loads: damage mapping using NDT (*digital image correlation-DIC, infra-red thermography*); modeling - continuum & stochastic.
2. Fretting fatigue of polycrystalline & single crystal material: experimental studies; analytical modeling to obtain stresses; life estimation using multi-axial fatigue parameters & fracture mechanics.
3. Manufacturing of fine grained materials using machining for severe plastic deformation: mechanical characterization
4. Three dimensional (3D) effects in contacts
5. 2D contact analysis of functionally graded & coated materials
6. Constitutive modelling of solid



## **Future Interests:**

Modeling of biological contacts





# Dr. T.M. Muruganandam

## PhD, Georgia Institute of Technology, USA

Professor, Dept. of Aerospace Engineering

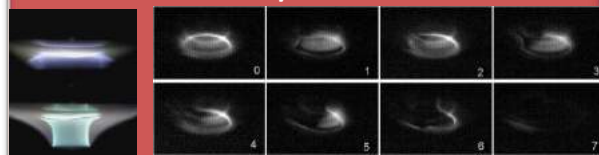
044-2257-4022; murgi@ae.iitm.ac.in

<http://www.ae.iitm.ac.in/~murgi/index.html>



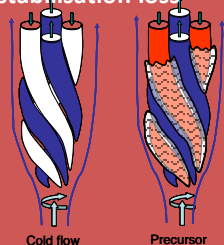
- Flame stabilisation, Burner Development, Blowout prediction, Precursors to blowout, detection of imminent blowout, unsteady combustion: experimental & analytical
- Optical diagnostics of high speed and reacting flows: Spectroscopic diagnostics, Chemiluminescence, Mie Scattering, LII, PLIF, TDLAS, Schlieren, Tomography (TDLAS, PLIF, Schlieren)
- High speed flows, intakes studies, unsteady movement of shocks, Shock-Boundary Layer Interaction(SBLI), MicroVortex Generators.

### Flame Loss/Stabilisation



Multiple stabilisations

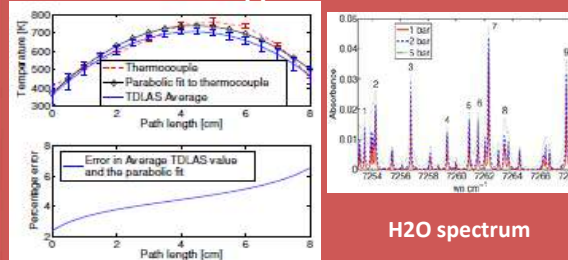
Stagnation stabilisation loss



Cold flow  
Precursor  
LBO precursor  
Swirl stabilisation

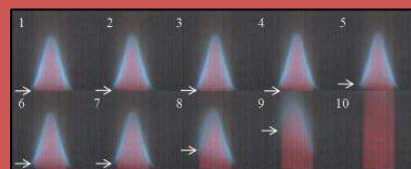
Shear stabilisation

### Diagnostics



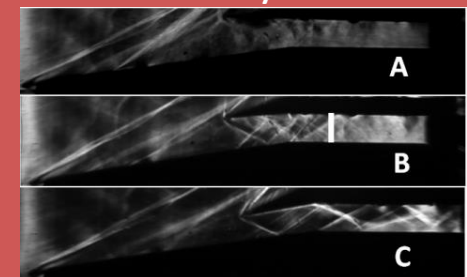
H<sub>2</sub>O spectrum

TDLAS

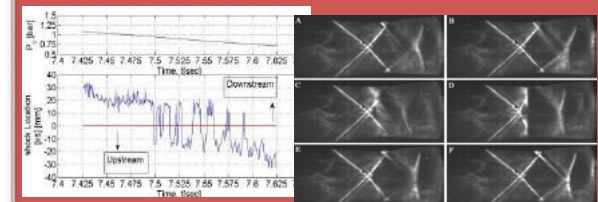


Mie scattering of reactants

### Shock Dynamics



Intake start/ unstart



Shock in diffuser



# Dr. Nagabhushana Rao Vadlamani

## PHD, University of Cambridge, UK

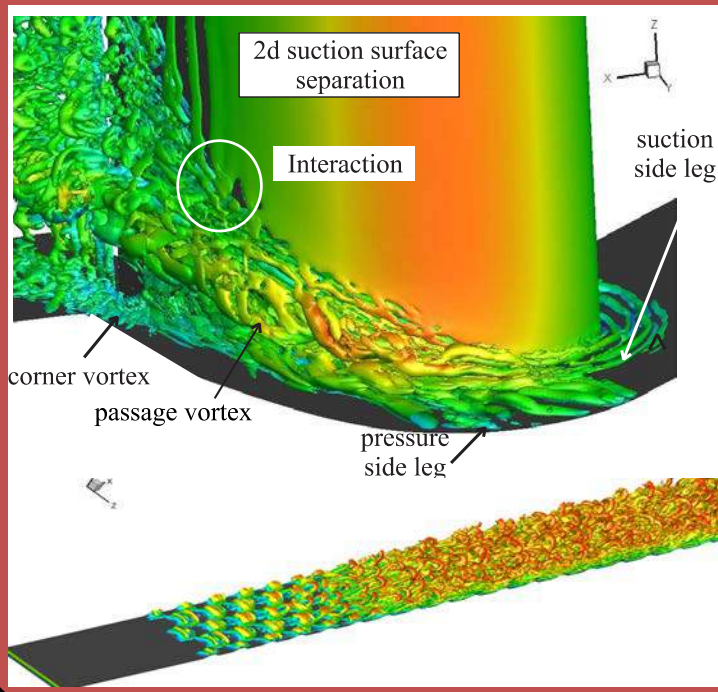
Assistant Professor, Dept. of Aerospace Engineering

044-2257-4037; [nrv@ae.iitm.ac.in](mailto:nrv@ae.iitm.ac.in)  
<http://www.ae.iitm.ac.in/~nrv/index.html>

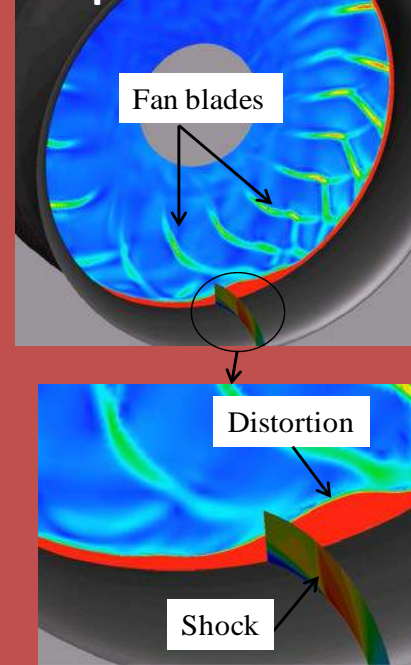


- CFD for turbomachines: DNS, LES, Hybrid RANS/LES, Low-order modelling
- Transition to turbulence, Coupled interactions, flow control
- High-order solver COMP<sup>2</sup> development, High performance computing (HPC)

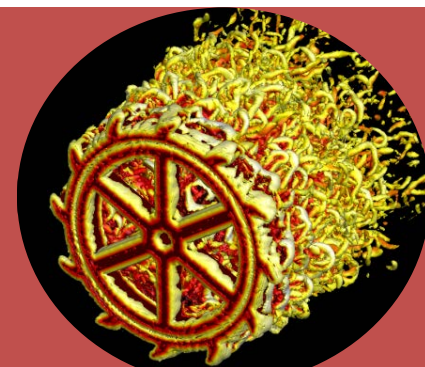
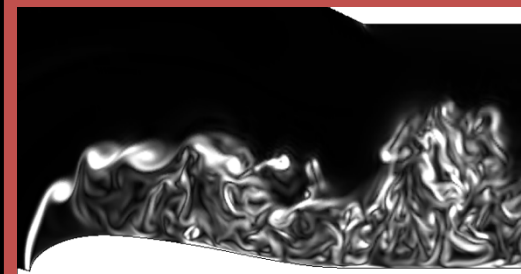
### Transitional flows



### Coupled interactions



### DNS/LES solver on HPC



Develop numerical frameworks to predict complex flow physics in turbomachines



# Dr. K. V. Nagendra Gopal

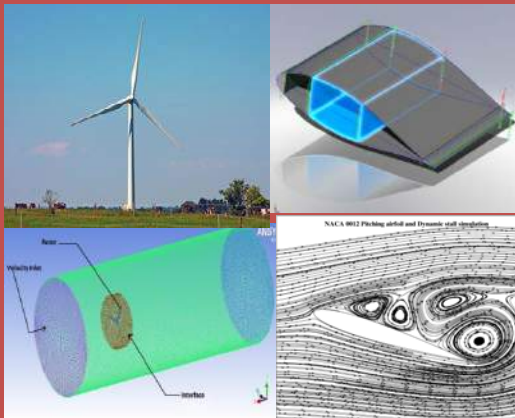
Ph.D, Indian Institute of Science, Bangalore  
Associate Professor, Dept. of Aerospace Engineering

044-2257-4015; gopal@iitm.ac.in

<http://www.ae.iitm.ac.in/~gopal/>



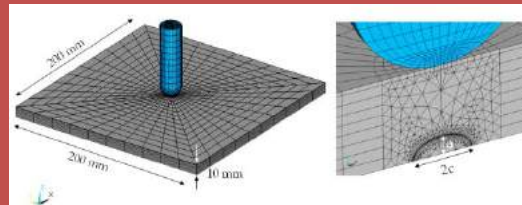
- **Aeroelasticity of wind turbines, design of smart composite blades using aeroelastic tailoring; analytical and computational modelling using coupled numerical methods**
- **Analytical and computational modeling of the mechanics of multifunctional structures made of advanced materials, multi-scale modelling, dynamics of automotive tyres**
- **Fracture mechanics - Crack growth analysis in metallic and composite structures**



Modelling aeroelastic behaviour of Wind Turbine Rotors using coupled FEA-CFD methods; Dynamic stall in wind turbines



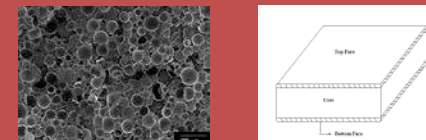
Tyre Dynamics; Rolling Resistance Estimation



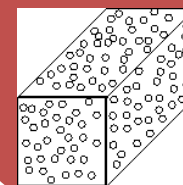
Low velocity impact in functionally graded plates with cracks



Fiber-matrix debonding in piezocomposites



Foam core sandwich composites



Modelling crack growth in particulate composites using XFEM

**Modelling of the Mechanics of Multi-functional and Multi-physics Systems**

[Back to Top](#)

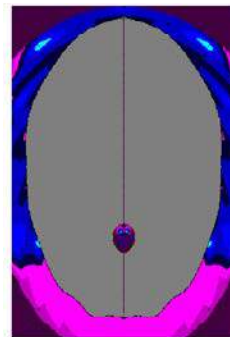
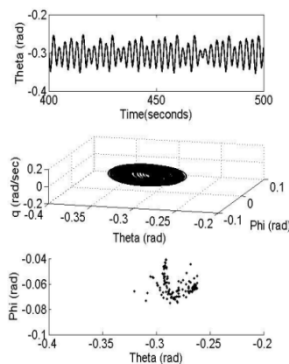
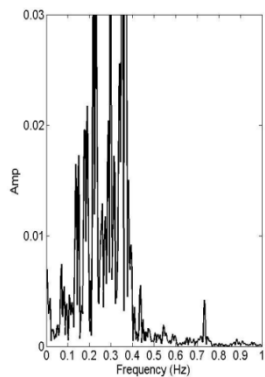




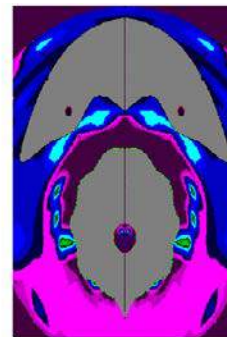
**Dr. Nandan Kumar Sinha**  
**PhD, IIT Bombay, India**  
**Professor, Dept. of Aerospace Engineering**  
 044-2257-4021; nandanks@iitm.ac.in  
<http://www.ae.iitm.ac.in/~nandan/nandan.html>



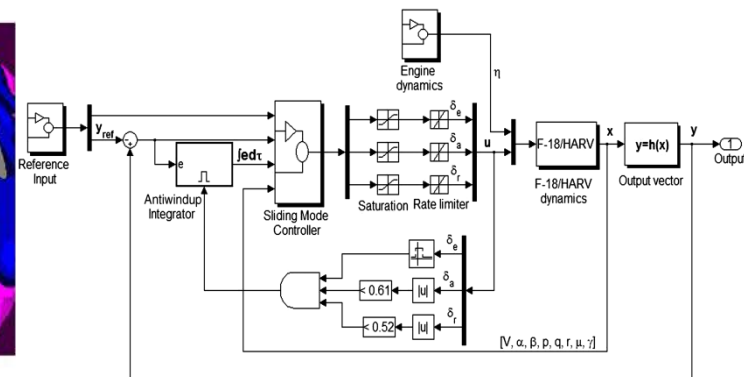
- **Nonlinear dynamics, bifurcation & chaos: Modeling nonlinear phenomena in dynamical systems exhibiting bifurcations and chaos under parametric variations**
- **Advanced six dof simulation: Missile-aircraft engagement simulation with/without flares, optimization of countermeasure system parameters**
- **Flight dynamics and control: Inverse design of vehicles, controller development for maneuvers/accident simulation, high angle-of-attack aircraft flight dynamics**



(a). No flare



(b). With flare



**Design, modeling, simulation, and control of aerospace vehicles**



# Dr. G. Rajesh

PhD, Andong National University, South Korea

Associate Professor, Dept. of Aerospace Engg

044-2257-4032; [grajesh@iitm.ac.in](mailto:grajesh@iitm.ac.in)

<http://www.ae.iitm.ac.in/~rajesh>

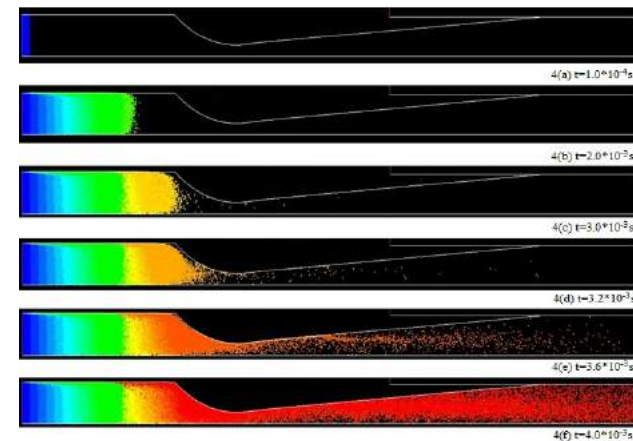
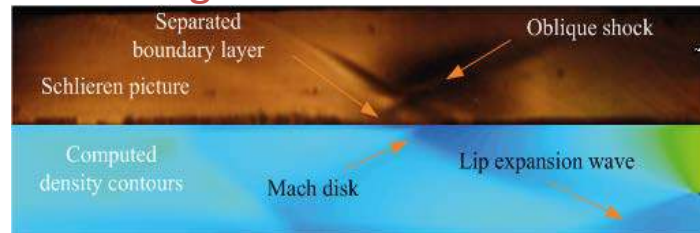
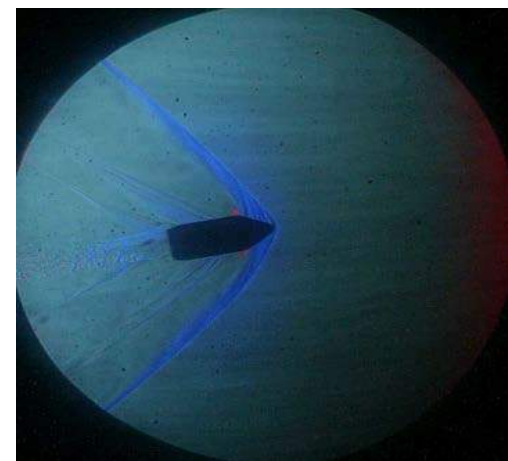


- Launch Dynamics, Unsteady Aerodynamics
- Wind Tunnel, Shock Tube and Gas Gun Experiments
- Shockwave dynamics

Projectile and sabot design  
Re-entry aerodynamics  
Transonic vehicle design

Vacuum ejector systems  
High altitude system  
design

Transdermal drug delivery  
Needle-less biolistic  
systems





Dr. Ramakrishna M.

PhD, University of Texas at Arlington, USA  
Professor, Dept. of Aerospace Engineering

044-2257-4005;krishna@ae.iitm.ac.in

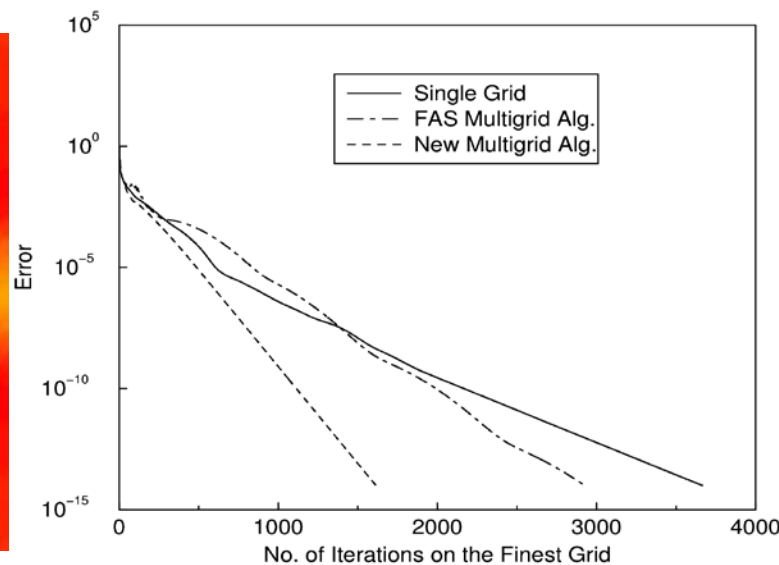
<http://www.ae.iitm.ac.in/~krishna/ramakrishnam.html>



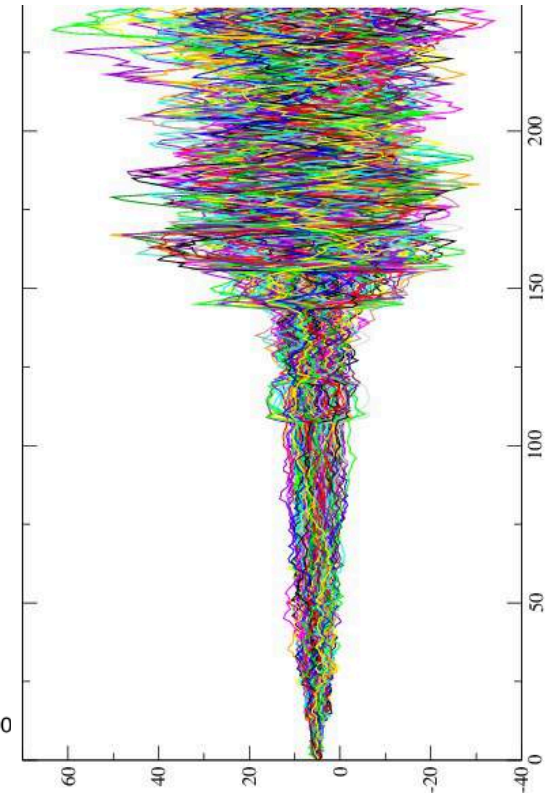
Aerodynamics / Fluid mechanics  
Develop new numerical schemes / algorithms



Mach 3.0 Flow past a cylinder



Convergence plot for a new Multi-grid scheme



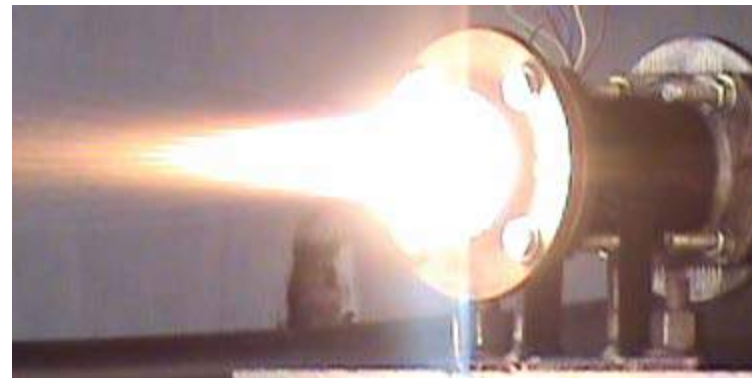
Stochastic differential eq & Monte-Carlo methods



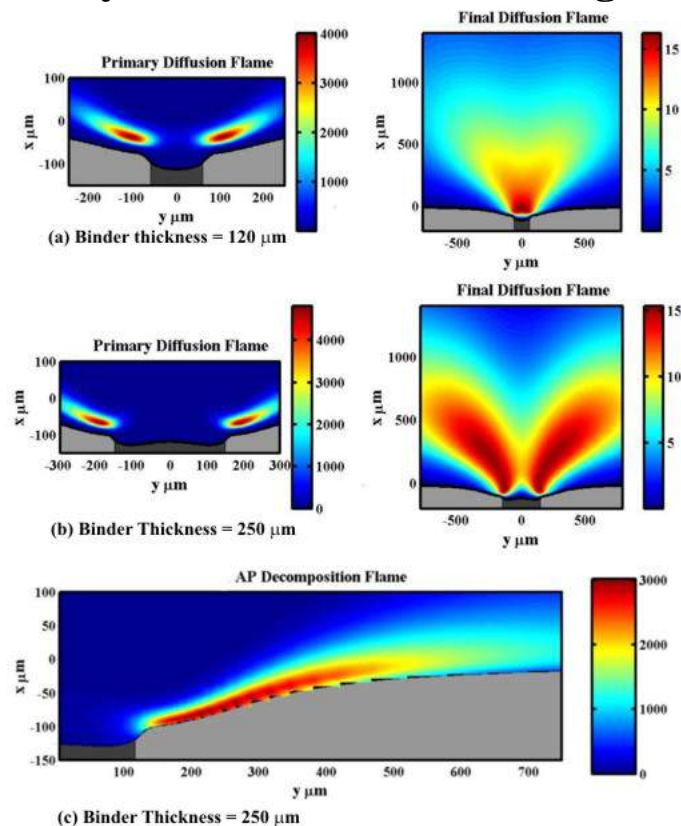
**P. A. Ramakrishna**  
**Professor**  
**Dept. of Aerospace Engg**  
**IIT Madras**

**Research areas**

- Modeling the combustion of solid propellants
- Understanding the mechanism of solid propellant catalyst action
- Understanding the energy separation mechanism in vortex tubes
- Development of high burn rate solid propellants
- Development of fast burning hybrid rocket fuels
- Development of fuel rich propellants for scramjets and ramjets
- Development of high power to weight ratio IC engines



**Hybrid rocket motor firing**



**Flame structure of composite propellant**





**Ranjith M.**  
**PhD, Florida Atlantic University, USA**  
**Assistant Professor, Dept. of Aerospace Engineering**  
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<http://www.ae.iitm.ac.in/~ranjith.m/index.htm>



## Research Interests

Aerodynamics and dynamics of:

✓ Helicopters

✓ MAVs

✓ Wind turbines



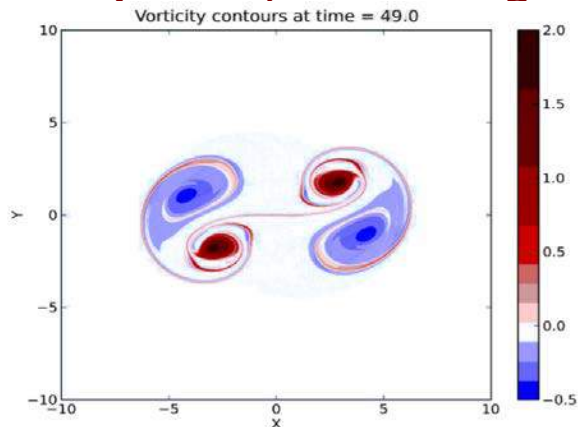
# Dr. A. Sameen

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Professor, Dept. of Aerospace Engg  
044-2257-4013; sameen@iitm.ac.in  
<http://www.ae.iitm.ac.in/~sameen>

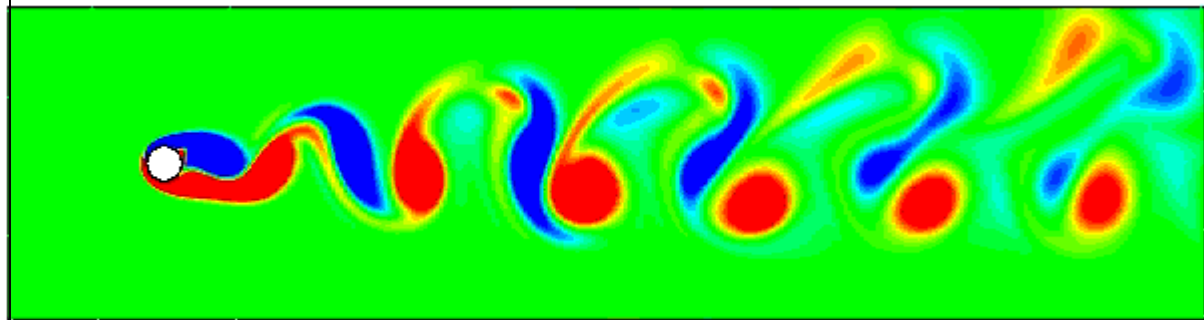


- Vortex and vorticity dynamics, boundary layer flows, flow control
- Computational and experimental fluid dynamics
- Stability, transition and turbulence in classical and quantum fluids
- Thermal convection and mixing

**Vortex behaviours**  
**Turbulence in wall jet, bluff body wakes, vortex mergers**



**Flow control: heating, hydrophobic surface, wall suction, magnetic forcing.**  
**Separation delay, lift augmentation, transition control.**







Dr. Santanu Ghosh

PhD, North Carolina State University, Raleigh, NC, USA

Assistant Professor, Dept. of Aerospace Engg.

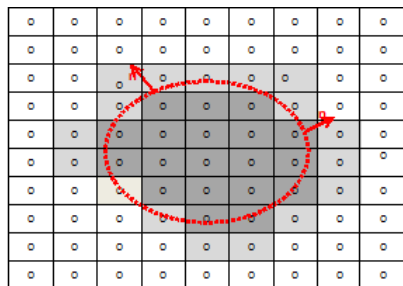
044-2257-4031; sghosh1@iitm.ac.in

<http://www.iitm.ac.in/~sghosh1/index.htm>

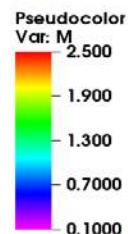
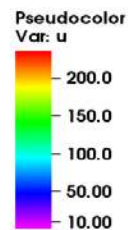


## RESEARCH INTERESTS

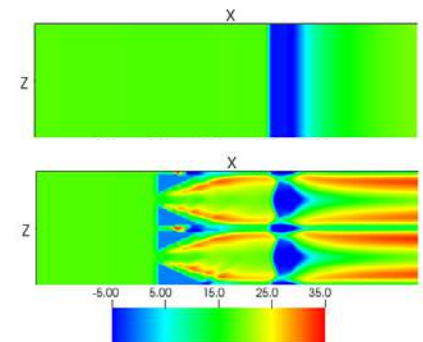
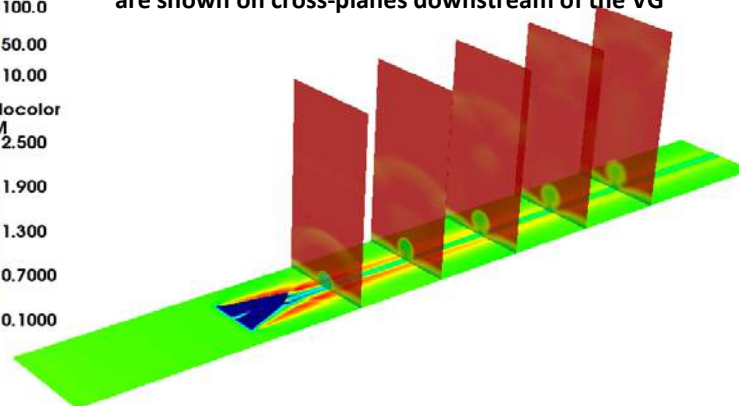
- *Computations of high-speed turbulent flows*
- *Shock/boundary layer interaction and its control*
- *Application of immersed-boundary methods*



Top: Schematic of Cartesian Grid surrounding an embedded surface;  
Bottom: Iso-surface of a control device



3-D view of the flow field around a slotted-ramp VG in  $M = 2.5$  flow. Axial velocity contours are shown on a near surface plane and Mach number contours are shown on cross-planes downstream of the VG



Near surface axial velocity contours ;  
Top: SBLI at  $M = 2.5$  with no control;  
Bottom: SBLI  $M = 2.5$  with flow control using an array of 3 mm high VGs



Dr. Satadal Ghosh

Assistant Professor, Aerospace Engineering

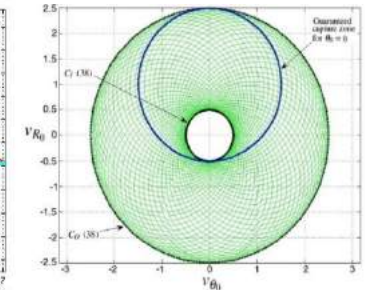
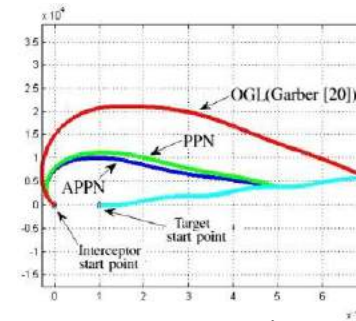
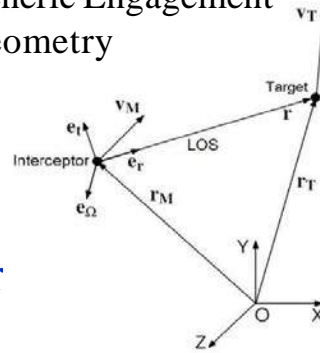
044-2257-4036; satadal@iitm.ac.in



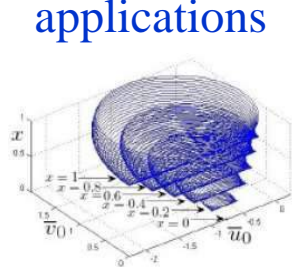
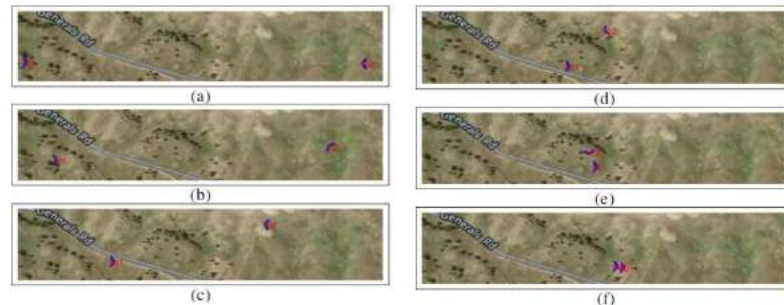
## Major Areas of Research

- Guidance and Control of autonomous aerial vehicles
- Cooperative or adversarial sear and capture / contain
- Autonomous unmanned aircraft systems (UAS) mission test-bed
- Autonomous fleet management
- Guidance for spacecraft applications

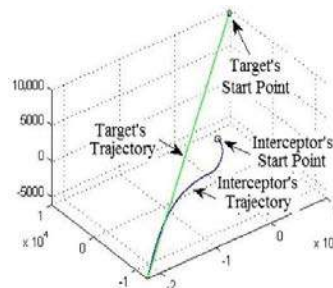
### Generic Engagement Geometry



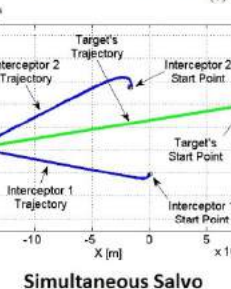
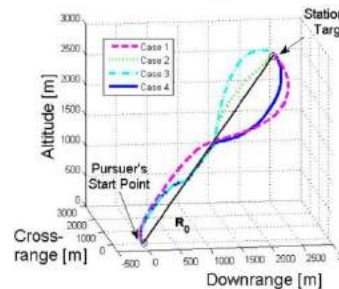
Engagement Trajectory & Capture Zone of APPN



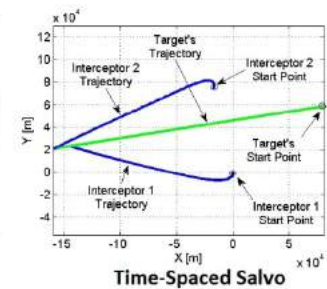
3-D Engagement Capture Zone of Retro-PN



Impact/Approach Angle Control



Simultaneous Salvo



Time-Spaced Salvo

Impact/Approach Time Control

[Back to Top](#)



# Dr. Satya R. Chakravarthy

## PhD, Georgia Institute of Technology, USA

Professor, Dept. of Aerospace Engineering

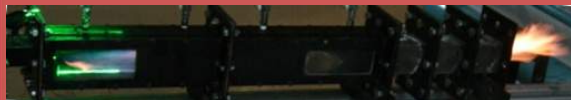
044-2257-4011; src@ae.iitm.ac.in

<http://www.ae.iitm.ac.in/people/faculty/chakravarthy.html>

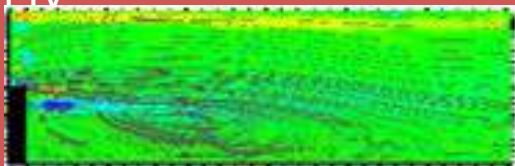


- Combustion instability in gas turbines/ramjets/rockets: experiments & computations, laminar and turbulent flames
- Laser diagnostics of flow, spray, and combustion: PIV, PDPA, LDV, PLIF, tomography
- Nano-aluminium production and combustion, solid propellant combustion, solid rocket combustion instability
- Coordinator, National Centre for Combustion Research and Development (NCCRD)

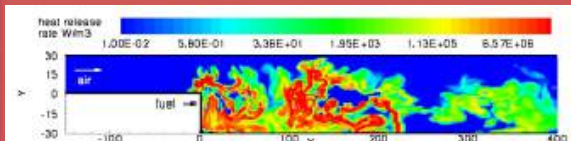
### Combustion instability



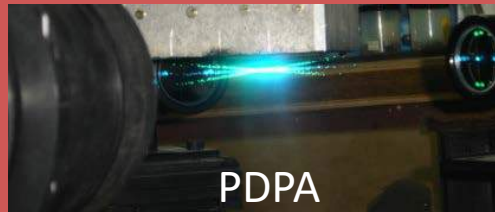
PIV



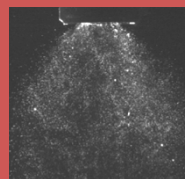
LES



### Laser diagnostics



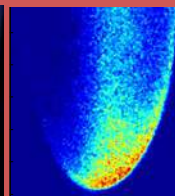
PDPA



Spray

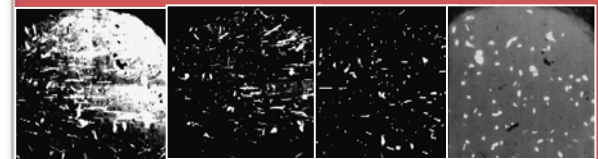


Triple flame

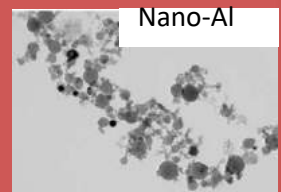


OH-PLIF

### Nano-aluminium/rockets

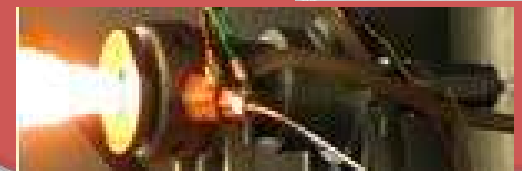


Wire explosion



Nano-Al

Rocket firing







**Dr. SHANKAR GHOSH**  
PhD, UNIVERSITY OF MINNESOTA, U.S.A

Assistant Professor

Department of Aerospace Engineering, I.I.T. Madras

044-2257-4023; gshankar@ae.iitm.ac.in

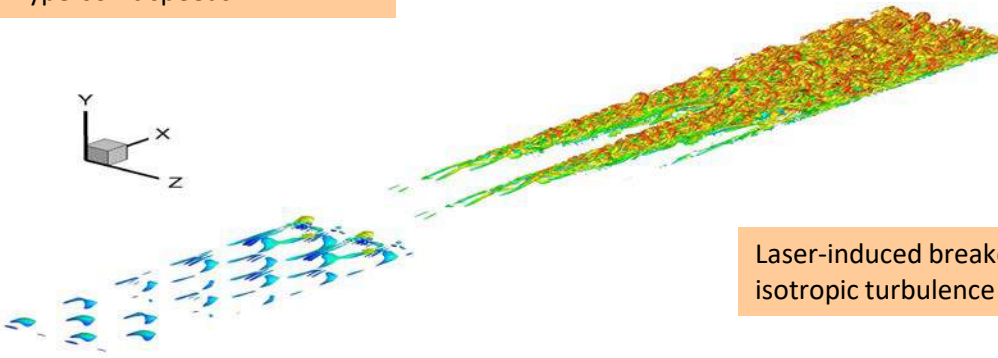
<http://www.iitm.ac.in/~gshankar/gshankar.htm>



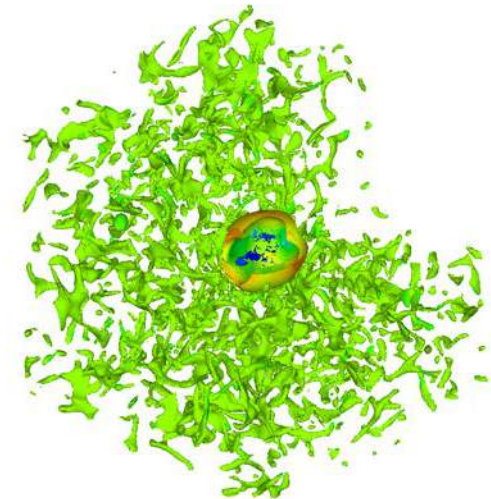
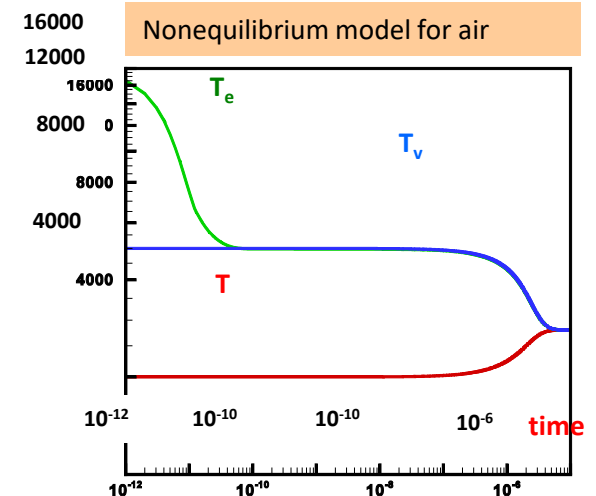
## RESEARCH INTERESTS

- *Computational fluid dynamics*
- *Numerical simulations of hypersonic turbulent flows*
- *Non-equilibrium effects*
- *Laser-induced breakdown*

Transition to turbulence at hypersonic speeds



Laser-induced breakdown in isotropic turbulence



[Back to Top](#)



# Dr. Shyam Keralavarma

## PhD, Texas A&M University, USA

Assistant Professor, Department of Aerospace Engineering

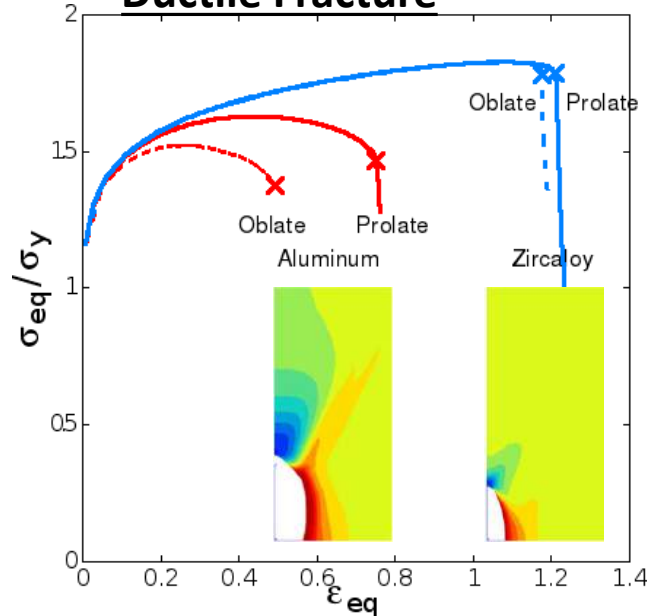
044-2257-4009; shyam@iitm.ac.in

<http://www.ae.iitm.ac.in/people/faculty/shyam.html>

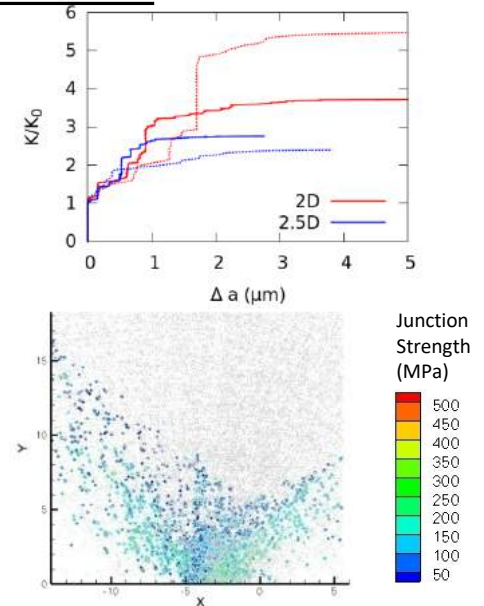
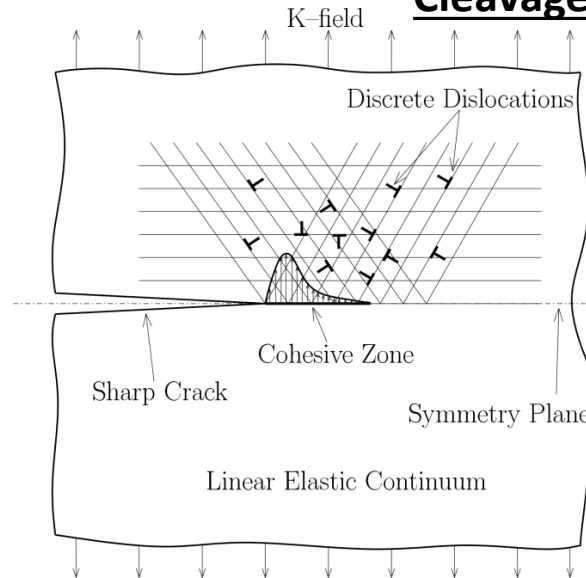


- **Plasticity:** discrete dislocation plasticity, crystal plasticity, development of continuum constitutive models using micromechanics.
- **Fracture Mechanics:** ductile fracture by void growth, low triaxiality fracture, discrete dislocation simulation of crack-tip plasticity.
- **Multi-scale Materials Modelling:** development of multi-scale models for plasticity, dynamic strain aging, creep and fracture in metals.

### Ductile Fracture



### Cleavage Fracture





# Dr. Sriram Rengarajan

Assistant professor, Aerospace Engineering

044-2257-4020; r.sriram@iitm.ac.in, r.sriram@ae.iitm.ac.in

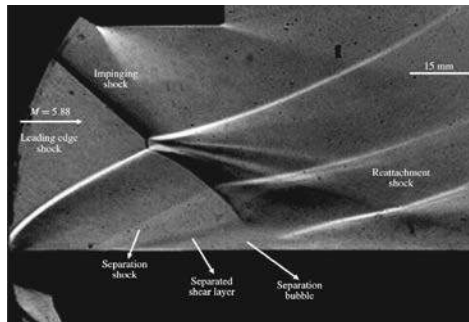
<https://www.iitm.ac.in/info/fac/r.sriram>

<https://scholar.google.co.in/citations?user=IAIQA6wAAAAJ&hl=en>

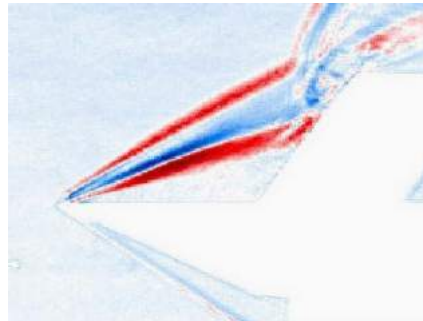


## Major Areas of Research

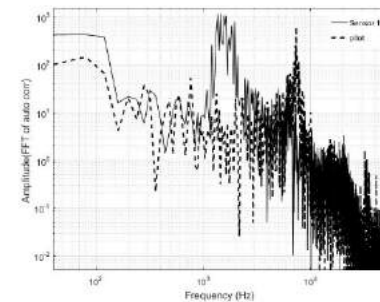
- Unsteady high-speed flows
- Shockwave boundary layer interaction
- Flow control



Shockwave boundary layer interaction



Dynamic mode decomposition analysis of shock induced unsteady leading edge separation



Time series analysis of unsteady pressure signals





Dr. R. I. Sujith

Ph. D., Georgia Institute of Technology, USA

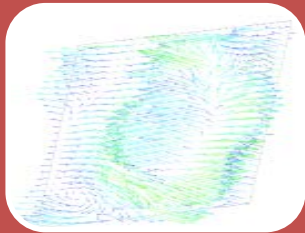
Professor, Dept. of Aerospace Engineering

044-2257-6012; [sujith@iitm.ac.in](mailto:sujith@iitm.ac.in)

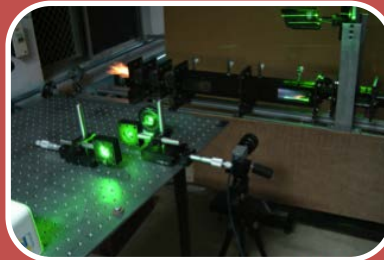
<http://www.ae.iitm.ac.in/~sujith>



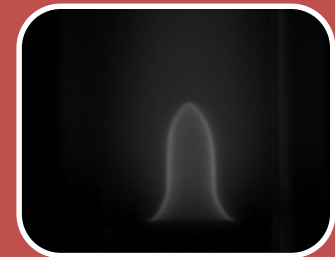
- Research Area: Combustion Instability; Focus Nonlinear dynamics; precursors
- Research Area: Optical flow diagnostics; Focus PIV, PLIF, LDV & PDPA, high speed imaging & image processing



Combustion Instability in Aero  
& land based gas turbines



Application of laser diagnostics  
to study combustion Instability



Fundamental studies on  
laboratory flames

**Understanding combustion instability, and mitigate it in industrial applications**



# Dr. Sunetra Sarkar

## PhD, Indian Institute of Science, India

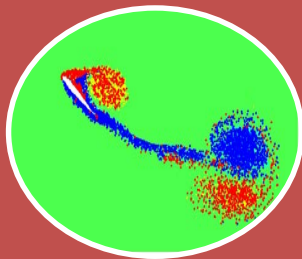
Professor, Dept. of Aerospace Engg.

044-2257-4024; [sunetra@iitm.ac.in](mailto:sunetra@iitm.ac.in)

<http://www.ae.iitm.ac.in/~sunetra/sunetra1.htm>



- Unsteady Aerodynamics of Flapping Bodies, Fluid-Structure Interactions
- Nonlinear Aeroelasticity, Uncertainty Quantification
- Computational Fluid Dynamics, Particle Based Tools



Resolving the flow-field of flapping insects and MAVs



Wind turbine rotor aeroelasticity with nonlinearities and uncertainties



Impeller acoustoelasticity and effect of dense gases on the combined fluid-structure dynamics

**← Unsteady Aerodynamics and Fluid-Structure Interactions of Engineering Systems →**



# Dr. R Velmurugan

## Ph.D, Indian Institute of Technology, Delhi

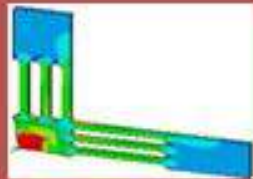
Professor, Dept. of Aerospace Engineering

044-2257-4017; [ramanv@iitm.ac.in](mailto:ramanv@iitm.ac.in)

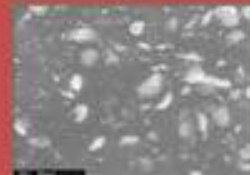
<http://www.iitm.ac.in/ramanv>



- Research Area/Focus 1 : Composite Materials
- Research Area/Focus 2 : Nano Composites
- Research Area/Focus 3 : Impact Mechanics and Structural Crashworthiness



Characterization studies of Composite Materials ( polymer, metallic and natural composites )



Characterization and analytical studies of composites materials with nano fillers for improvement of functional properties in structural applications



Studies of different composite materials for impact loading and crashworthiness applications



INDIVIDUAL FACULTY PROFILE

# DEPARTMENT OF APPLIED MECHANICS

# LIST OF FACULTY

[Abhijit Chaudhuri](#)

[Anubhab Roy](#)

[Anuradha Banerjee](#)

[Arockiarajan A](#)

[Arul Prakash K](#)

[Arun K Thittai](#)

[Baburaj A P](#)

[Ganesh Tamadapu \(Profile yet to be uploaded\)](#)

[Ilaksh Adlakha](#)

[Lakshmana Rao C](#)

[Mahesh V Panchagnula](#)

[Manivannan M](#)

[Pijush Ghosh](#)

[Prasad Patnaik B.S.V](#)

[Raghavendra Sai V.V](#)

[Ramakrishnan S](#)

[Ramasubba Reddy M \(Profile yet to be uploaded\)](#)

[Ramesh K](#)

[Rinku Mukherjee](#)

[Sarith P Sathian \(Profile yet to be uploaded\)](#)

[Satyanarayanan S](#)

[Saumendra K Bajpai](#)

[Sayan Gupta](#)

[Shaikh Faruque Ali](#)

[Sivakumar M Srinivasan](#)

[Sujatha N](#)

[Vagesh D Narasimhamurthy](#)

[Varadhan S.K.M](#)

[Vengadesan S](#)



Dr. Abhijit Chaudhuri

PhD, Indian Institute of Science, Bangalore, India

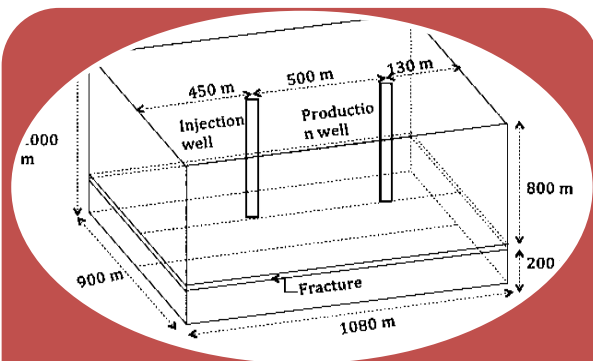
Associate Professor, Applied Mechanics

044-2257-4074; abhijit.chaudhuri@iitm.ac.in

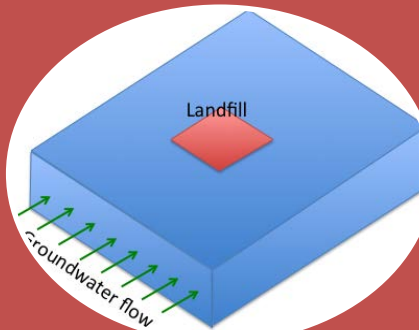
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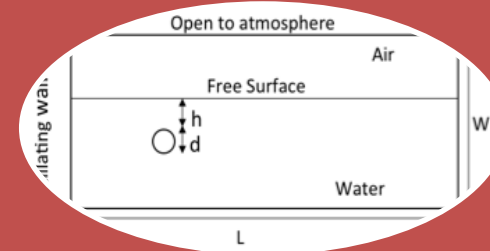
- Geothermal system: Coupled processes simulation
- Subsurface hydrology: Conditional and inverse stochastic analysis
- Fluid structure interaction, Water waves



Geothermal heat extraction, Carbon sequestration



Groundwater hydrology, contamination from landfill/nuclear waste repository.



Flow induced vibration, wave interaction to automatic underwater vehicle.

**Alternative energy resources and environmental safety assessment**



# Dr. Anubhab Roy

Assistant Professor, Applied Mechanics

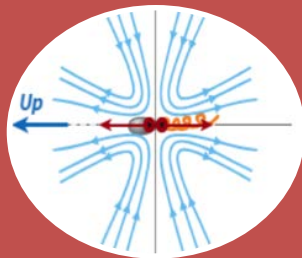
044-2257-4080; [anubhab@iitm.ac.in](mailto:anubhab@iitm.ac.in)

<https://home.iitm.ac.in/anubhab/>

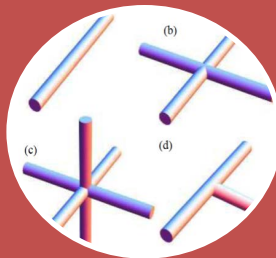


## Major Areas of Research

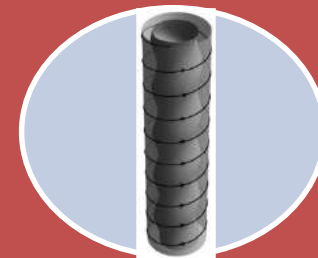
- ❑ Living fluids – Dynamics of swimming microorganisms
- ❑ Hydrodynamic Stability
- ❑ Suspension Mechanics



Active stresses due to swimming bacteria



Orientation dynamics of anisotropic particles in viscous fluids



Stability of rotating flows

← Applying modeling and simulations to solve problems in fluid mechanics →

[Back to Top](#)





# Dr. Anuradha Banerjee

## PHD, University of Glasgow, UK

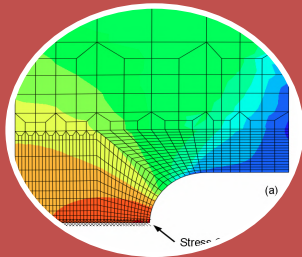
Professor, Dept. of Applied Mechanics

044-2257-4075; [anuban@iitm.ac.in](mailto:anuban@iitm.ac.in)

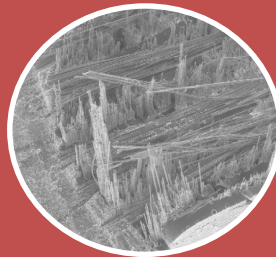
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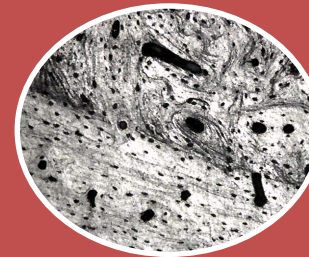
- Fracture and Fatigue of Materials
- Biomaterials/Hard Tissues
- Composites



Fracture Models



Material  
Characterization



Mechanics of  
Bone

**Theoretical, Experimental and Computational Mechanics of Materials**





# Dr. A. Arockiarajan

## PHD, University of Kaiserslautern, Germany

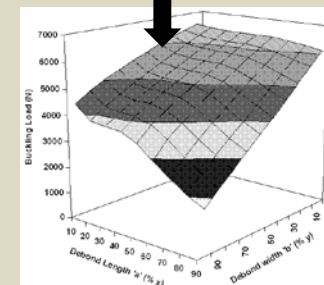
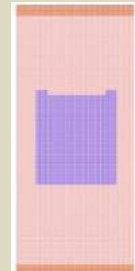
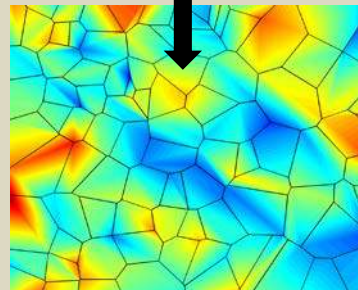
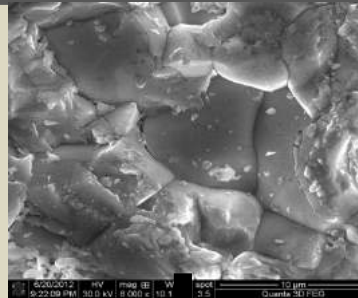
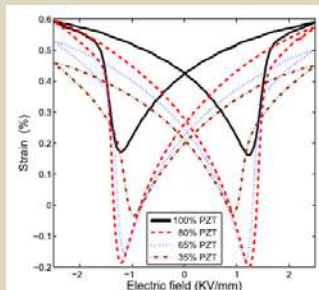
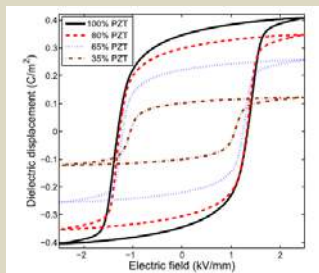
Professor, Dept. of Applied Mechanics

044-2257-4070; aarajan@iitm.ac.in

<http://apm.iitm.ac.in/smlab/rajan/index.html>



- Smart/Functional Materials
- Material Modelling
- Experimental characterization



Performance of ferroelectrics

Microstructural modelling

Debonding on composites



Dr. K. Arul Prakash

Ph.D., Indian Institute of Technology Kanpur, India

Associate Professor, Department of Applied Mechanics

044-2257-4066; [arul@iitm.ac.in](mailto:arul@iitm.ac.in)

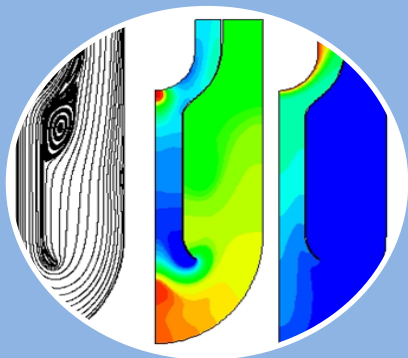
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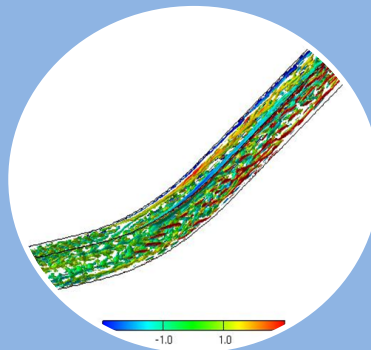
## Research areas

- Computational Fluid Dynamics and Heat Transfer – Development of Algorithms
- Turbulence Modeling, Large Eddy Simulation and related techniques
- Thermal Hydraulics
- Aerodynamics, Fluid Structure Interaction

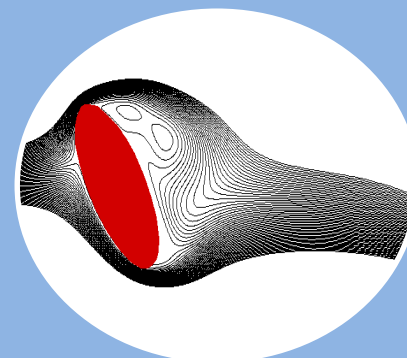
## Applications



**Thermal Hydraulics -  
Accelerator Driven nuclear  
reactor System**



**Large Eddy Simulation –  
Cooling duct of Ariane II  
rocket engine**



**Aerodynamics –  
Fluid flow characteristics  
past elliptic cylinder**

**Energy and Environment**



# Dr. Arun K. Thittai

Associate Professor, Applied Mechanics (Biomedical Engineering)

044-2257-4053; akthittai@iitm.ac.in

<https://home.iitm.ac.in/akthittai/>



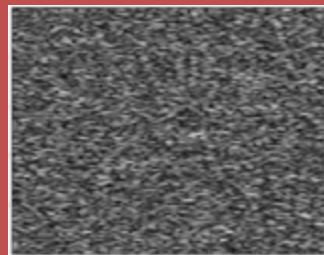
## Major Areas of Research

>>Biomedical Ultrasound Imaging (Clinical and Pre-clinical)

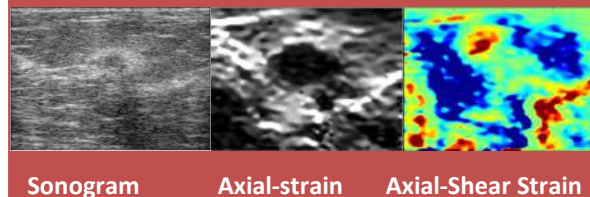
>> Ultrasound Elastography

>>Ultrasound guided Treatment monitoring

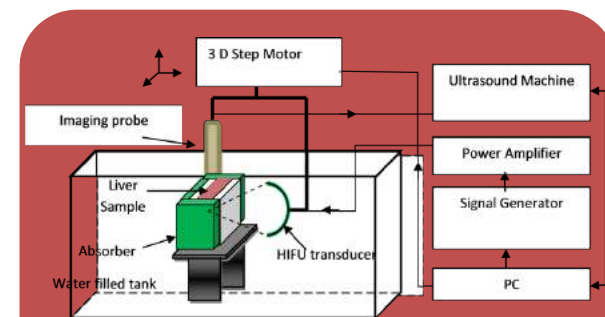
>> Ultrasound Guided Biopsy



Ultrasound Image Formation  
Techniques for Biomedical  
Applications



Ultrasound Elastography  
Measurement and Imaging of the  
Tissue Elastic Properties



High Intensity Focused Ultrasound  
(HIFU) Treatment and Real-time  
monitoring of it by Ultrasound  
Imaging Techniques

Exploiting Ultrasound Signals for Wide Ranging Bio-Medical Applications

[Back to Top](#)



Dr. A. P. Baburaj  
PhD, IISc Bangalore, India

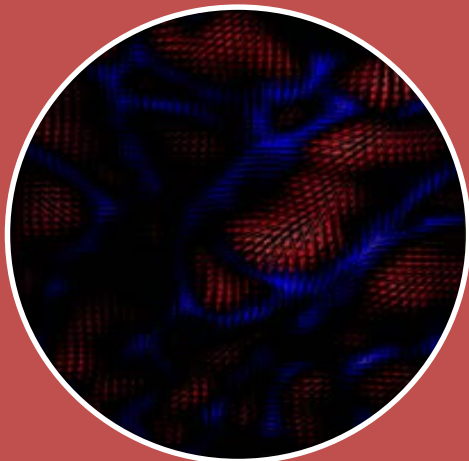
Associate Professor, Dept. of Applied Mechanics

044-2257-4065; [apbraj@iitm.ac.in](mailto:apbraj@iitm.ac.in)

<http://apm.iitm.ac.in/fmlab/raj/index.html>

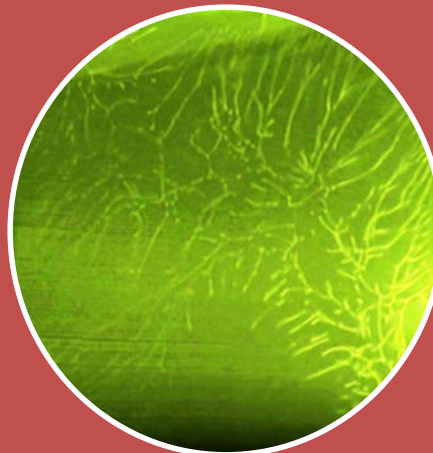


Turbulent convection



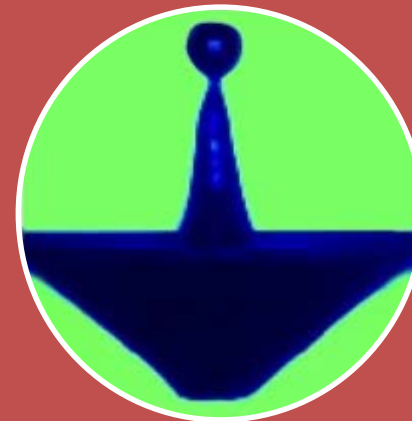
Top view of the velocity field just above a horizontal hot surface

Transport across membranes



Pattern of density driven mass transfer above a horizontal membrane

Interfacial phenomena



Last two stages of bubble collapse at an interface

**The research encompasses study of organised motion in turbulence, pattern formation, interaction of boundary layers with ambient flows, dynamics of bubbles, drops and aerosols.**

[Back to Top](#)





**Dr. Ilaksh Adlakha**

**Assistant Professor, Applied Mechanics**

044-2257-4082; [ilaksh.adlakha@iitm.ac.in](mailto:ilaksh.adlakha@iitm.ac.in)

<https://home.iitm.ac.in/ilaksh.adlakha/>



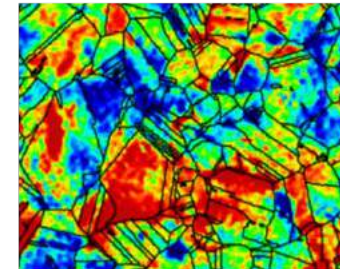
## Integrated Research Vision

*Stress Assisted Corrosion*  
*Hydrogen Embrittlement*  
*Application of Data Science in Mechanics*  
*Lightweight Alloys*  
*Role of Grain Boundaries during Fatigue*



*Crystal Plasticity*

*Phase Field Modeling*

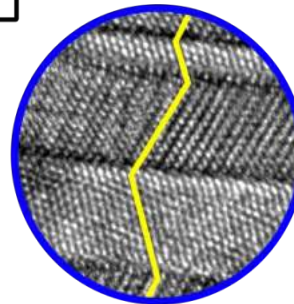


**Mechanical Testing**

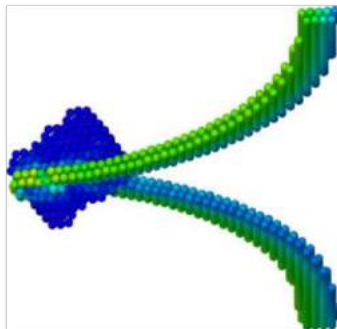
*Fatigue*  
*Nanoindentation*  
*Hopkinson Bar*

**Electrochemical**

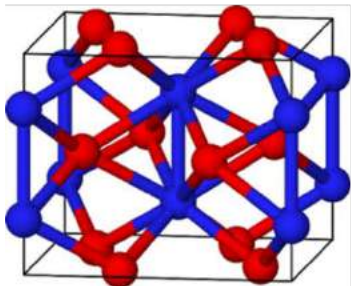
*Potentiodynamic Measurements*  
*EIS*



*Atomistic Simulations*



*QM/MM*  
*DFT*



**Characterization**

*DIC* *SEM*  
*EBSD* *TEM*

**MultiScale Mechanics Lab**

[Back to Top](#)



# Dr. C. Lakshmana Rao

Doctor of Science, Massachusetts Institute of Technology, USA

Professor, Dept. of Applied Mechanics

044-2257-4059; [lakshman@iitm.ac.in](mailto:lakshman@iitm.ac.in)

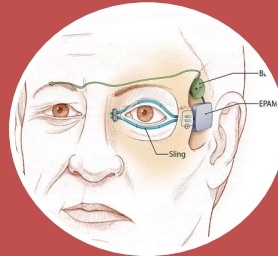
<http://apm.iitm.ac.in/smlab/clr/index.html>



- Ballistic Impact and Blast Mitigation on Structures
- Characterization of Piezopolymers
- Buckling Control of Structures using Smart Materials



MILITARY VEHICLES



SENSORS AND  
ACTUATORS



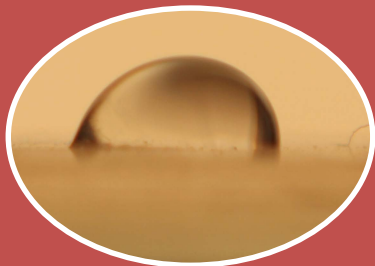
SPACE STRUCTURES



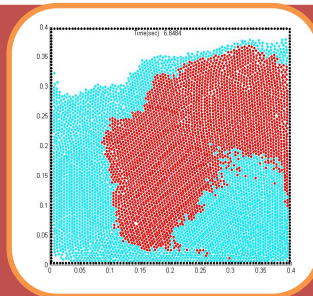
**Dr. Mahesh V. Panchagnula**  
PhD, Purdue University, USA  
Professor, Dept. of Applied Mechanics  
+91-44-2257 4056; [mvp@iitm.ac.in](mailto:mvp@iitm.ac.in)  
<http://apm.iitm.ac.in/fmlab/mvp/index.html>



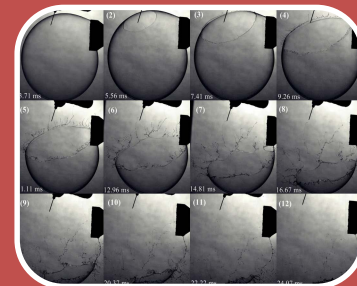
- Liquid Atomization and Spray Combustion
- Multiphase Fluid Mechanics
- Wetting and contact angle hysteresis



Wetting and hysteresis  
(Microscale)



Wet granular flows  
(Mesoscale)



Sprays  
(Macroscale)

**Multiscale multiphase flows - spanning a range of length and time scales**



**Dr. Manivannan M**

**PhD, IISc India**

**Professor, Dept. of Applied Mechanics**

+91-44-2257 4064; mani@iitm.ac.in

<http://apm.iitm.ac.in/biomedical/mani>



- Haptics/Touch Feedback, Medical Simulation, Advanced Robotics
- Biomechanics: Soft Tissue Multiscale Modeling and Simulation
- Quantitative Physiology: Arterial Pulse Modeling and Simulation

**Laparoscopic  
Simulator  
Hardware For  
Haptic Feedback  
Designed In house**



**Mannequin  
Based  
Simulation For  
Training on  
Diagnosing and  
Treating Heart  
Attack**



[Back to Top](#)





# Dr. Pijush Ghosh

## PHD, North Dakota State University, USA

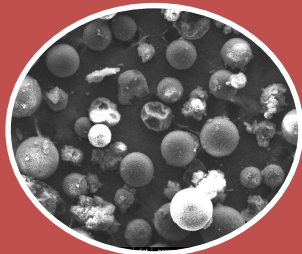
Associate Professor, Dept. of Applied Mechanics

044-2257-4060; [pijush@iitm.ac.in](mailto:pijush@iitm.ac.in)

[http://apm.iitm.ac.in/smlab/pijush/Pijush\\_index.html](http://apm.iitm.ac.in/smlab/pijush/Pijush_index.html)



- Self-Healing Materials/Focus 1
- Polymer Thin Films/Focus 2
- Molecular Dynamic Simulation/Focus 3



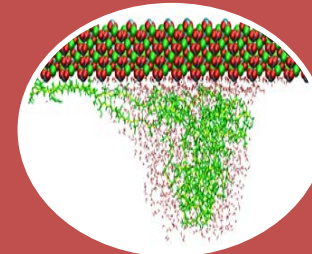
> Self-Healing of Cracks in polymeric matrix

> Surface Modification applying Microencapsules



> Polymer Functional (thermal, anti-hydration) Coatings

> Polymer Ceramic (cement) Interface



> Organic-Inorganic Interaction at the interface

> Mechanics of Polymeric and Protein Molecules

Automobile, Aviation, Polymer Composites, Construction Materials Industries >> Mechanics of thin films, nanocomposites, interface mechanism, polymeric nanofilms, microencapsulations, MD simulations



# Dr. Prasad Patnaik BSV

## Ph.D., IIT Madras, Chennai, INDIA

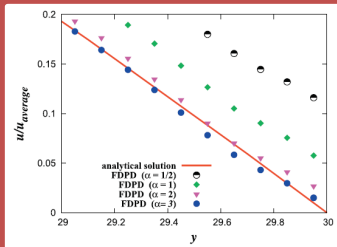
Professor, Dept. of Applied Mechanics

044-2257-4068; [bsvp@iitm.ac.in](mailto:bsvp@iitm.ac.in)

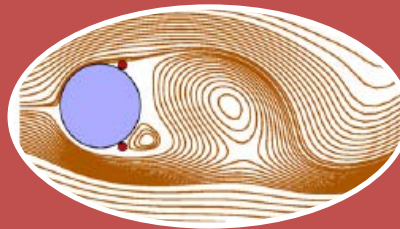
<http://apm.iitm.ac.in/fmlab/bsvp/index.html>



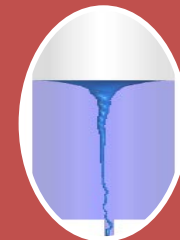
- Development of schemes for Fluid dynamics (both continuum and mesoscopic simulations)
- Control of vortices : through drain tanks, past bodies, through heat exch. etc.
- Flow Structure Interaction (FSI) : vortex induced vibrations, blast mitigation etc.



Development of numerical methods for both continuum and Particle based simulations. A typical DPD simulation is depicted.



Analysis of bluff and streamlined configurations. Development of control strategies for the suppression of vortex induced oscillations.



Application specific design and analysis problems : development of shock capture methods for blast mitigation devices (DRDO), vortex suppression in drain tanks (ISRO), gas entrainment studies (IGCAR) etc.

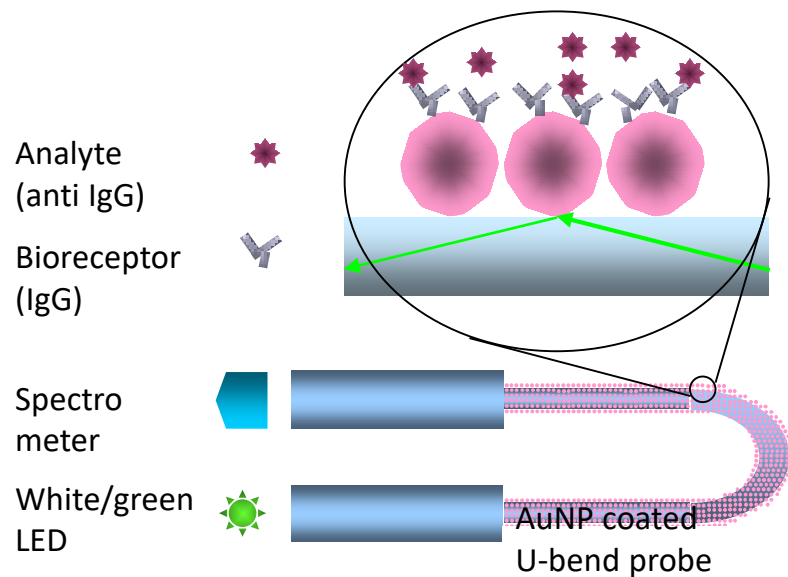
**Fluid Dynamics simulations ranging from mesoscopic to continuum scales**



**Dr. V V Raghavendra Sai**  
**PhD from IIT Bombay, INDIA**  
 Associate Professor, Dept. of Applied Mechanics  
 044-2257-4076; [vvrsai@iitm.ac.in](mailto:vvrsai@iitm.ac.in)  
<http://apm.iitm.ac.in/biomedical/sai/index.html>

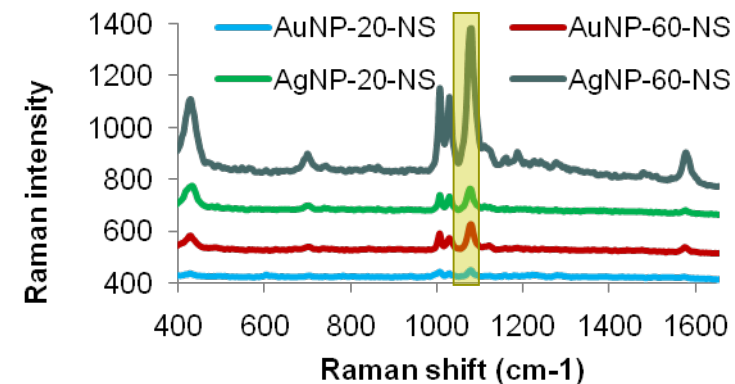


- Localized surface plasmon resonance (LSPR) and surface enhanced Raman scattering (SERS) based **Optical Biosensors**
- Clinical diagnosis & Environmental monitoring
- Detection of Explosives and Toxins



LSPR based Fiber optic biosensors for model analyte (IgG)

V V R Sai, et al 2009. *Biosens. & Bioelectron*, 24, 2804–09;



SERS mapping of AgNP 60nm coated SiO<sub>2</sub> Nanosprings



**Dr. S. Ramakrishnan**

**Ph.D, Indian Institute of Technology Madras, India**

**Professor, Dept. of Applied Mechanics**

**MSB207B; 044-2257-4073; sramki@iitm.ac.in**

**<http://apm.iitm.ac.in/biomedical/ramki/index.html>**



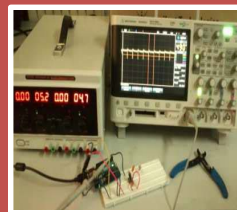
- **Brain Image Analysis** - Characterization of Brain micro structure and Tractography in conditions such as Alzheimer's disorders.
- **Infrared Thermal Image Analysis** - Analysis of physiological variables using medical infrared thermograph in Human Breast and Hand.
- **Biomedical Instrumentation** - Enhancing the diagnostic relevance of medical equipment.
- **Signal analysis** - EMG signal generation, modeling, diagnosis of myopathy and neuropathy
- **Calibration of Medical Devices** - Design and development of test schemes for calibrating and standardizing medical devices



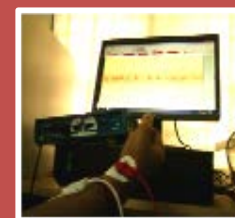
**Brain Image  
Analysis**



**Thermal Image  
Analysis**



**Instrumentation  
& Calibration**



**EMG Signal Analysis**





Dr. K. Ramesh

PHD, IIT Madras, India

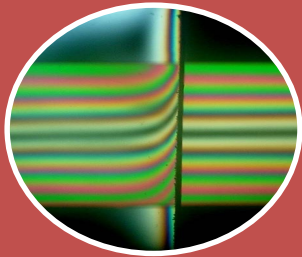
Professor, Dept. of Applied Mechanics

044-2257-4058; [kramesh@iitm.ac.in](mailto:kramesh@iitm.ac.in)

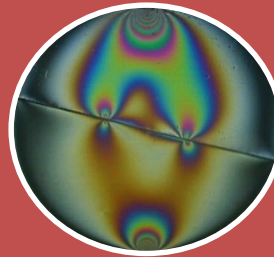
<http://apm.iitm.ac.in/smlab/kramesh/index.html>



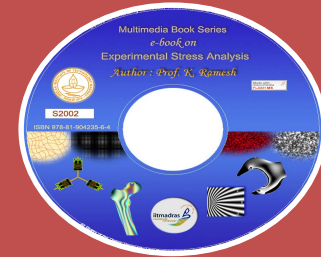
- Experimental Mechanics/Digital Photoelasticity
- Fracture Mechanics/Stress field evaluation
- Educational Technology/Innovative use of Multimedia



Glass Stress  
Analysis



Failure Analysis



Development of e-  
Books/e-Teacher

**Experimental Solid Mechanics**



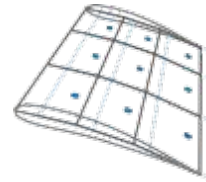
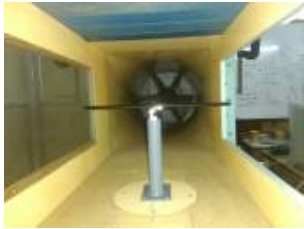
# Dr. Rinku Mukherjee

PhD, North Carolina State University, USA, 2004

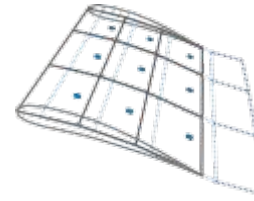
Email: rinku@iitm.ac.in Website: <https://home.iitm.ac.in/rinku>

Scopus ID: 55535113700 Researcher ID: M-2111-2013

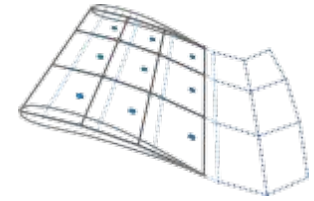
Aerodynamics (High-Alfa, Unsteady, Applied), Boundary Layers



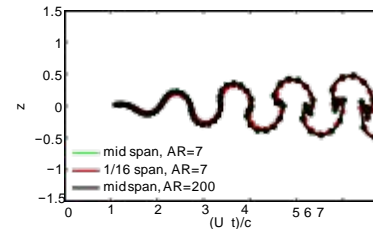
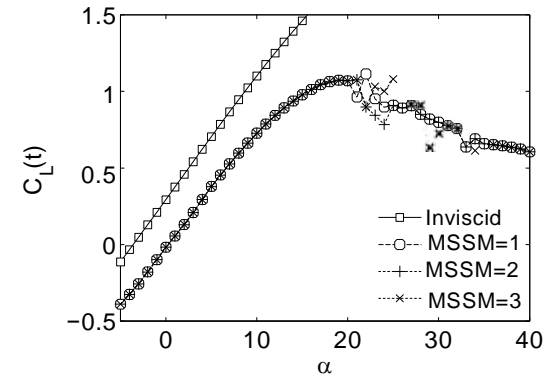
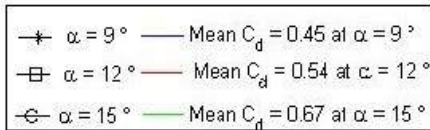
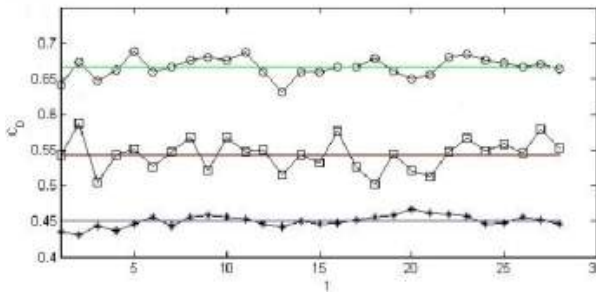
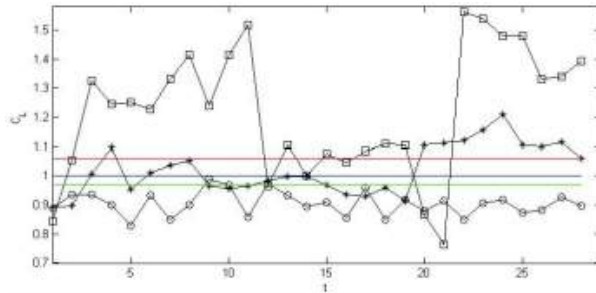
(i) time-step=1



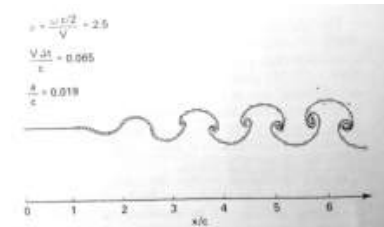
(ii) time-step=2



(iii) time-step=3



(i) present work



(ii) literature

**Unsteady Aerodynamics**

**Experimental High-Alfa Aerodynamics**

[Back to Top](#)



# Dr. Satyanarayanan S

Asst. Professor, Applied Mechanics

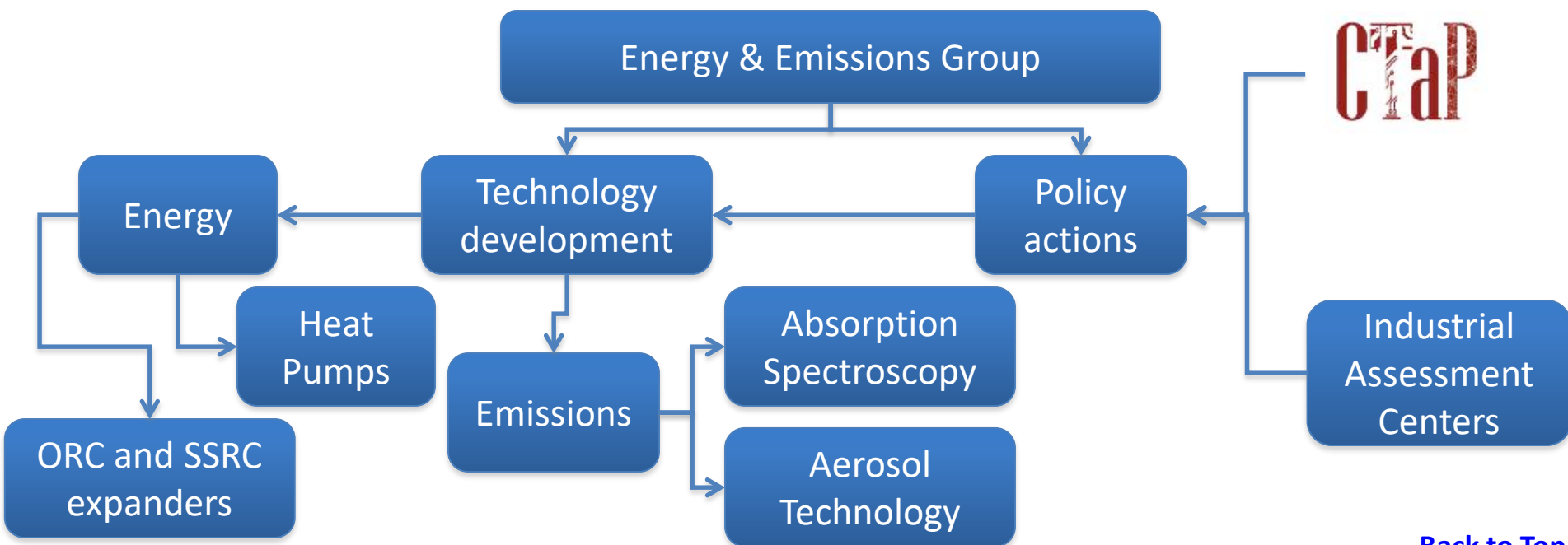
044-2257-4078; satya@iitm.ac.in

<http://home.iitm.ac.in/satya>



## Major Areas of Research

- Aerosol Science and Technology Applications
- Emissions measurement and control
- Efficient utilization of energy through recovery, reuse and renewable options

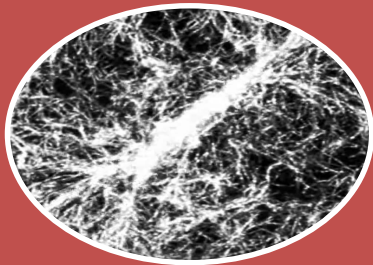




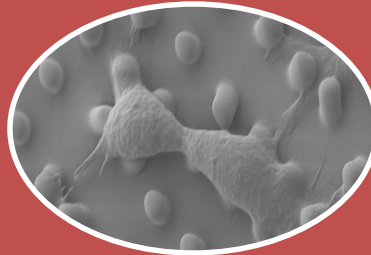
**Dr. Saumendra K. Bajpai**  
PhD, Johns Hopkins University  
Asst. Professor, Dept. of Applied Mechanics  
+91-44-2257 4072; [sbajpai@iitm.ac.in](mailto:sbajpai@iitm.ac.in)  
<http://home.iitm.ac.in/sbajpai/lab-overview.html/>



- Cell mechanics and tissue-remodeling
- Multiple-scale characterization of soft-matter
- Bio-mimetic systems, design, and applications



3D cell-invasion



Cellular traction



Tissue mechanics

Assay development, diagnostics, and device design



# Dr. Sayan Gupta

## Ph.D, Indian Institute of Science, Bangalore

Professor, Dept. of Applied Mechanics

044-2257-4055; [sayan@iitm.ac.in](mailto:sayan@iitm.ac.in)

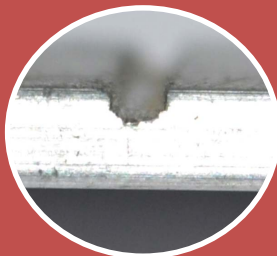
<http://apm.iitm.ac.in/smlab/sayan/Site/WELCOME.html>



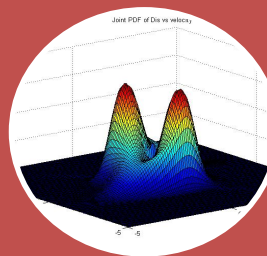
- Vibrations, Nonlinear dynamics and Chaos, Stochastic Dynamics
- Stochastic Load Modeling, Structural Reliability, Stochastic Finite Elements
- Damage detection & Life Assessment, Structural Health Monitoring



Stochastic load modeling in Fluid Structure Interaction problems, eg., wind turbines, offshore platforms



Detection of fatigue cracks from vibration measurements in aging infrastructure



Analysis of turbine blades for aero-elastic failures & random fatigue damage in stochastic flow



Energy harvesting from wind in bladeless windmills

Applications in stochastic dynamical systems





# Dr. Shaikh Faruque Ali

## PhD, IISc, India

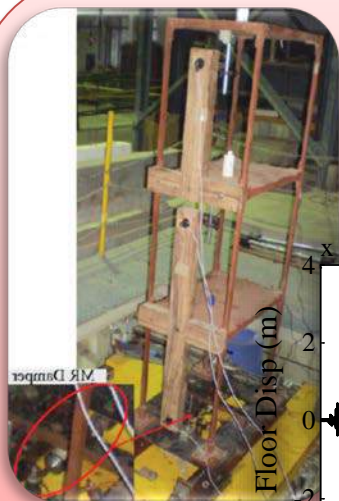
Associate Professor, Dept. of Applied Mechanics

044-2257-4054; sfali@iitm.ac.in

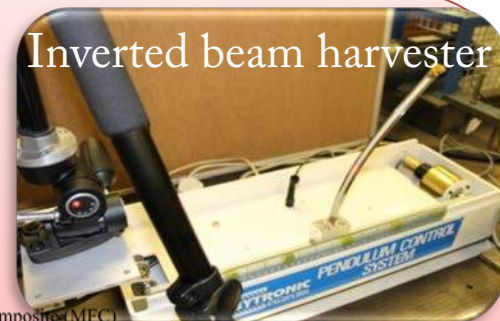
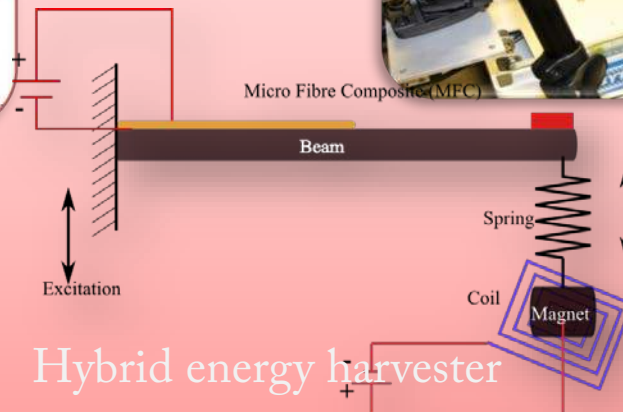
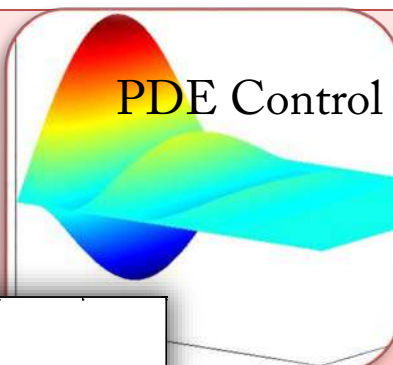
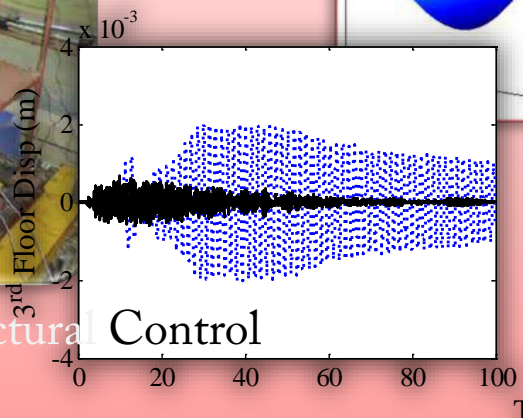
<http://apm.iitm.ac.in/smlab/sfali/index.html>



- Structural vibration and control
- Dynamics and control of nonlinear systems
- Nonlinear and hybrid energy harvesting



Structural Control





# Dr. Sivakumar M. Srinivasan

## Ph.D, Louisiana State University, USA

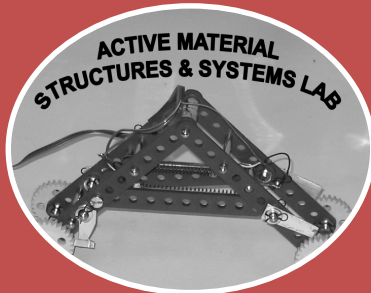
Professor, Dept. of Applied Mechanics

044-2257-4061; [mssiva@iitm.ac.in](mailto:mssiva@iitm.ac.in)

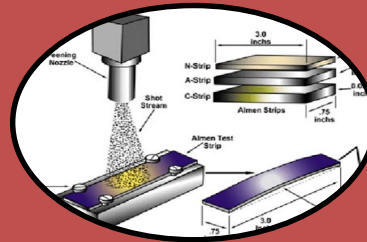
<http://apm.iitm.ac.in/smlab/mss/index.html>



- Structural Mechanics / Analysis and design of thermo-mechanical structures
- Inelasticity of materials / modeling mechanics of plasticity, creep and fatigue
- Smart materials & composites / Shape mem alloys, piezos and magnetic



Smart Structures & Composites



Modeling mechanical processing effects



Low cycle fatigue of materials & structures

**Inelastic Analysis and design of materials and engineering structures**



# Dr. N. Sujatha

## PHD (NTU Singapore)

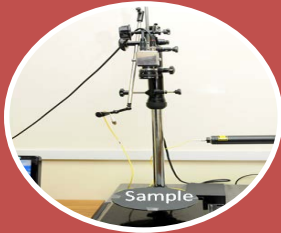
Professor, Dept. of Applied Mechanics

044-2257-4067; [nsujatha@iitm.ac.in](mailto:nsujatha@iitm.ac.in)

<http://apm.iitm.ac.in/biomedical/sujatha/index.html>



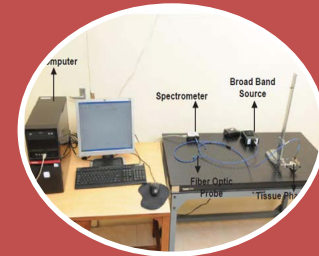
- Non destructive imaging of tissue using laser speckle techniques
- Optical signal / image processing
- Biomedical optical spectroscopy instrumentation for in vivo diagnostics



Laser speckle contrast  
imaging for assessment of  
blood flow



Processing of laser Doppler  
signals for analysis of  
hemodynamics



Diffuse reflectance  
spectrum analysis for tissue  
hemoglobin assessment

**NON-INVASIVE TISSUE DIAGNOSTICS USING DIFFERENT OPTICAL TECHNOLOGIES**

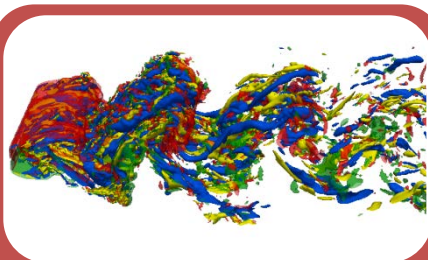


**Dr. Vagesh D. Narasimhamurthy**  
PhD, NTNU, Norway  
Associate Professor, Dept. of Applied Mechanics  
+91-44-2257-4079; vagesh@iitm.ac.in  
<https://home.iitm.ac.in/vagesh/>

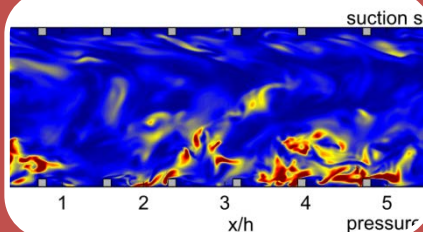


## Major Areas of Research

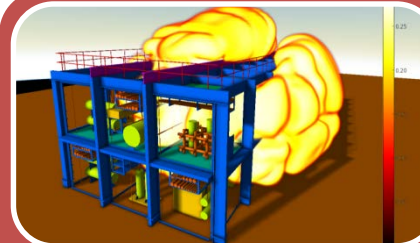
- CFD, DNS, transition & turbulence, bluff-body flows, wall-bounded flows
- Turbulent premixed combustion, gas-explosion safety
- Gas dispersion, two-phase flows (particulate dispersion)



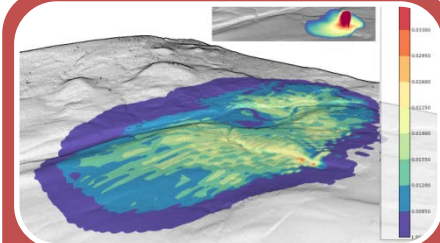
Direct numerical simulation of transitional and turbulent bluff-body flows



Direct numerical simulation of wall-bounded turbulent flows: mixing, Coriolis force and roughness effects



Turbulent premixed combustion modeling: Industrial gas-explosion safety analysis



Two-phase gas- and particulate-dispersion modeling of flammable, toxic or asphyxiating fluids

Computational fluid dynamics (CFD) studies ranging from laboratory to industrial scale



**Dr. Varadhan S.K.M**  
PhD(The Pennsylvania State University, USA )  
**Asst. Professor, Dept. of Applied Mechanics**  
+91 44 2257 4071; skm@iitm.ac.in  
<http://apm.iitm.ac.in/biomedical/skm/index.html>



## Research Areas

## Description

### Neuromechanics

The neural basis of Biomechanics, understanding the central nervous system control strategies responsible for movement generation

### Motor Learning

Understanding the mechanisms that underlie learning motor tasks, from simple, daily movements to special movements in art and sport

### Rehabilitation

Development of Assist devices to be used in Rehabilitation of patients with neuro-motor disorders, such as stroke





# Dr. S. Vengadesan

## PhD, Kobe University, Japan

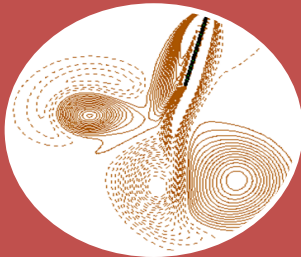
Professor, Dept. of Applied Mechanics

044-2257-4063; [vengades@iitm.ac.in](mailto:vengades@iitm.ac.in)

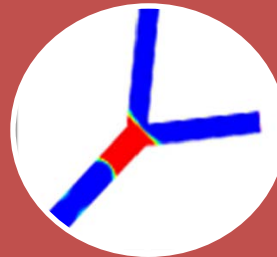
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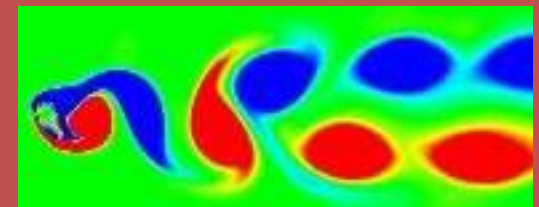
- Insect Aerodynamics/ Aerodynamics of low flying insect under different operating condition
- Bubble transport in a micro channel/Investigation of a PFC bubble transport through a micro channel with bifurcation at different roll angle
- Bluffbody aerodynamics/characterisation of flow regime for elliptic cylinders



Pair of dipole formation at the end of upstroke



PFC bubble lodging at the bifurcation of a microchannel oriented at 45° roll angle



Identification of different flow regimes for flow past elliptic bodies



INDIVIDUAL FACULTY PROFILE

# DEPARTMENT OF BIOTECHNOLOGY

# LIST OF FACULTY

[Amal Kanti Bera](#)

[Anju Chadha](#)

[Athi Narayanan Naganathan](#)

[Baskar R](#)

[Chandra T.S](#)

[Chandraraj Krishnan](#)

[Gopala Krishna Aradhyam](#)

[Guhan Jayaraman](#)

[Hamsa Priya Mohana Sundaram](#)

[Himanshu Sinha \(Profile yet to be uploaded\)](#)

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[Karunagaran D](#)

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[Nitish R Mahapatra](#)

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[Sanjib Senapati](#)

[Sathyanarayana N Gummadi](#)

[Smita Srivastava](#)

[Srinivasa Chakravarthy V](#)

[Subramaniam K \(Profile yet to be uploaded\)](#)

[Suraishkumar G.K](#)

[Vani Janakiraman](#)

[Vignesh Muthuvijayan](#)



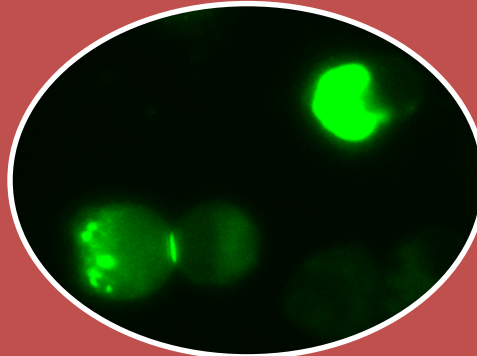
**Dr. Amal Kanti Bera**  
Ph.D., University of Delhi, India  
Professor, Dept. of Biotechnology  
044-2257-4121; [amal@iitm.ac.in](mailto:amal@iitm.ac.in)  
<http://www.biotech.iitm.ac.in/faculty/amal>



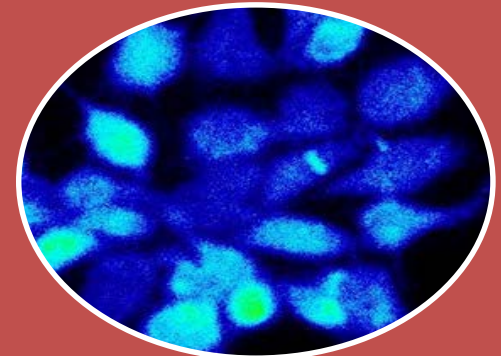
- Structure-function relationship of Ion Channels
- Regulation of Ion Channels
- Ion channels associated with Stroke and Heart attack



Patch clamp



Gap junction



Calcium signaling

**Electrophysiology of Ion Channels**



# Dr. Anju Chadha

## PhD, IISc, Bangalore, India

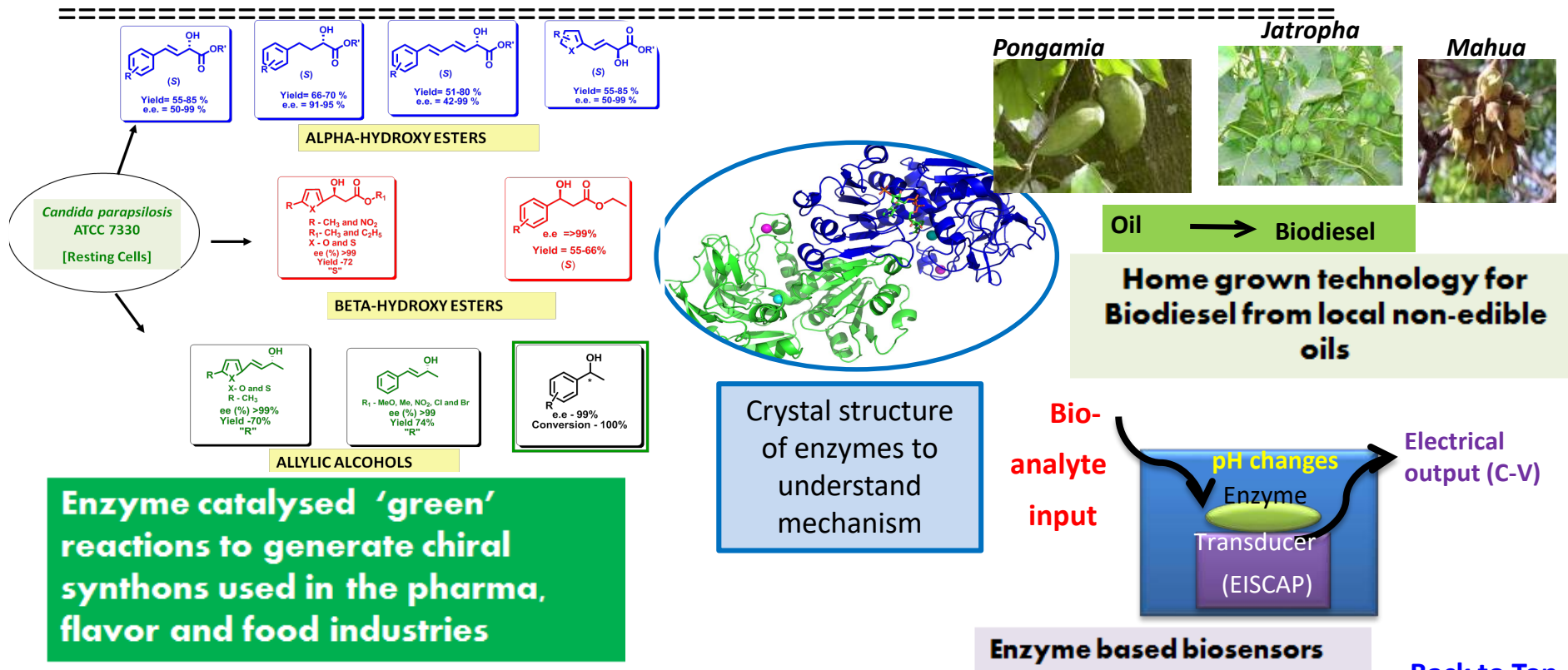
Professor, Dept. of Biotechnology

044-2257-4106; anjuc@iitm.ac.in

<http://biotech.iitm.ac.in/faculty/anjulabsite/anjuchadha.html>



- Enzymes in Organic Synthesis/Green Chemistry
- Biocatalysis/Enzyme Mechanisms
- Biocatalytic Reactions for Biosensors and alternate fuels e.g. Biodiesel







# Dr. Athi Narayanan Naganathan

## PhD, University of Maryland, USA

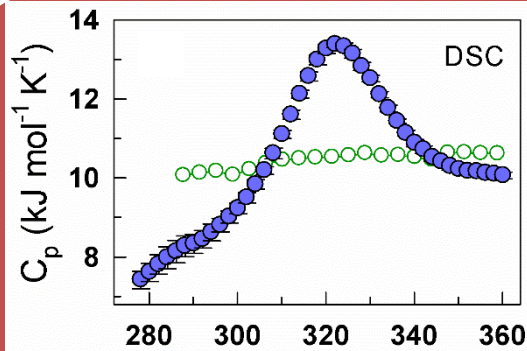
Assistant Professor, Dept. of Biotechnology

044-2257-4140; athi@iitm.ac.in

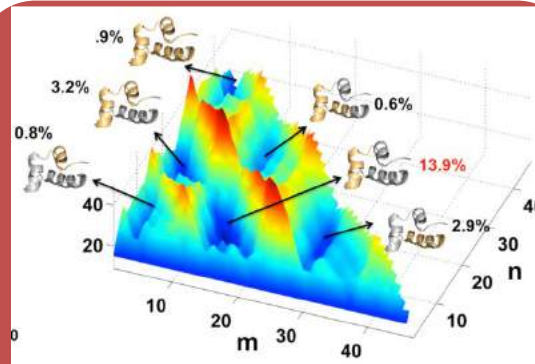
<http://www.biotech.iitm.ac.in/Faculty/ProteinBiophysicsLab/>



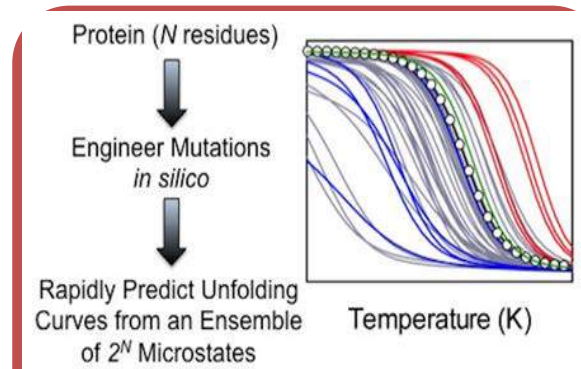
- Experimental Spectroscopic Characterization of Protein Conformational Behavior and its Relation to Function (Folding-Function Landscape)
- Modeling/Predicting Folding and Fitness Landscapes Using Statistical Methods
- Probing Folding/Dynamics through Coarse-Grained and Molecular Simulations



Equilibrium/Kinetics



Functional Landscapes



Protein Design

Experimental/Computational Characterization of Protein Folding Landscapes



# Dr. R. Baskar,

Associate Professor , Dept. of Biotechnology,  
IIT Madras, Chennai-600036

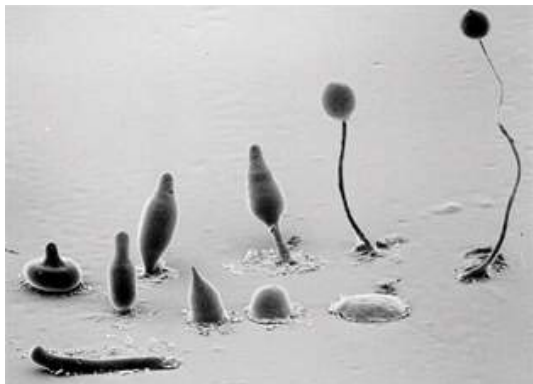
044-2257-4110 ; rbaskar@iitm.ac.in  
<http://www.biotech.iitm.ac.in/RBaskar>



- **Research Area:** Pattern formation in cellular slime molds
- **Research Area:** Estimating spontaneous mutation rates and meiotic recombination frequency during different biological events in flowering plants

## ***Dictyostelium* as a model to investigate:**

1. Mechanisms of caffeine action
2. Volatile mediated chemotaxis.
3. Ageing



## ***Arabidopsis* as a model to investigate:**

1. Somatic mutation rates upon parental ageing, hybridization.
2. Meiotic recombination rates





**Dr. Chandra Sainathan(T.S.Chandra)**  
**PHD, Indian Institute of Science, India**  
**Emeritus Professor, Dept. of Biotechnology**

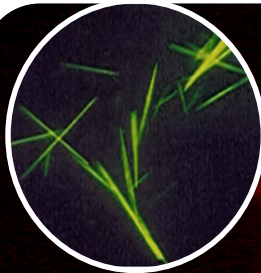
044-2257-4103; [chandra@iitm.ac.in](mailto:chandra@iitm.ac.in)



- Industrial Biotechnology- salt tolerant enzymes, riboflavin B-vitamins animal feed , antioxidants, nutraceuticals from millet grains, genetic and metabolic engineering in fungi
- Environmental Bioprocesses- biogas, composting, bioconversion of red sea algae carrageenan to alcohol
- Nanobiotechnology- biosynthesis magnetite nanoparticles , electrospun nanomembranes for food packaging, nanoparticle-coated bioelectrodes biofuel cells.



Applied Microbiology Biogas collection from Jatropha oil seed cakes



Genetically engineered Fluorescent fungal filament and riboflavin crystals



Bread spoilage prevented by electrospun nanomembrane

**Applied Microbiology and Nanobiotechnology**



**Dr. CHANDRARAJ KRISHNAN**

**Ph.D., IIT MADRAS, INDIA**

Professor, Dept. of Biotechnology

044-2257-4111; [kcraj@iitm.ac.in](mailto:kcraj@iitm.ac.in)

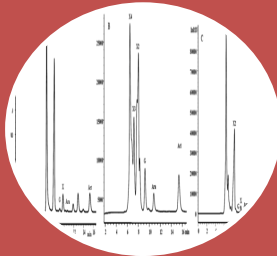
<http://www.biotech.iitm.ac.in/faculty/kcr.php>



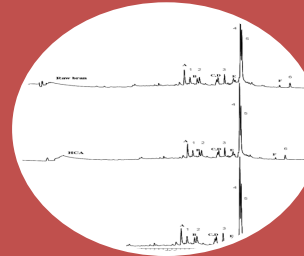
- Biomass conversion/ Cellulosic bioethanol
- Functional Foods/ Oligosaccharides and phenolic acids
- Recombinant Enzymes/Amylases, Cellulases, Xylanases, Proteases



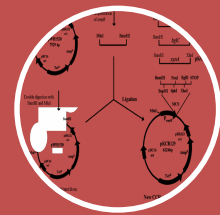
Cellulosic ethanol used as automobile fuels by blending with petrol



Functional oligosaccharides used as prebiotics in food products



Phenolic acids used as antioxidants in food formulations



Amylases, cellulases, xylanases, proteases applied in textile, bioethanol and leather industries

**Conversion of Low Cost Agricultural Residues into Fuels and Chemicals**





# Dr. Gopala Krishna Aradhyam

## Ph.D, NCL (CSIR). University of Pune, India

Professor, Dept. of Biotechnology

044-2257-4112; agk@iitm.ac.in

<http://www.biotech.iitm.ac.in/faculty/agk/home.html>



### The Signal Transduction Lab

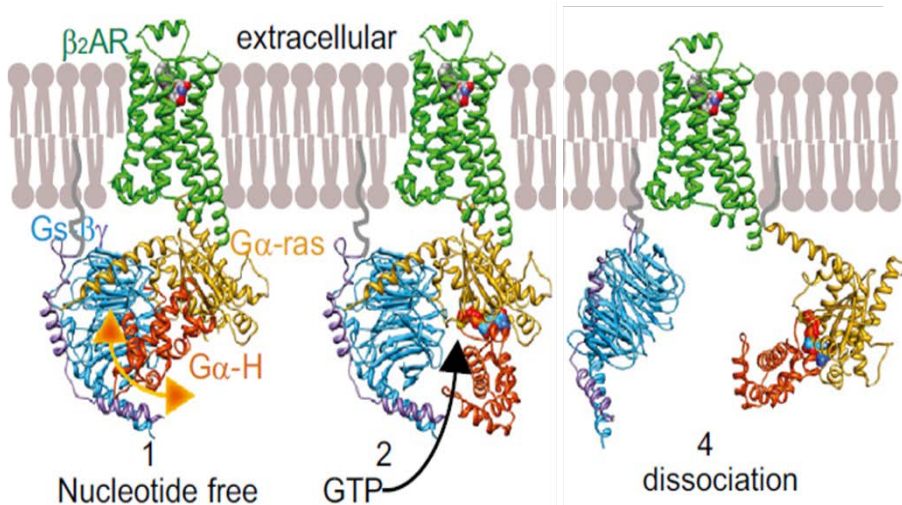
#### G Protein Coupled Receptors (GPCRs)

#### Ca<sup>2+</sup>-binding proteins

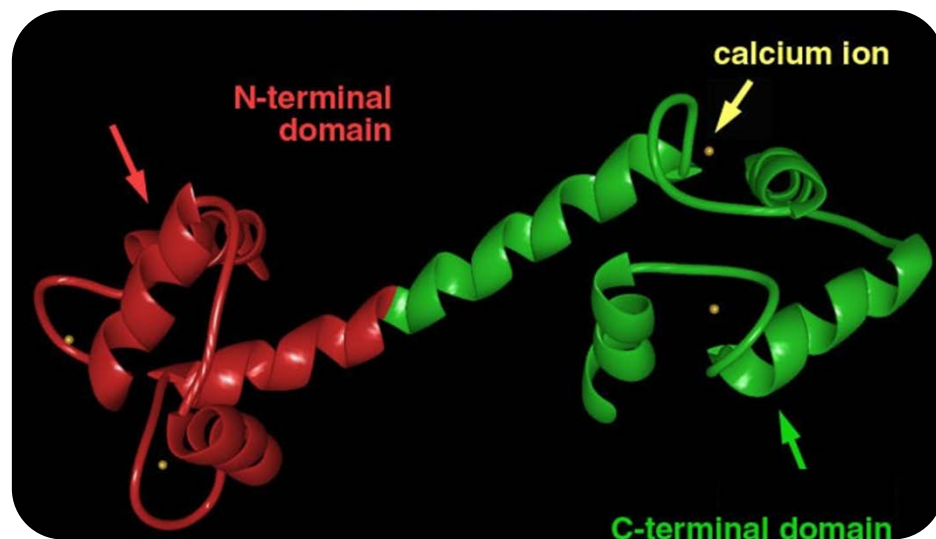
- The general focus of research in our lab is protein structure-function and biochemistry.
- Elucidating novel functions of proteins.

### BROAD DESCRIPTION OF THE BANDWIDTH/AREA OF RESEARCH

#### Signal Transduction by Membrane proteins



#### Signal Transduction by Ca<sup>2+</sup>-binding proteins



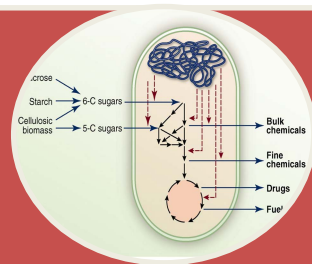




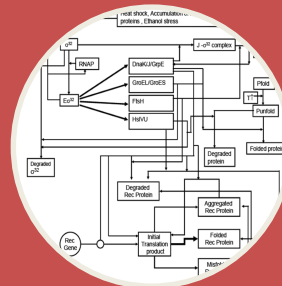
**Dr. Guhan Jayaraman**  
**PhD, Rensselaer Polytechnic Institute, USA**  
**Professor, Dept. of Biotechnology**  
 044-2257-4108; guhanj@iitm.ac.in



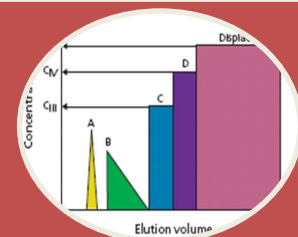
- Metabolic Engineering for Biopolymers and Biofuels production
- Bacterial Systems Biology – Analysis of Metabolic and Gene Regulatory Networks
- On-line Monitoring of Bioprocesses using Spectroscopic Techniques
- Process Chromatography for Protein Purification



Metabolic Engg of Lactic Acid  
Bacteria  
High Molecular Weight  
Hyaluronan



Analysis of Bacterial Stress  
Response Networks



Displacement Chromatography  
Simulated Moving Bed  
Chromatography



# Dr. Hamsa Priya Mohana Sundaram

Assistant Professor, Dept. of Biotechnology

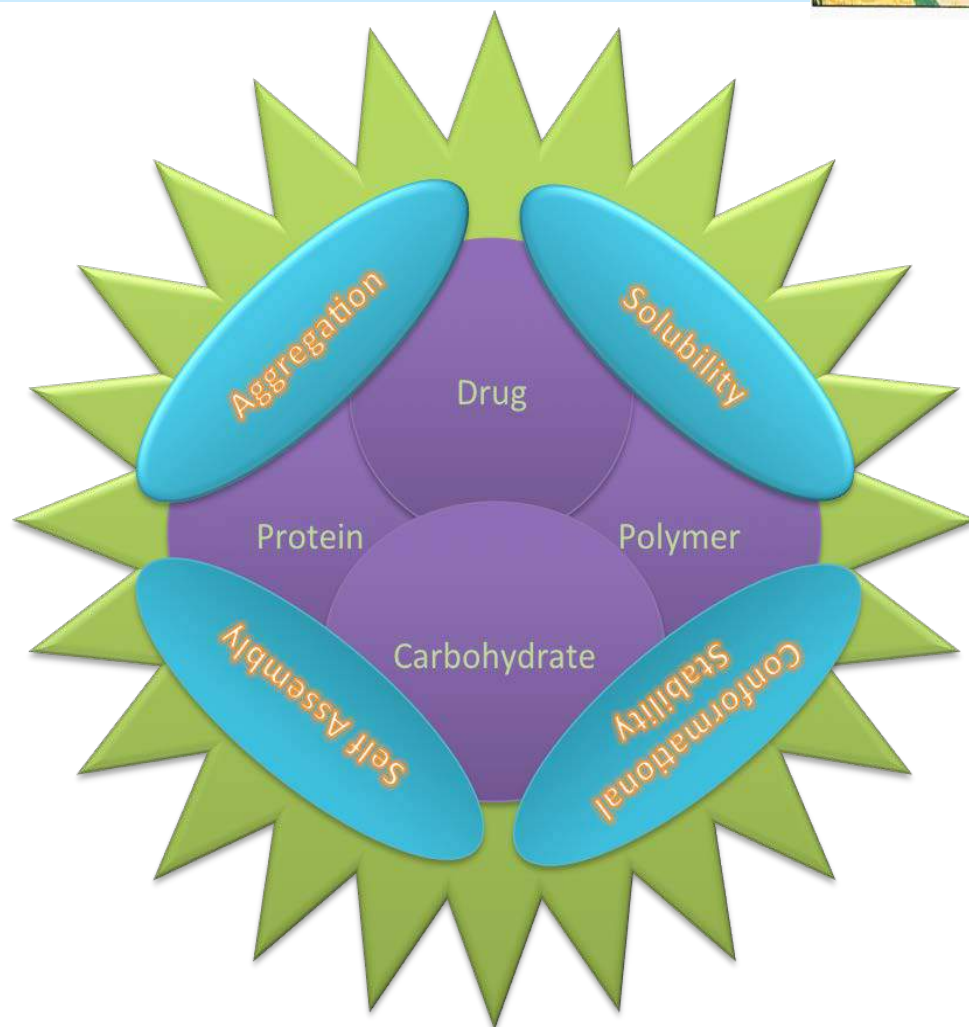
PhD, The Ohio State University, USA

044-2257-4132; hamsa@iitm.ac.in



## Major Areas of Research

- ComputaNonal biophysics
- Protein aggregaNon
- Protein solubility and stability
- ComputaNonal characterizaNon of materials for therapeuNcs
- Self assembly of nano drug delivery carriers
- Drug-polymer conjugates
- Bio-molecular simulaNons
- MulN-scale modeling





# Dr. Karthik Raman

PhD, Indian Institute of Science, Bangalore

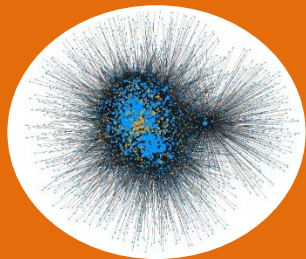
Associate Professor, Department of Biotechnology

Bhupat & Jyoti Mehta School of Biosciences

+91-44-2257-4139; [kraman@iitm.ac.in](mailto:kraman@iitm.ac.in); <https://home.iitm.ac.in/kraman/lab>



- Computational Systems Biology/Modelling of Complex Biological Systems
- *In silico* Modelling for Metabolic Engineering
- High-performance Computing for Biology
- Synthetic Biology/Design of Biological Networks



Biological  
Network Analysis



*in silico* Metabolic  
Engineering



Synthetic  
Biology

← Systems-level modelling of complex biological networks →

CV



[Back to Top](#)

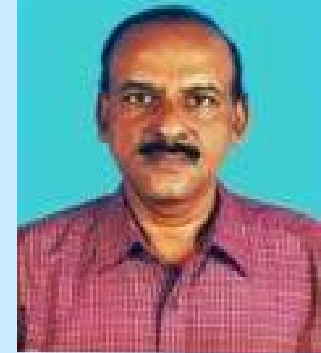


# Dr. Karunakaran D

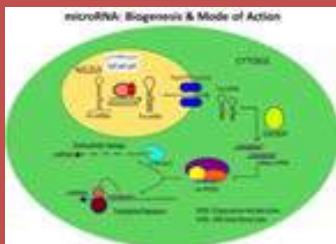
PHD, Sri Krishnadevaraya University, India  
Professor, Dept. of Biotechnology, IIT Madras

044-2257-4126 ; karuna@iitm.ac.in

[http://www.biotech.iitm.ac.in/faculty/dk\\_new/index.php](http://www.biotech.iitm.ac.in/faculty/dk_new/index.php)



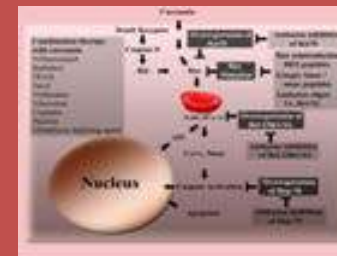
- Role of miRNAs
- Aberrations in signaling
- Mechanisms of potential anticancer agents



Target prediction and experimental validation  
Functional characterization – Effects of miRNAs on signaling pathways



Aberrations in NF- $\kappa$ B, TGF- $\beta$ , Wnt and apoptosis signaling in cancer cells/tumors



Molecular mechanisms of Apoptosis induced by phytochemicals (curcumin, emodin, plumbagin, allicin etc), marine alkaloid analogs and organic compounds

**CANCER BIOLOGY**



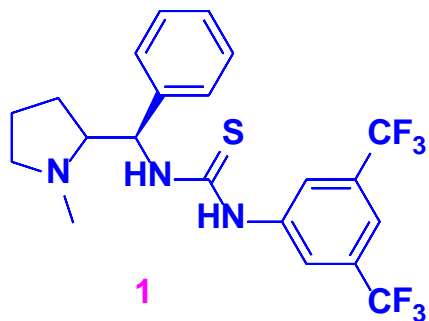
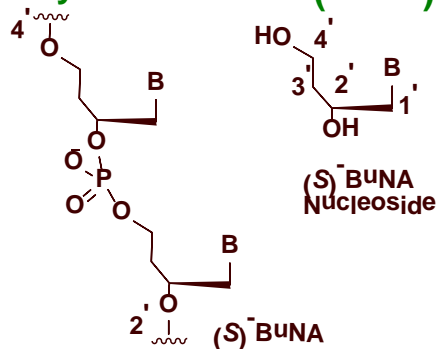
# V. Kesavan, Ph.D

Associate Professor,  
Department of Biotechnology  
044 22574124; vkesavan@iitm.ac.in  
<http://www.biotech.iitm.ac.in/Kesavan>

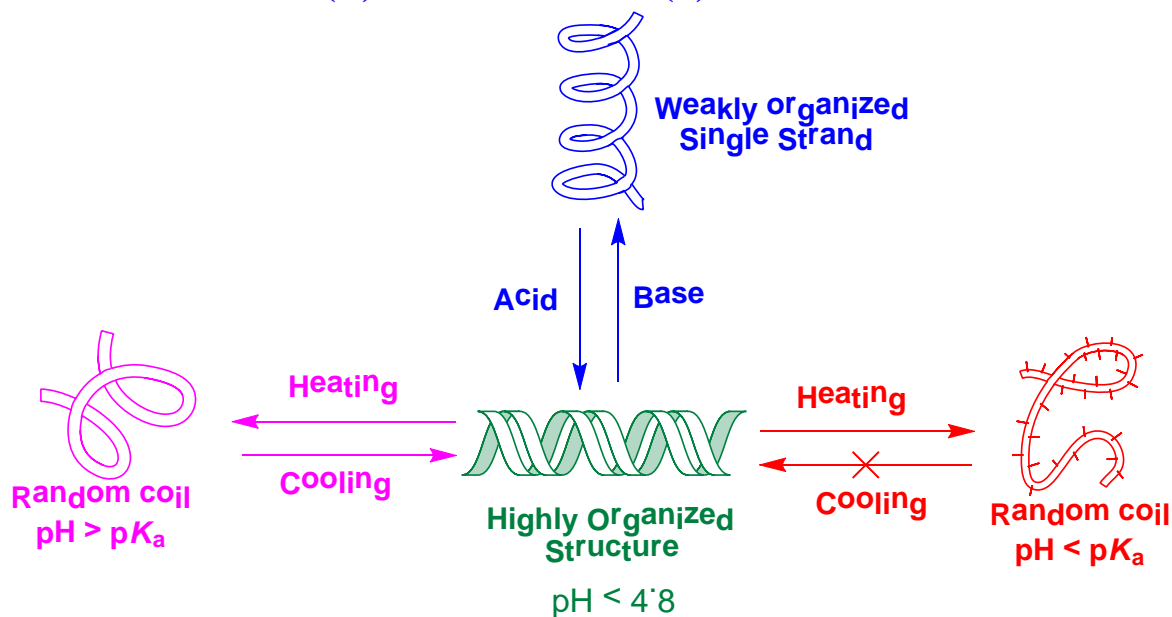


- Development of acyclic nucleic acid and molecular devices
- Development of organo catalysts from proline
- Exploration of covalent inhibition of cysteine kinases using NCEs

## Butyl Nucleic Acid (BuNA)



## (S) BuNA of poly (a) at pH 7.0



Vipin Kumar *et al.* *Org. Biomol. Chem.* **2013**, 000, and *RSC Adv.* **2013**

Vinayagam *et al.* *Org. RSC Adv.* *Under revision*

[Back to Top](#)





**Dr. Madhulika Dixit**  
**PhD, IIT Bombay, India**  
**Associate Professor , Dept. of Biotechnology**

044-2257-4131; [mdixit@iitm.ac.in](mailto:mdixit@iitm.ac.in)  
<http://www.biotech.iitm.ac.in/faculty/mdixit/>



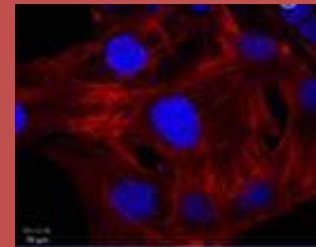
- Endothelial Progenitors and Glucose Metabolism
- Endothelial Dysfunction and Shear Stress
- Atherosclerosis



**Therapeutic Neo-vascularization**



**Functional Food**



**Vascular Grafts**

**← Cardio-Vascular Dysfunction in Diabetes and Metabolic Syndrome →**



# Dr. S. Mahalingam

Professor, Department of Biotechnology

044-2257-4130; mahalingam@iitm.ac.in

<http://www.biotech.iitm.ac.in/Mahalingam>



## Tumor Biology

- Cross-talk between tumor suppressor genes and oncogenes.
- Nucleolar GTPases and ribosome biogenesis.
- Functional characterization of Ras effectors .

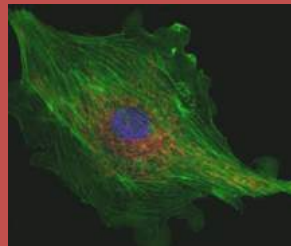
## Molecular pathogenesis of HIV

- Host-virus interaction, Neutralizing antibodies

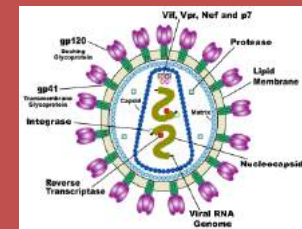
### Tumor Bio-Bank



### Tumor Biology



### Molecular pathogenesis of HIV



Laboratory of Molecular Cell Biology

[Back to Top](#)



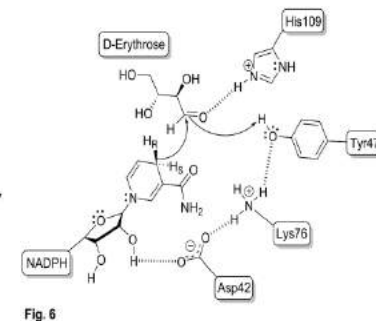
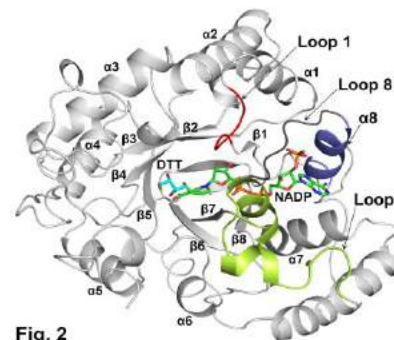
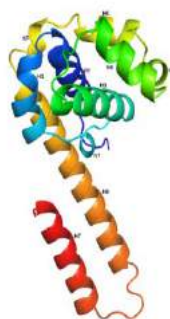
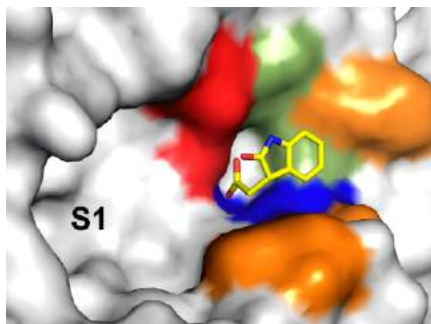
N.Manoj

PhD, Indian Institute of Science  
Associate Professor, Dept. of Biotechnology  
[nmanoj@iitm.ac.in](mailto:nmanoj@iitm.ac.in)



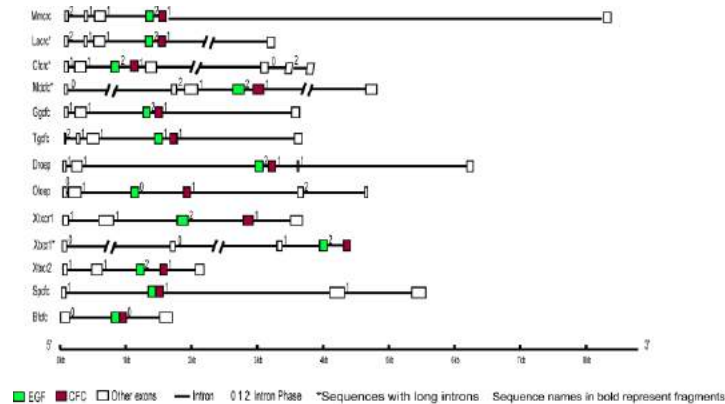
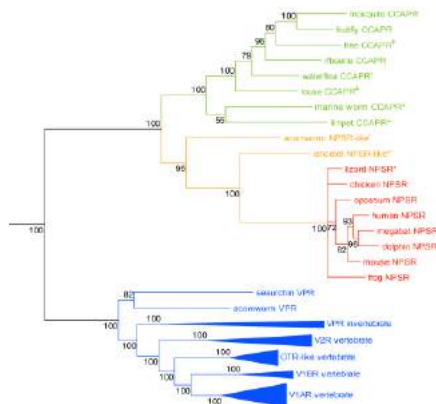
- **Protein Structure and Function**

# Structural biochemistry of enzymes for biotechnology applications



- **Molecular Evolution**

## Comparative genomics of membrane bound proteins



**[Back to Top](#)**

# Protein

Folding,  
Stability,  
Aggregation  
Interactions

**Dr. M. Michael Gromiha**

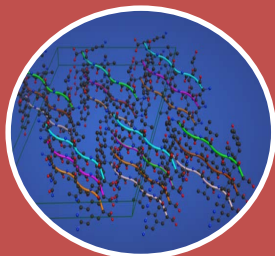
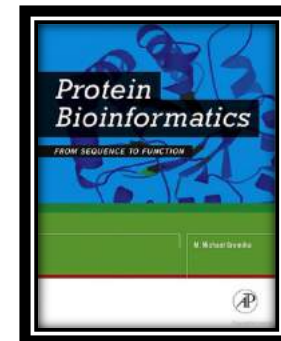
Professor, Dept. of Biotechnology

044-2257-4138; gromiha@iitm.ac.in

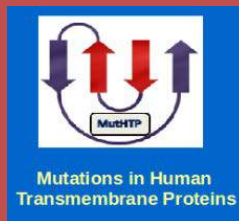
<https://www.iitm.ac.in/bioinfo/Gromiha/>



- Protein structure and function: binding affinity and aggregation rate
- Disease causing mutations in transmembrane proteins
- Deep learning and next generation sequence analysis: cancer, Alzheimer and Parkinson diseases



1. Mutational effects on binding affinity of protein complexes.
2. Prediction of aggregation prone regions and aggregation rates



1. Disease causing mutations in membrane proteins
2. Sequence and structural parameters for membrane proteins
3. Developing databases and tools



1. Identify cancer mutations using deep learning
2. NGS analysis: Neurodegenerative disorders
3. Structure based drug design

**Structure-Function Relationship in Proteins and their Complexes: Applications to Drug Design**



Dr. Nitish R. Mahapatra

Ph.D., Indian Institute of Chemical Biology, Kolkata

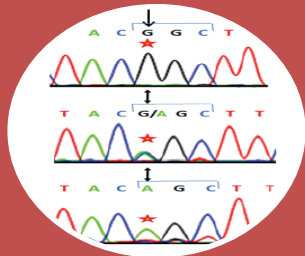
Professor, Dept. of Biotechnology

044-2257-4128; nmahapatra@iitm.ac.in

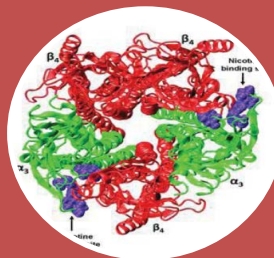
<https://biotech.iitm.ac.in/faculty/nitish-r-mahapatra/>



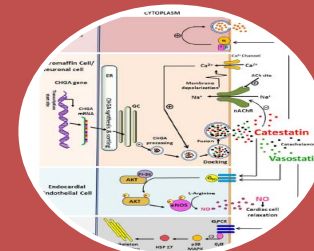
- Functional Genomics and Biomarker Discovery
- Transcriptional and Post-transcriptional Gene Regulation
- Molecular Medicine



Discovery of genetic variations



Structure of nicotinic receptor



Molecular signal transduction

**MOLECULAR BASES OF CARDIOVASCULAR AND METABOLIC DISORDERS**

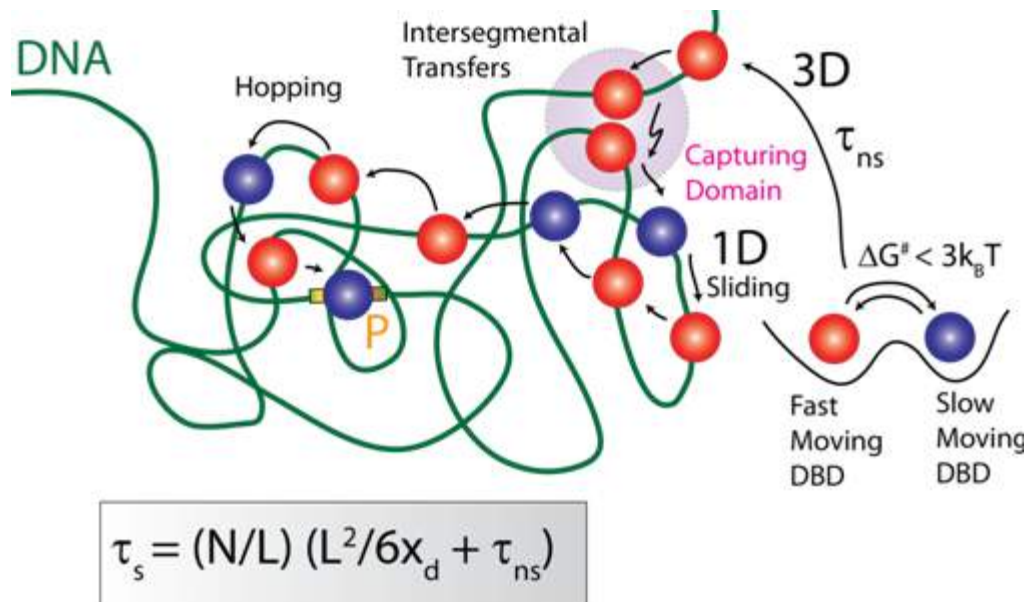




Dr. Rajamanickam Murugan  
PHD, T.I.F.R Mumbai, India  
Assistant Professor, Dept. of Biotechnology  
044-2257-4116; rmurugan@iitm.ac.in  
<http://www.biotech.iitm.ac.in/Murugan>



- Theoretical Biology and Biophysics
- Computational/Systems Biology
- Rate Processes in Biology



Understanding the dynamics of transcription factors helps to further our unravel the design principles connected with the existence of life.



# Dr. Rama Shanker Verma

Ph.D.: Jawaharlal Nehru University New Delhi

Professor, Dept. of Biotechnology

044-2257-4109; [vermars@iitm.ac.in](mailto:vermars@iitm.ac.in)

<http://www.biotech.iitm.ac.in/faculty/verma/index.html>



## 1- Development of Stem Cell based Cardiac Tissue and Liver organ

*Developing patch and liver organ using biodegradable material and 3 D Bio printing using stem cells*

## 2- Construction of Novel Immunotoxins

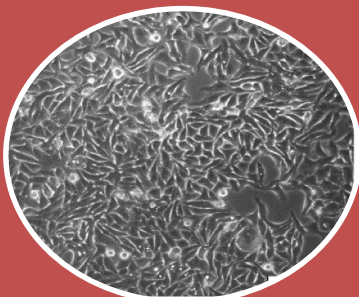
*Targeted anticancer therapy with recombinant immunotoxins*

## 3- Fanconi Anemia

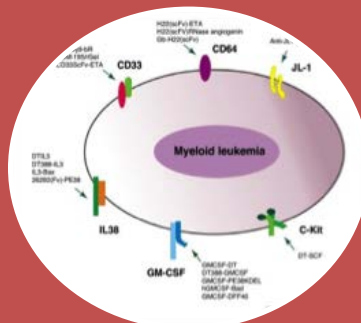
*Gene expression profiling of Fanconi anemia and Identifying marker genes*

## 4- Development of Nanotherapeutics

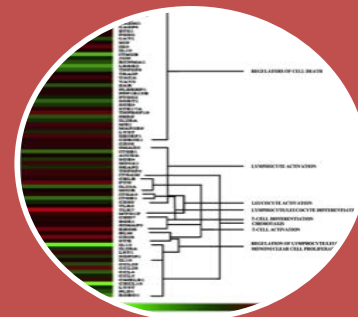
*Drug delivery in cancer stem cell*



Trans differentiation of stem cells and tissue regeneration



Immunotoxins for Cancer Therapy



Biomarker studies of Fanconi Anemia

**BROAD DESCRIPTION OF THE AREA OF RESEARCH**



**Dr. Rayala Suresh Kumar**  
**Ph.D, Cancer Institute, Chennai, INDIA**

Professor, Dept. of Biotechnology

044-2257-4137; rayala@iitm.ac.in

[http://www.biotech.iitm.ac.in/Rayala\\_research](http://www.biotech.iitm.ac.in/Rayala_research)



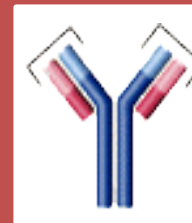
- Cancer Biology
- Small molecule inhibitors and drug resistance
- Indigenous antibodies for diagnostic applications



Cancer Biology



Drug resistance



Diagnostic  
antibodies

**Aiming novel diagnostic and therapeutic reagents for Cancer**



Dr. Sanjib Senapati  
PHD, I.I.T. Kanpur, India

Professor, Dept. of Biotechnology

044-2257-4122; [sanjibs@iitm.ac.in](mailto:sanjibs@iitm.ac.in)

[http://www.biotech.iitm.ac.in/faculty/Sanjib\\_lab/index.html](http://www.biotech.iitm.ac.in/faculty/Sanjib_lab/index.html)



- Molecular dynamics of proteins and structure-function study
- Protein-ligand and protein-protein docking
- Atomic simulations of Green solvents: Ionic Liquids and supercritical CO<sub>2</sub> (scCO<sub>2</sub>)

Structure based drug  
discovery

Ionic liquids for  
biomolecular  
preservations

scCO<sub>2</sub>: a new generation  
solvent in chemical  
industries?



Dr. Sathyanarayana N. Gummadi

Ph.D. IIT Madras, INDIA

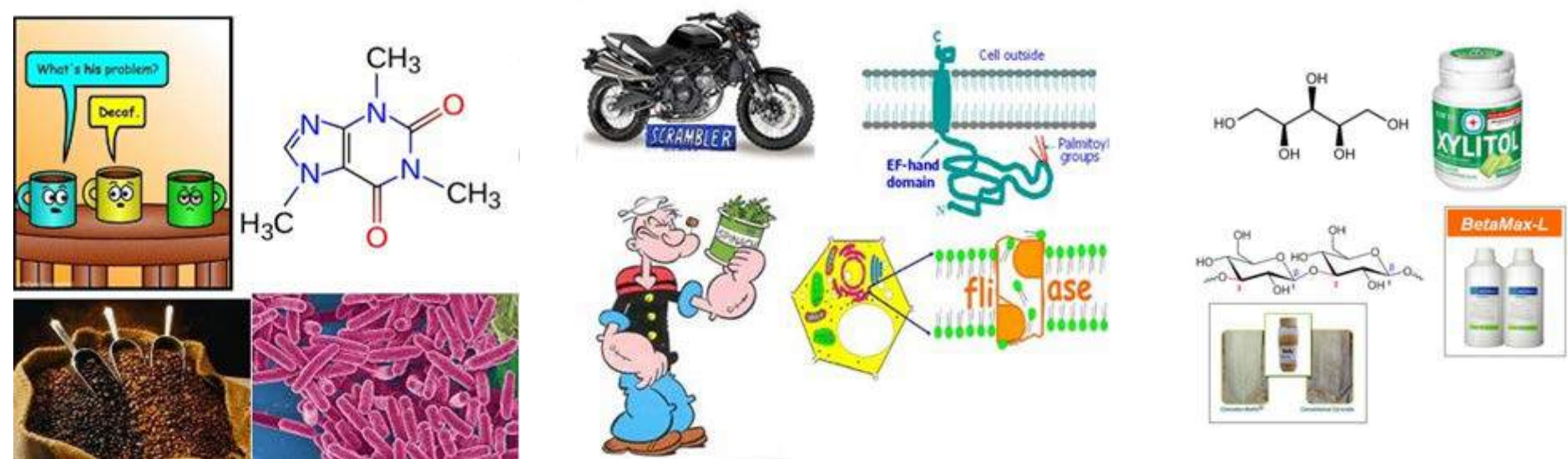
Professor, Dept. of Biotechnology

044-2257-4114; [gummadi@iitm.ac.in](mailto:gummadi@iitm.ac.in)

<http://www.biotech.iitm.ac.in/faculty/sng/index.htm>



- Microbial and Enzymatic Process for Caffeine Degradation
- Bioprocess Development for Production of Biopolymers, Xylitol, Enzymes
- Biochemistry of Flippases and Scramblases



**Fundamental biosciences to industrial applications**





# Dr. SMITA SRIVASTAVA

## PHD, IIT DELHI, INDIA

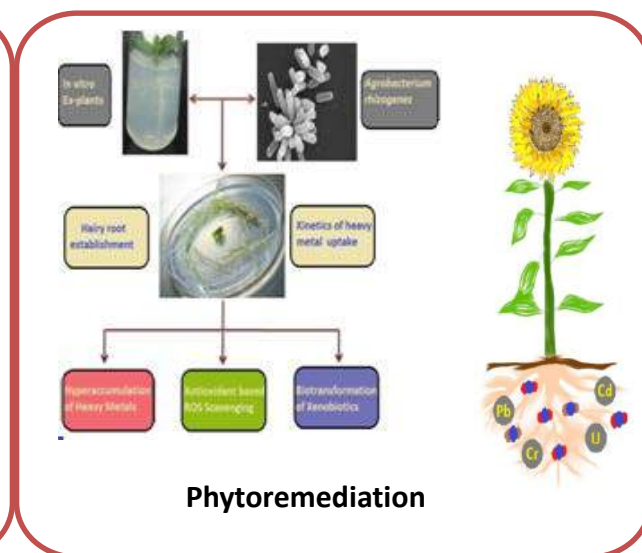
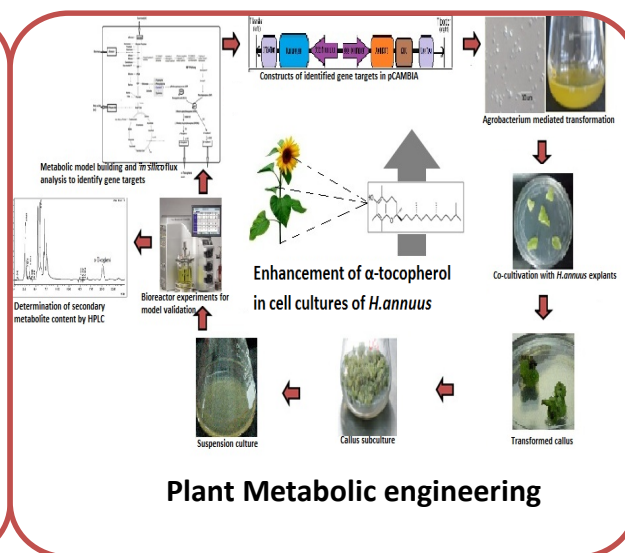
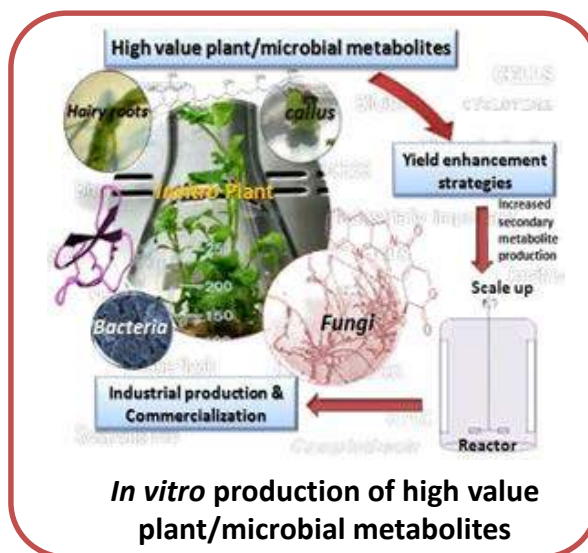
Associate Professor, Dept. of Biotechnology

044-2257-4127; [smita@iitm.ac.in](mailto:smita@iitm.ac.in)

<http://www.biotech.iitm.ac.in/faculty/smita/>



- Plant cell technology
- Microbial technology



**Applied/Industrial Biotechnology**



# Dr. V. Srinivasa Chakravarthy

PhD, University of Texas at Austin, Austin, USA.  
Professor, Department of Biotechnology,  
IIT Madras.

Tel: 044-2257-4115; [schakra@iitm.ac.in](mailto:schakra@iitm.ac.in)

[http://www.biotech.iitm.ac.in/faculty/CNS\\_LAB/home.html](http://www.biotech.iitm.ac.in/faculty/CNS_LAB/home.html)



## Research Area: Computational Neuroscience

### Objective 1:

Develop a comprehensive Computational model of Basal Ganglia, a part of the brain affected in Parkinson's Disease.

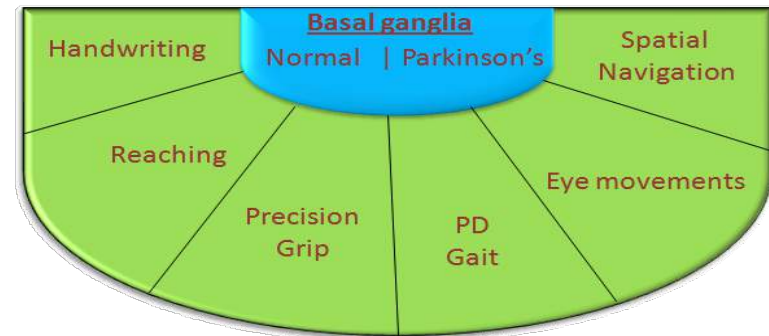
### Application:

The model developed has potential Application in Deep Brain Stimulation Surgery for PD.

### Objective 2:

Using computational modeling, study the role of vascular dynamics on neural activity.

**Application:** Leads to the radical notion of vascular computation.

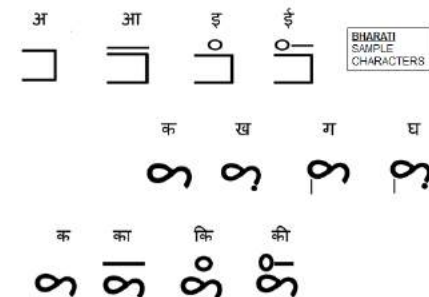


## Research Area:

### Indian Language Technology

Develop a new script called Bharati.

The script can represent 9 major Indian scripts. Simple and easy to learn.





# G. K. Suraishkumar

## Ph.D., Drexel University, Philadelphia, USA

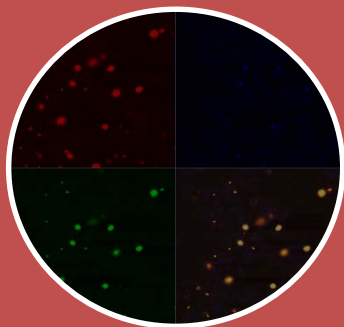
Professor, Dept. of Biotechnology

044-2257-4105; gk@iitm.ac.in

<https://biotech.iitm.ac.in/research/faculty/suraishkumar-g-k>



- Improved cancer treatment strategy through reactive species (RS) rhythms
- Improved bioprocess strategies (RS-based) – e.g. improved algal bio-oil production
- Interesting cell phenomena (RS-based)



Interesting cell phenomena



Improved cancer treatment



Bioprocess strategies

← Quantitative Understanding and Manipulation of Biological Systems (RS-based) →



**Dr. Vani Janakiraman**

PhD,UPMC, Paris, France

Assistant Professor, Department of Biotechnology

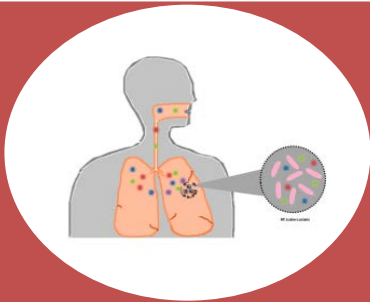
044-2257-4141; [vani@iitm.ac.in](mailto:vani@iitm.ac.in)

<https://biotech.iitm.ac.in/research/faculty/vani-janakiraman/>



## Major areas of research

- Understanding immune evasion and delineating factors that tilt the inflammatory balance
- Understanding the role of novel immune receptors and pleiotropic cytokines in modulating immune responses
- Understanding bacterial communication



Immune evasion



Immune  
receptors/cytokines



Bacterial communication

Understanding host-pathogen interaction in tuberculosis - The immunological aspects

[Back to Top](#)



# Dr. Vignesh Muthuvijayan

## PhD, Oklahoma State University, USA

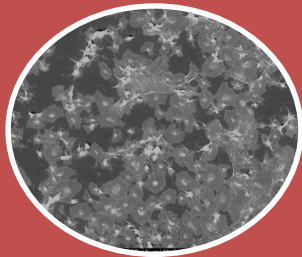
Associate Professor, Dept. of Biotechnology

044-2257-4123; [vigneshm@iitm.ac.in](mailto:vigneshm@iitm.ac.in)

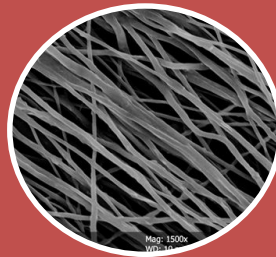
<http://www.biotech.iitm.ac.in/vignesh>



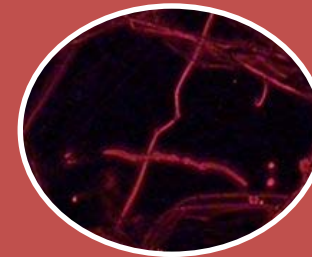
- Surface modification of polymeric materials
- Novel biomaterials as tissue engineering scaffolds
- Development of drug delivery systems



Haemocompatibility



Tissue engineering  
scaffolds



Controlled drug  
delivery

**BIOMATERIALS AND TISSUE ENGINEERING**





INDIVIDUAL FACULTY PROFILE

# DEPARTMENT OF CHEMICAL ENGINEERING

# LIST OF FACULTY

[Abhijit P. Deshpande](#)

[Aravind Kumar Chandiran](#)

[Arun K. Tangirala](#)

[Basavaraj M Gurappa](#)

[Ethayaraja Mani](#)

[Jithin John Varghese \(Profile yet to be uploaded\)](#)

[Kannan A.](#)

[Nagarajan R.](#)

[Niket Kaisare](#)

[Preeti Aghalayam](#)

[Pushpavanam S.](#)

[Raghuram Chetty](#)

[Rengaswamy R](#)

[Rajagopalan Srinivasan](#)

[Rajnish Kumar](#)

[Ramanathan S.](#)

[Ramnarayanan R \(Profile yet to be uploaded\)](#)

[Ravi R](#)

[Ravikrishna R](#)

[Renganathan T](#)

[P.S.T Sai](#)

[Shankar Narasimhan](#)

[Sreenivas Jayanti](#)

[Sridharakumar Narasimhan](#)

[Sumesh P Thampi](#)

[Susy Varughese](#)

[Tanmay Basak](#)

[Tapobrata Panda](#)

[Upendra Natarajan](#)

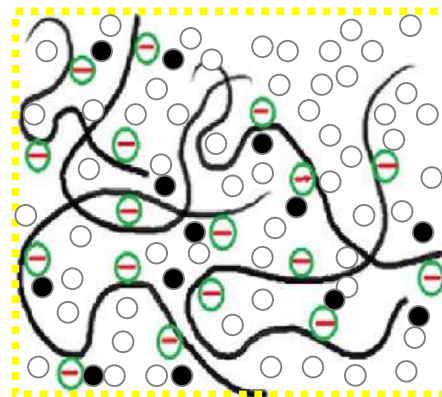
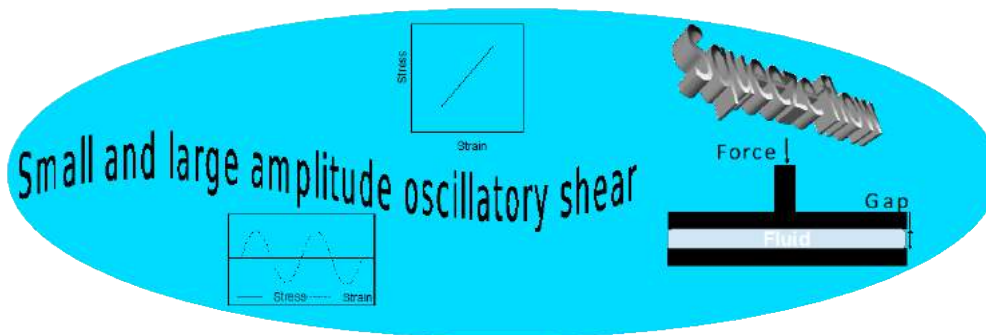
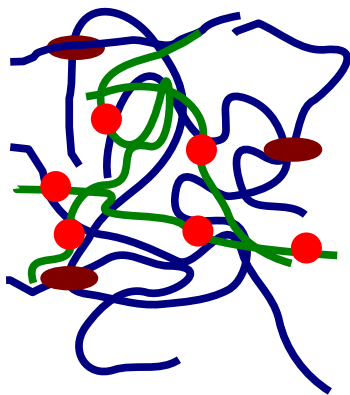
[Vinu R](#)



**Dr. Abhijit P. Deshpande**  
Professor, Dept. of Chemical Engineering  
044-2257-4169; abhijit@iitm.ac.in  
<http://www.iitm.ac.in/~abhijit>



- Polymeric systems: aggregation, gelation, rheology
- Ionic polymers, Polysaccharides
- Wettability and composite processing



**Representative publications:**

Majhi A., Pardhi T. K. and Deshpande A. P., International Journal of Multiphase Flow, (2015).  
Kodavaty J. and A. P. Deshpande, Journal of Applied Polymer Science, (2014).  
Jacob A. J., Deshpande A. P., Bouteiller L., Journal of Non-Newtonian Fluid Mechanics, (2014).  
Prathyusha K. R., Deshpande A. P., Laradji M., Kumar P. B. S., Soft Matter (2013).



## Aravind Kumar Chandiran

Email: aravindkumar@iitm.ac.in

Mobile: +91-80563 80100



Assistant Professor  
Department of Chemical Engineering  
Indian Institute of Technology - Madras



Postdoc, Long Group  
Department of Chemistry  
University of California - Berkeley



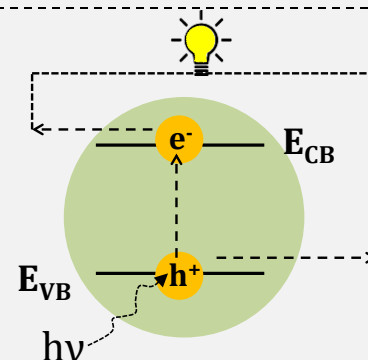
PhD – Chemistry and Chemical Engineering  
Grätzel's group  
Swiss Federal Institute of Technology

Google Scholar profile

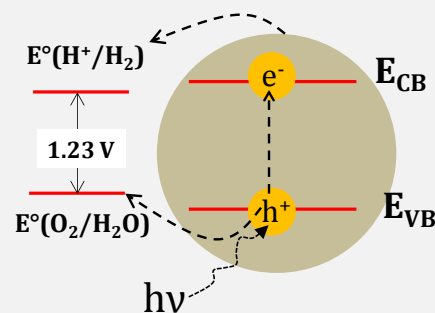
<https://scholar.google.com/citations?user=D18I3fcAAAAJ>

## Photoelectrochemical Solar Energy Conversion

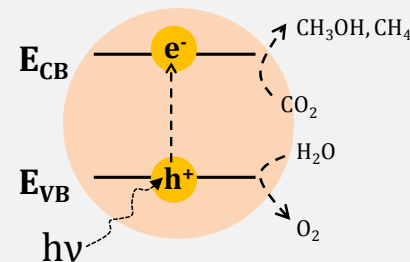
### Photovoltaics



### Water Splitting



### Carbon Dioxide Reduction





# Dr. Arun K. Tangirala

## Ph.D., University of Alberta, Canada

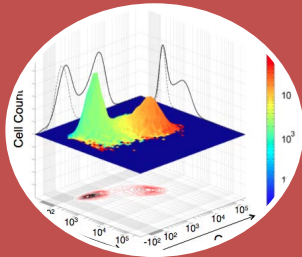
Professor, Dept. of Chemical Engineering

044-2257-4181; arunkt@iitm.ac.in

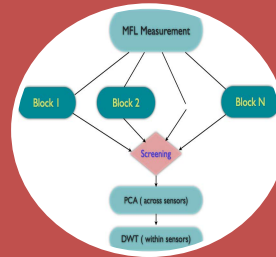
<http://www.che.iitm.ac.in/~arunkt>



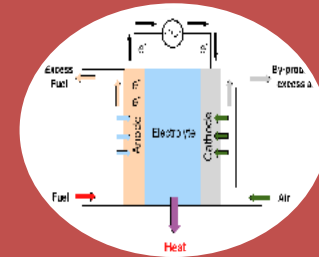
- Process Control, Identification & Monitoring
- Control loop performance assessment
- Data-driven process analysis and control



Systems Biology



Process & Pipeline  
Health Monitoring



Energy Systems

← SYSTEMS ENGINEERING & INFORMATION-THEORETIC APPROACHES →





Dr. Basavaraj M Gurappa

PhD. KU Leuven, Belgium

Associate Professor, Chemical Engineering

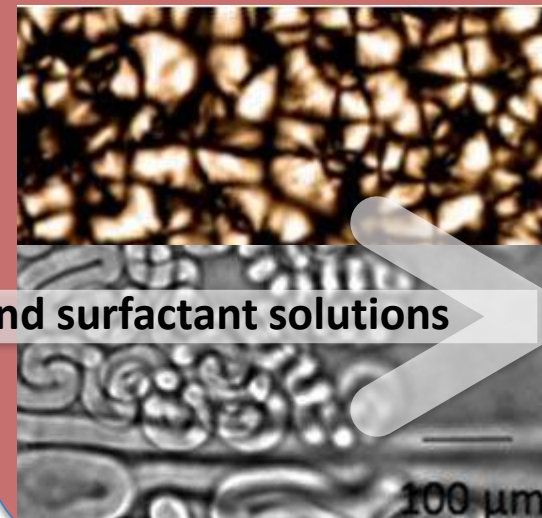
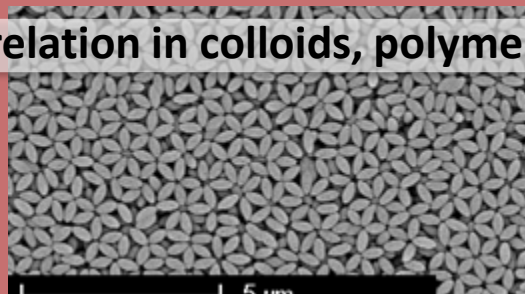
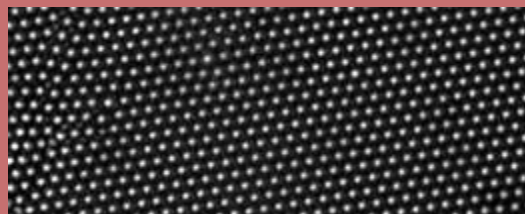
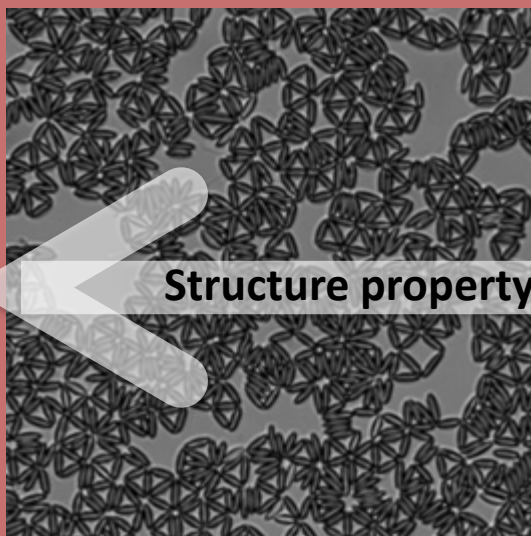
044-2257-4164; basa@iitm.ac.in

<http://www.che.iitm.ac.in/~basa>



## Research Area: Colloids and Interface Science

- ✧ Self-assembly of colloids and nanoparticles
- ✧ Rheology and microstructure of suspensions
- ✧ Structure and surface rheology of complex fluid interfaces, Emulsions, Foams
- ✧ Surfactant in aqueous, organic and ionic liquids



Structure property correlation in colloids, polymers and surfactant solutions



# Dr. Ethayaraja Mani

## PHD, IIT Bombay, India

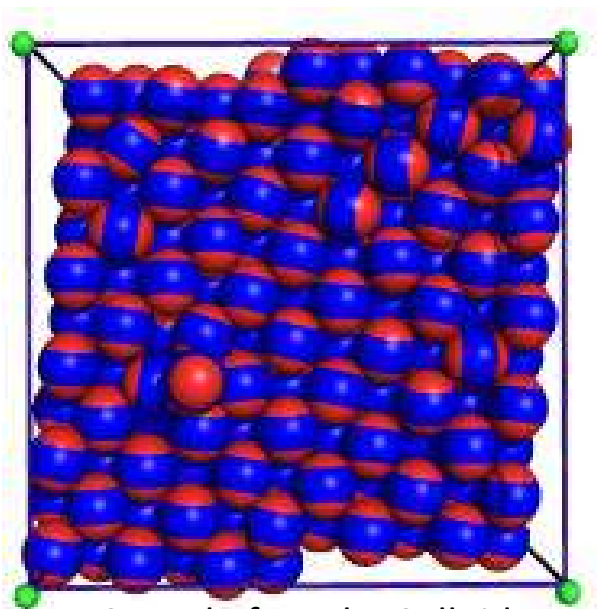
Associate Professor, Dept. of Chemical Engineering

044-2257-4157; [ethaya@iitm.ac.in](mailto:ethaya@iitm.ac.in)

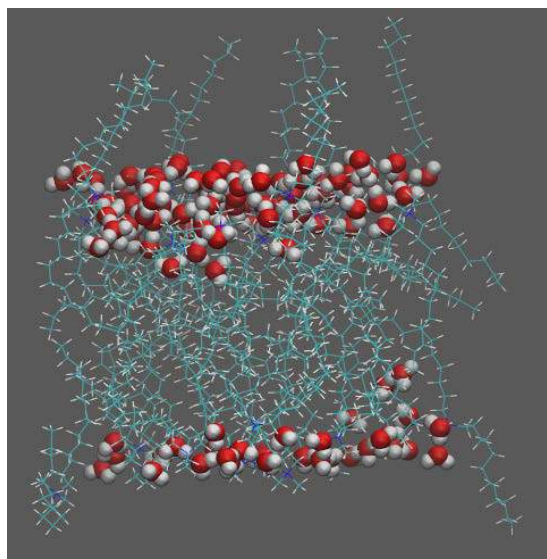
<http://www.che.iitm.ac.in/~ethaya/ethaya/Home.html>



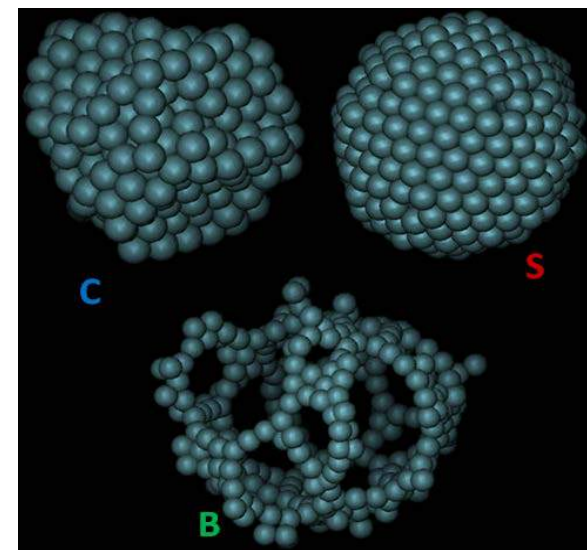
- Self-assembly of patchy colloids
- Molecular simulation of softmatter
- Stochastic simulation of formation of nanostructures



Crystal of Patchy Colloids



Surfactant Bilayer



Soft-colloid Stabilized Emulsions

[Back to Top](#)

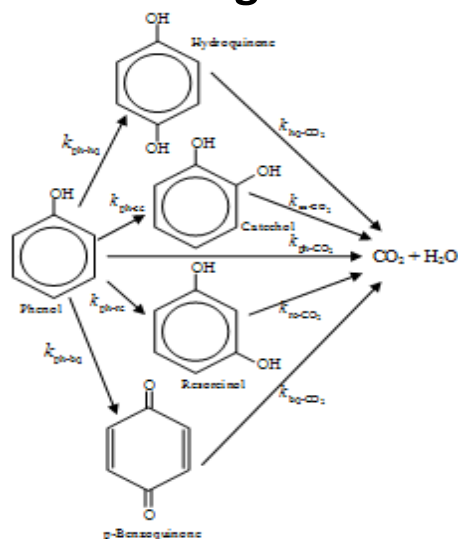


**Dr. KANNAN A.**

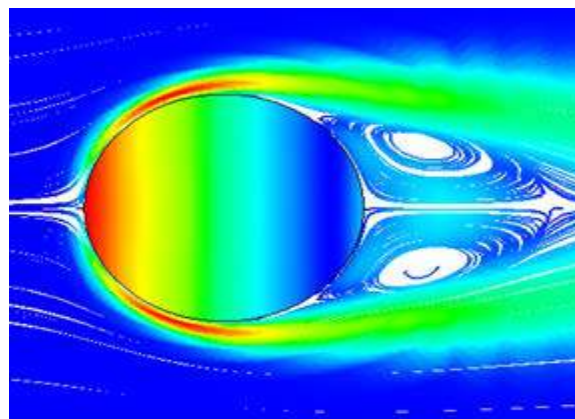
PHD, McMASTER University, CANADA  
 Professor, Dept. of Chemical Engineering  
 044-2257-4170; kannan@iitm.ac.in  
<http://www.che.iitm.ac.in/~kannan/>



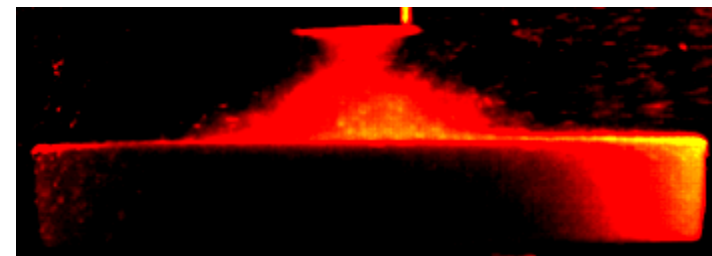
- ❖ Intensification of Transport and Reaction Rates in Environmental Pollution Control, Separation Processes and Thermal Food Processing
- ❖ Innovative Process Equipments for Environmental Pollution Control
- ❖ Modelling and Simulation of Chemical and Environmental Processes



Reaction pathway in a photocatalytic reactor



CFD based fluid flow patterns and convective heat fluxes around a food particle



Ultrasound jet impinging on a spinning disk to enhance mass transfer

[Back to Top](#)





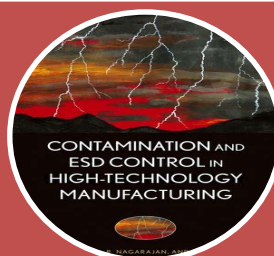
**Dr. R. Nagarajan**  
**Ph.D., Yale University, USA**  
Professor, Dept. of Chemical Engineering  
044-2257-4158; nag@iitm.ac.in  
<http://www.che.iitm.ac.in/~nag/>



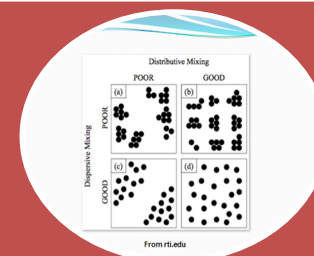
- Ultrasonic process intensification
- Particulate phenomena in cleanrooms
- Synthesis of nano-materials & nano-composites



Sono-enhancement of: dyeing of textiles, heat-transfer in furnace tubes, removal of ash and sulfur from coal, destratification of cryogenic fuels, reactive breakdown of pollutants, surface cleaning of semiconductor wafers, atomization of liquid fuels



Particle generation, transport, deposition and adhesion in controlled environments; cost-effective cleanroom designs



Sono-fragmentation for nano-particle synthesis; sono-processing of nano-composites and nano-emulsions— process optimization

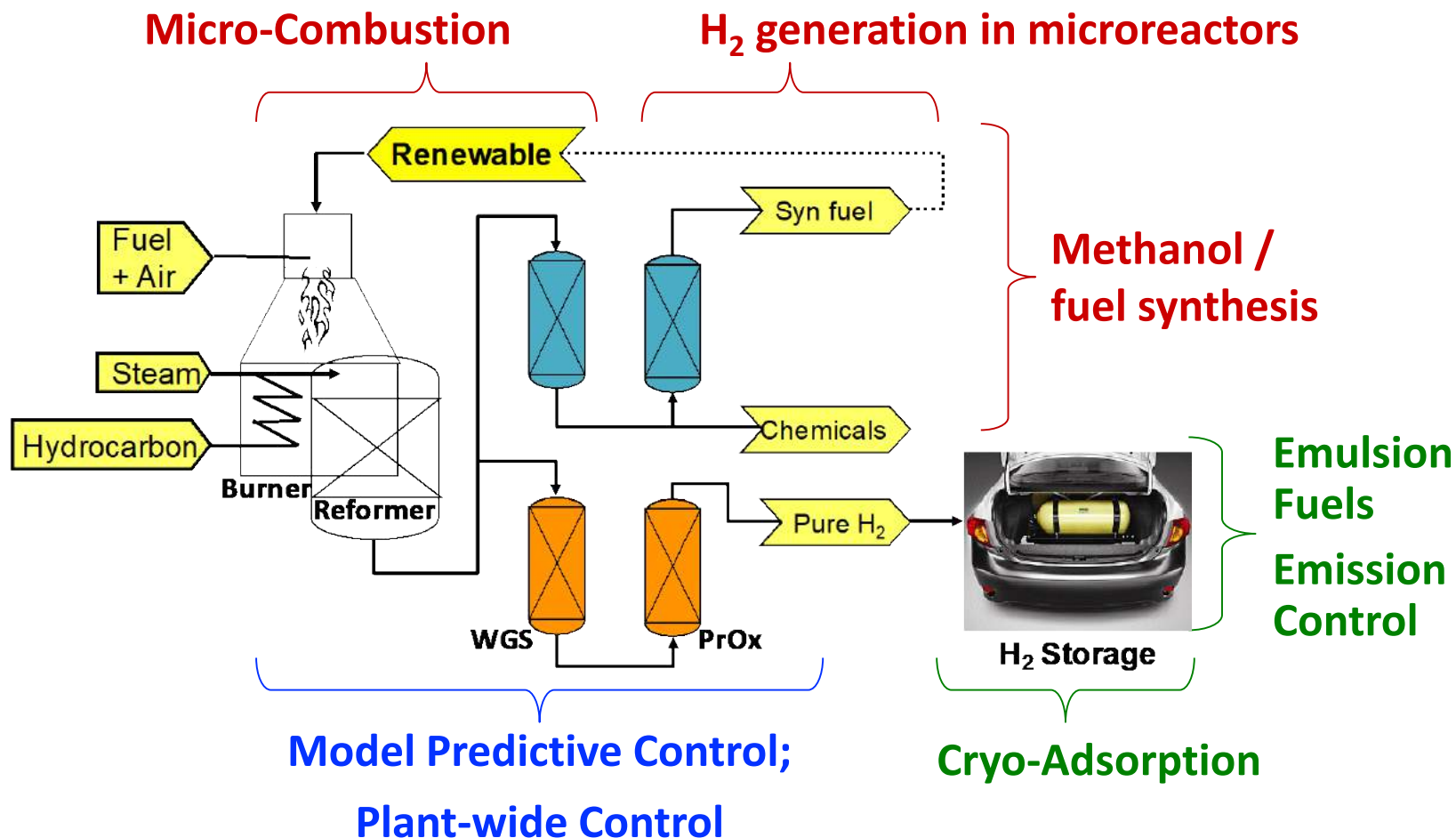


# Dr. Niket Kaisare

Professor, Chemical Engineering

Phone: [+91] (44) 22574176, [nkaisare@iitm.ac.in](mailto:nkaisare@iitm.ac.in)

<http://www.che.iitm.ac.in/~nkaisare/>







# Dr. Preeti Aghalayam

## PHD, Univ. of Massachusetts Amherst, USA

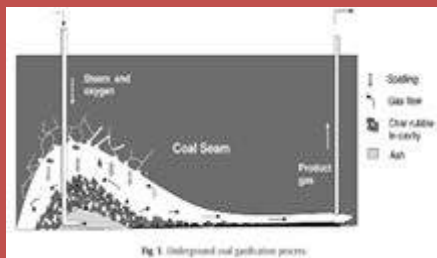
Professor, Dept. of Chemical Engg.

044-2257-4185; preeti@iitm.ac.in

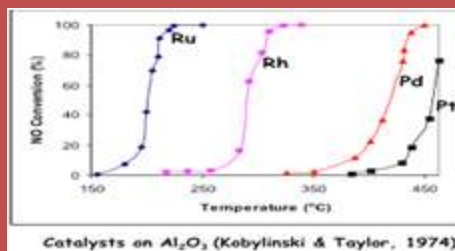
<http://www.aghalayam.com>



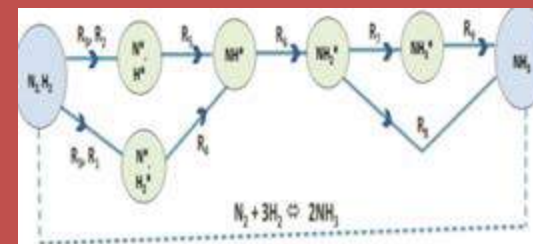
- **Coal Gasification:** *In-situ utilisation of deep coals; Kinetic Experiments; Modeling*
- **Catalytic Converters:** *Detailed chemistry for catalytic reduction of NO*
- **Reaction Mechanisms:** *Reduction of detailed reaction mechanisms*



Underground Coal Gasification:  
Cavity studies & Process  
models



Automotive Catalytic  
Converters:  
Surface reaction mechanisms &  
Catalyst Selection



Detailed Reaction Mechanisms:  
Analysis, Reduction  
Methodologies

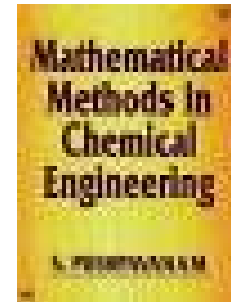
MICROKINETIC MODELING; LAB-SCALE EXPERIMENTS; FUNDAMENTAL STUDIES



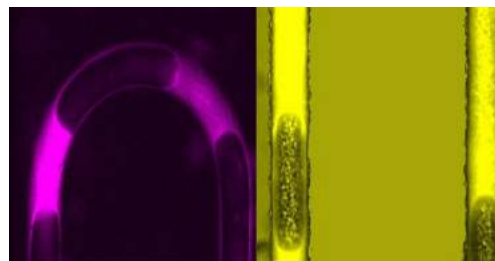
**Dr. S. Pushpavanam**  
**PHD, University of Florida, USA**  
Professor, Dept. of Chemical Engineering  
044-2257-4161; [spush@iitm.ac.in](mailto:spush@iitm.ac.in)  
<http://www.che.iitm.ac.in/~spush/>



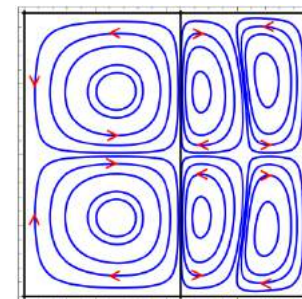
- Two phase flows and interfacial transport
- Micro flows: Hydrodynamics and Mass Transport
- Mathematical Modeling and Nonlinear Dynamics



Molten Flows



Microfluidics



Fundamentals

**Mathematics + Physics ---> Smarter Engineering**



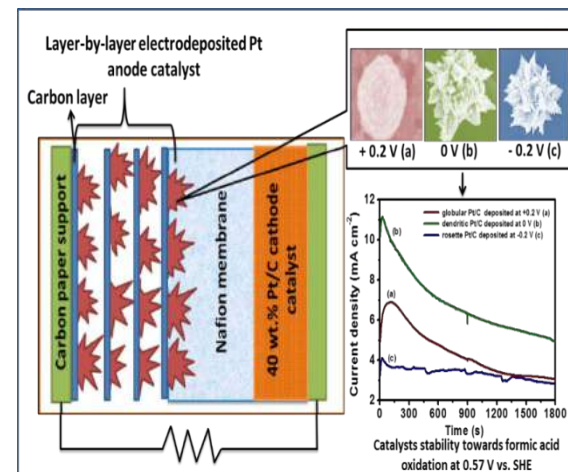


Dr. Raghuram Chetty  
(PhD Newcastle University, UK)  
Professor, Department of Chemical Engineering  
raghuc@iitm.ac.in | +91 44 2257 4178  
<http://www.che.iitm.ac.in/~raghuc/>

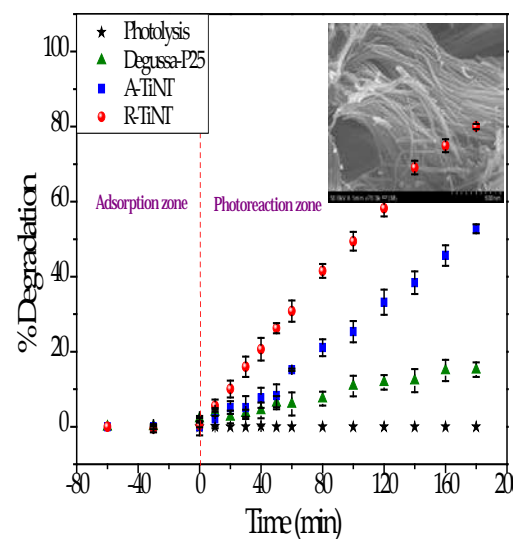


## Research Interest

- Fuel Cells (Electrocatalyst, Bipolar Plates)
- Redox Flow Batteries (Vanadium Flow Battery)
- Conversion of CO<sub>2</sub> into Chemicals
- Electrochemical & Photochemical Wastewater Treatment
  - Electrochemical Reduction of Nitrate
  - Heavy Metal (Chromium) Removal
  - Photocatalytic Degradation (Dyes, Pharmaceuticals)
  - Water Desalination (Anti Fouling RO Membranes)



Different morphologies of Pt catalysts synthesized by electrochemical deposition by varying the potential.



Photodegradation of Rhodamine-B with different crystalline TiO<sub>2</sub> nanotubes (TiNT) phase as compared to commercial P25 nanoparticles.

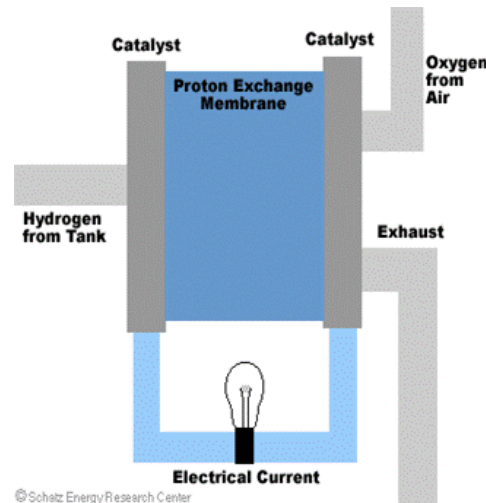
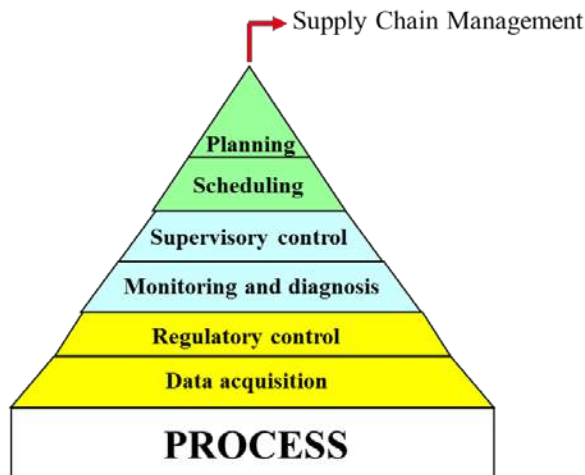
[Back to Top](#)



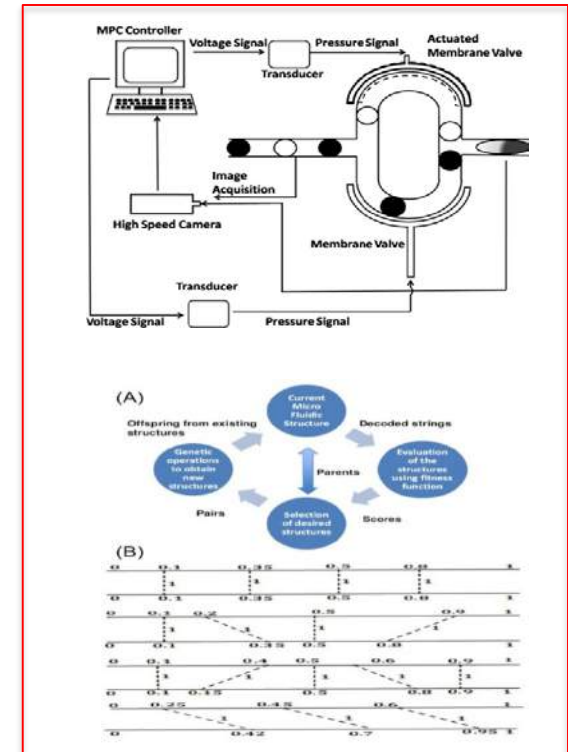
**Dr. R. Rengaswamy**  
 Professor, Chemical Engineering  
 044 - 2257 4159; raghur@iitm.ac.in



- Process Systems Engineering
- Fuel Cell Research
- Computational Droplet-based Microfluidics Research



©Sohatz Energy Research Center





# Dr. Rajagopalan Srinivasan

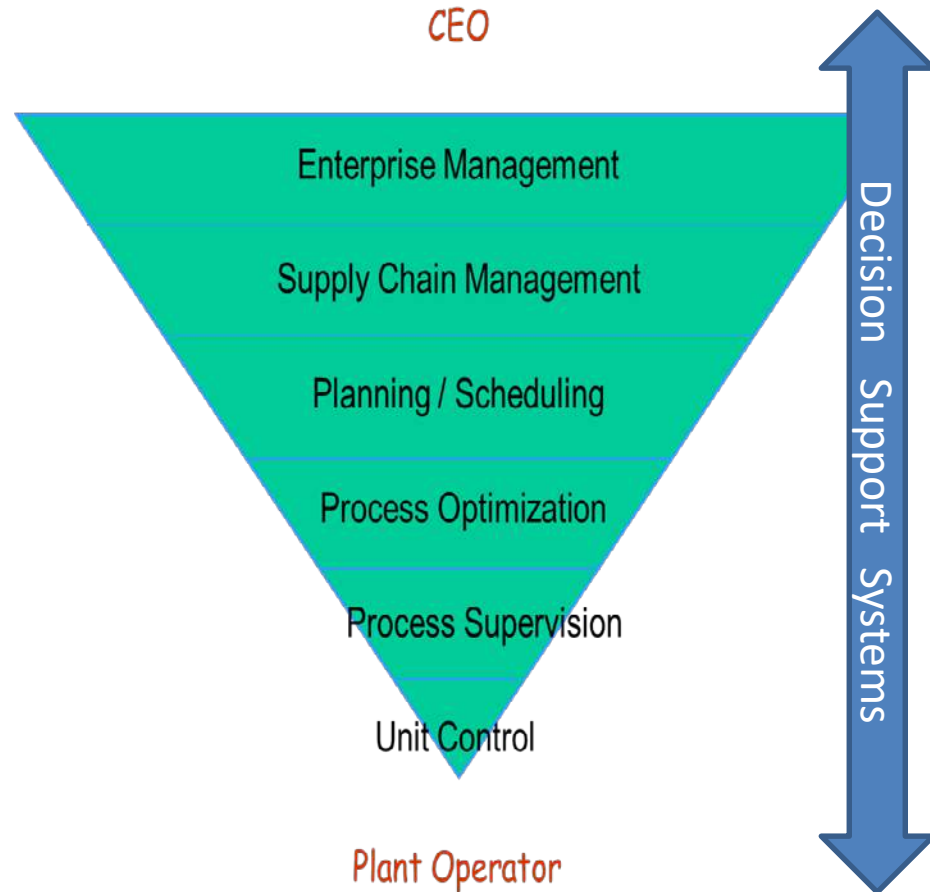
Professor, Chemical Engineering

+91 44-2257-4190; [raj@iitm.ac.in](mailto:raj@iitm.ac.in)

[https://che.iitm.ac.in/?page\\_id=457](https://che.iitm.ac.in/?page_id=457)



- Major Research Areas
  - Safety, Sustainability & Resilience of complex systems
  - Cognitive Engineering
  - Supply Chain Management & Enterprise Optimization







# Dr. Rajnish Kumar

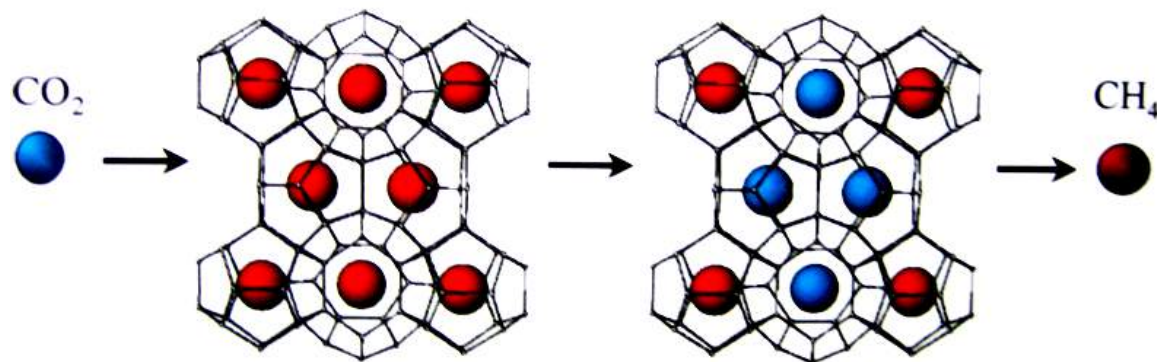
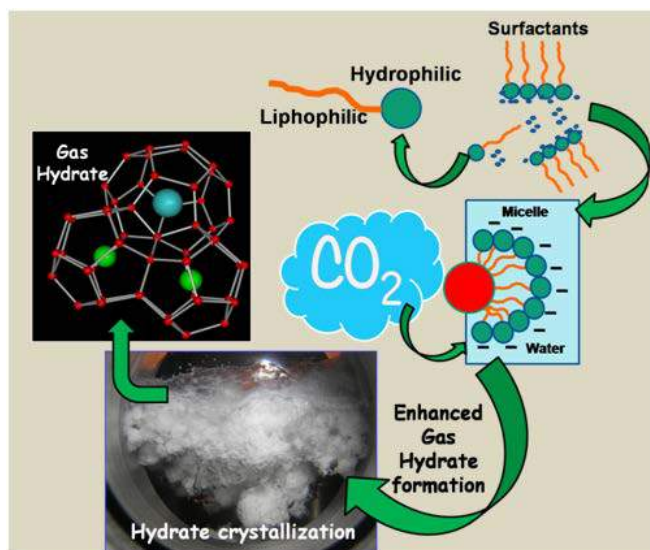
Associate Professor, Chemical Engineering

Ph: 8805340709; rajnish@iitm.ac.in



## Major Areas of Research

- Methane recovery from natural gas hydrate; methane storage and transportation
- Gas separation through molecular selection and enclathration; CO<sub>2</sub> capture
- Process development and scale up; biomass upgradation through HTL



Gas Hydrates: Opportunities for Innovative Energy Selection

[Back to Top](#)

# S. Ramanathan

Professor, Department of Chemical Engineering

+91 44 2257 4171, [srinivar@iitm.ac.in](mailto:srinivar@iitm.ac.in)

<http://www.che.iitm.ac.in/~srinivar/>



**A**

Electrochemistry.  
Corrosion, Electroplating

Corrosion monitoring and control.  
Electroplating, process optimization

**B**

Nonlinear Electrochemical  
Impedance Spectroscopy  
(NLEIS) development

Mechanistic analysis of  
electrochemical reactions

Technique development.  
Nonlinear electrochemical Impedance  
Spectroscopy (NLEIS)

**C**

Semiconductor Processing – Chemical  
Mechanical Planarization - CMP

Metal, Oxide and STI CMP



Dr. R. Ravi

PHD, Purdue University, USA

Professor, Dept. of Chemical Engineering

044-2257-4167; [rravi@iitm.ac.in](mailto:rravi@iitm.ac.in)

<http://www.che.iitm.ac.in/~rravi/>



- Thermodynamics
- Transport
- Statistical Mechanics

Phase  
equilibrium

Multicomponent  
mass transfer

Property  
Estimation

**Mathematical modeling and theoretical analysis**



**Dr. R. Ravikrishna**  
**Ph.D., Louisiana State University, USA**

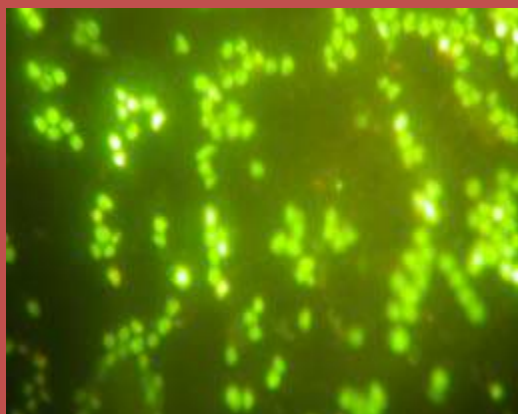
Professor, Dept. of Chemical Engineering

044-2257-4175; rrk@iitm.ac.in

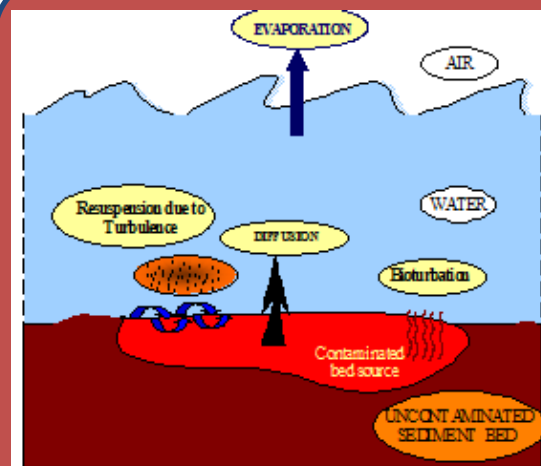
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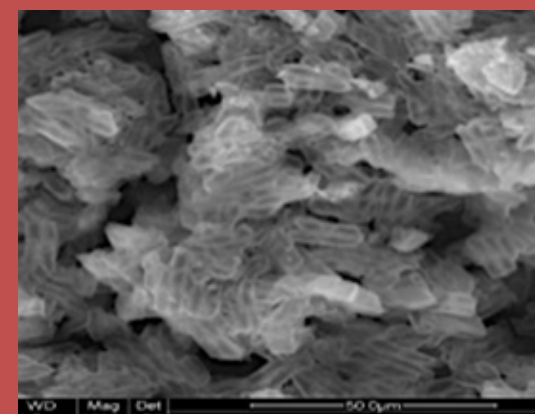
- ***Fate and Transport of Pollutants in the Environment***
- ***Assessment and Remediation of Contaminated Sediments***
- ***Development of Waste Treatment Technologies***



*Bioaerosol Release from  
solid waste surfaces*



*Chemical Release Rates  
from Sediments*



*Photocatalytic  
Degradation of Organic  
Chemicals*



# Dr. T. Renganathan

## PhD, IIT Madras, India

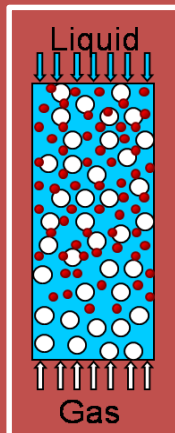
Associate Professor, Dept. of Chemical Engineering

044-2257-4186; renga@iitm.ac.in

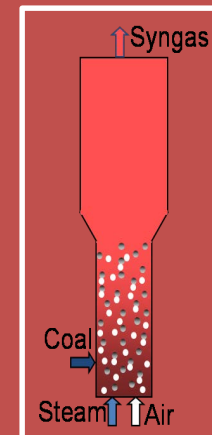
<http://www.che.iitm.ac.in/faculty.php?fid=20>



- Multiphase systems – Inverse fluidized bed
- Gasification – Fluidized bed gasifier



Hydrodynamics of inverse fluidized bed



Simulation of fluidized bed gasifier





Dr. P S T SAI

PhD, IIT Madras, India

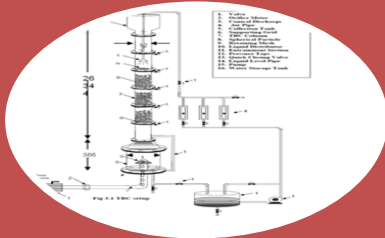
Professor, Dept. of Chemical Engineering

044-2257-4163; psts@iitm.ac.in

<http://www.che.iitm.ac.in/~psts/index.php>



- Fluidization
- Reaction Engineering
- Mass Transfer



Development of Air  
Pollution Control  
Equipment



Process development



Analysis and design of  
Process Equipment



# Dr. Shankar Narasimhan PHD Northwestern University, USA

Professor, Dept. of Chemical Engineering

044-2257-4165; [naras@iitm.ac.in](mailto:naras@iitm.ac.in)

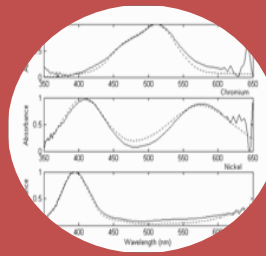
<http://www.iitm.ac.in/~naras>



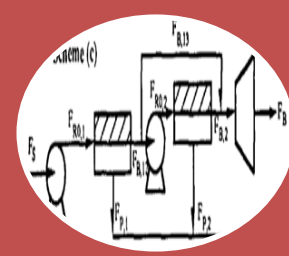
- PROCESS DESIGN – Sensor networks, Pipeline networks, Heat Exchanger Networks
- DATA ANALYTICS – Data reconciliation, Multivariate data analysis, Fault Diagnosis
- PROCESS OPTIMIZATION AND CONTROL – Solar powered RO networks



Pipeline networks  
monitoring and control



Extracting pure spectra  
from mixture spectra –  
source separation



Optimal design, operation  
and control of battery less  
solar powered RO networks



Dr. Sreenivas JAYANTI

PhD, Imperial College, London, UK

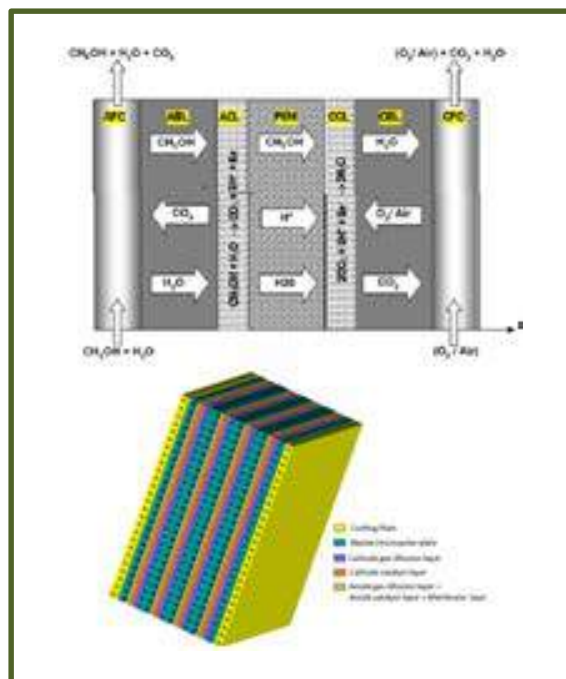
Professor, Department of Chemical Engineering

044-22574168; sjayanti@iitm.ac.in

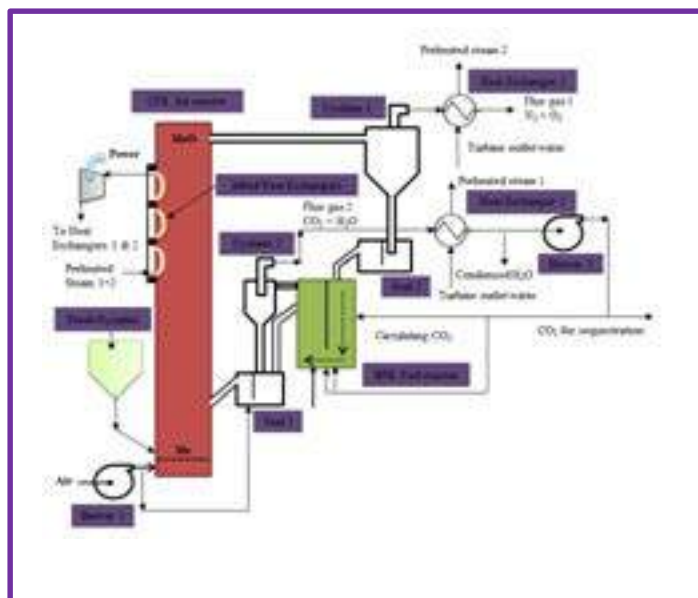
<http://www.che.iitm.ac.in/~sjayanti/>



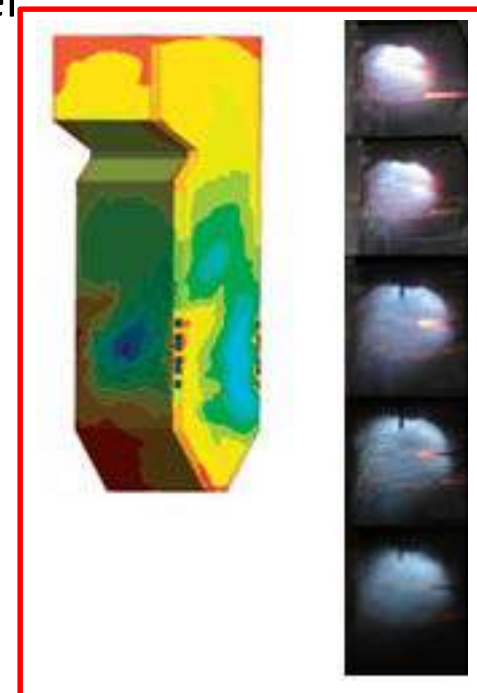
- Combustion: Oxy-fuel combustion; chemical looping combustion
- Electrochemical devices: Fuel cells; redox flow batteries
- Multiphase flow: computational fluid dynamics, heat transfer



Cell and stack level studies of fuel cells



System level studies of chemical looping combustion



Experimental and CFD studies of oxycoal combustion

[Back to Top](#)



# Sridharakumar Narasimhan

Professor, Dept. of Chemical Engineering

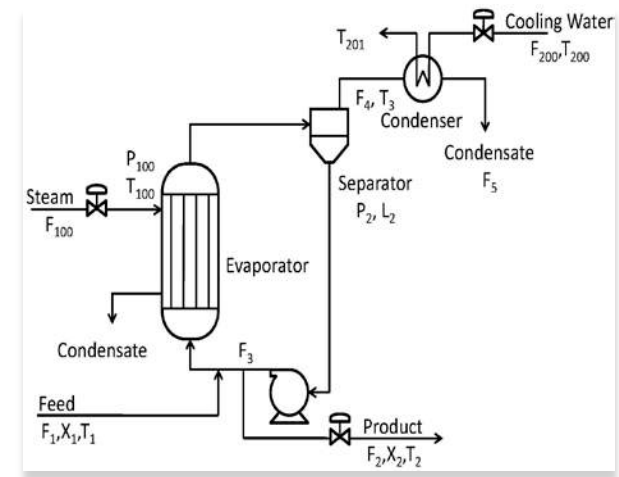
Email: sridharkrn@iitm.ac.in

Ph: 91-44-22574177



## • Research focus

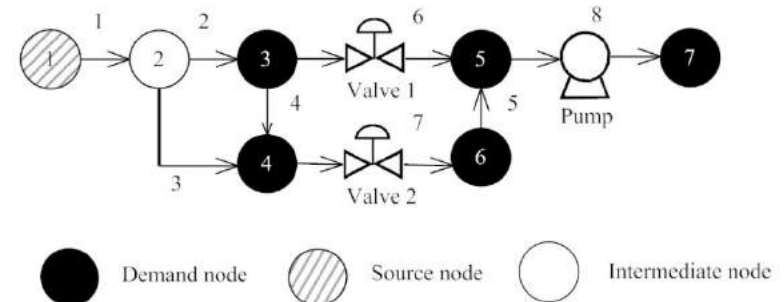
- Process systems engineering
- Sensor placement and scheduling
- Efficient control relevant model generation
- Optimal operation and design



• Approach: Formulate and solve tractable (e.g., **convex**) **optimization** problems to guarantee performance

## • Applications

- Water treatment and distribution
- Pipeline operations
- Systems biology, imaging





# Dr. Sumesh P. Thampi

Assistant Professor, Chemical Engineering

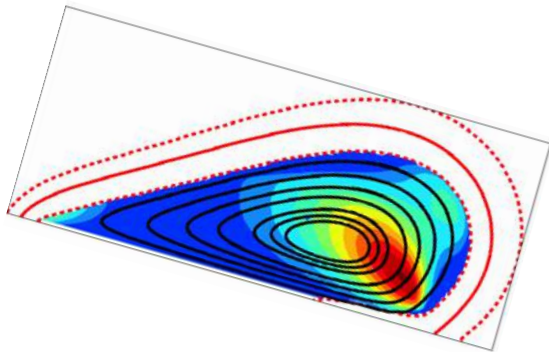
044-2257-4169; [sumesh@iitm.ac.in](mailto:sumesh@iitm.ac.in)

<http://www.che.iitm.ac.in/~sumesh>

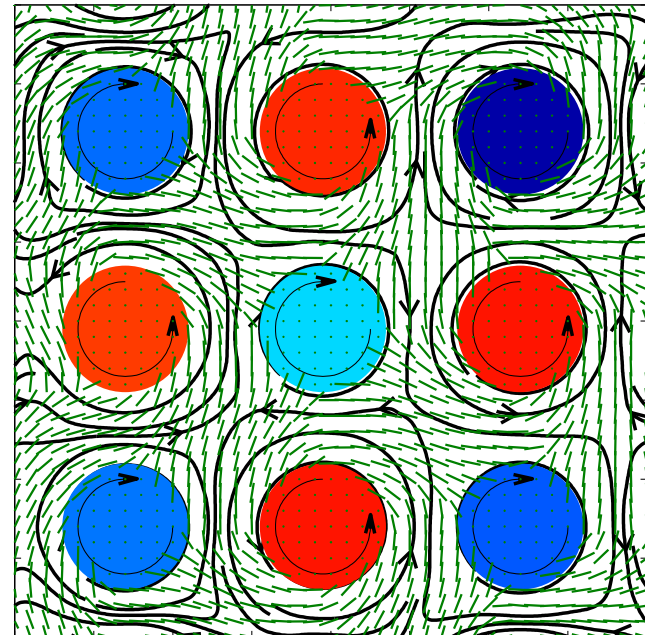


## Major Areas of Research

- @ Hydrodynamics of complex fluids
- @ Collective motion in active matter
- @ Interfacial fluid mechanics



Sliding–rolling motion of a drop on an inclined surface – streamlines and vorticity contours



Counter rotating colloidal discs to power micro-machines exploiting nemato-hydrodynamics of active turbulence

Application of fluid mechanics on soft and biological matter

[Back to Top](#)





# Dr. SUSY VARUGHESE

Professor, Chemical Engineering

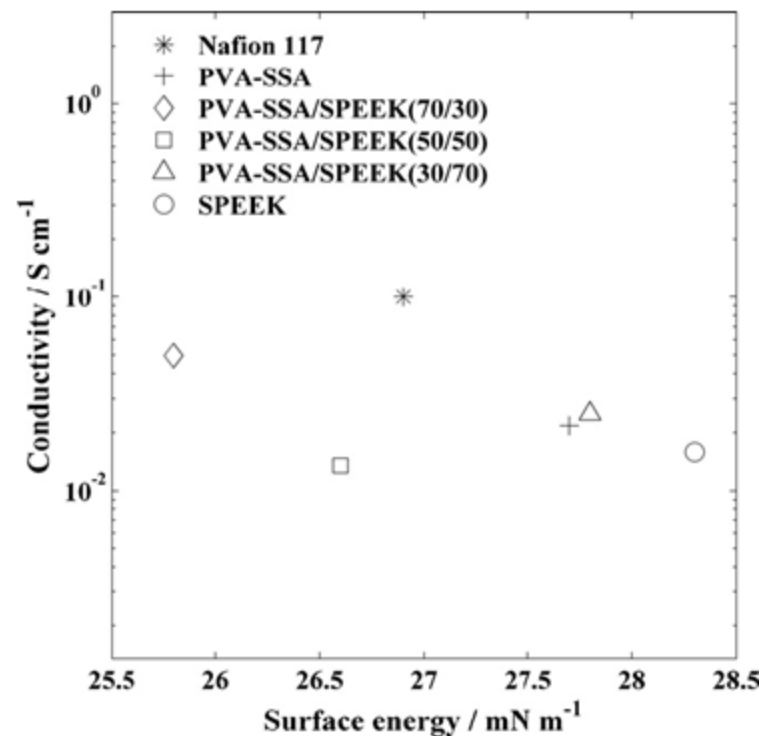
2257 4172 ; susy@iitm.ac.in

<http://www.che.iitm.ac.in/~susy/>



## Major Areas of Research

- Physics and mechanics of polymeric materials
  - dynamic mechanical behaviour of polymers
  - vibration damping and isolation using polymers
  - Filler-polymer interactions
- Conducting polymers
  - Processing aspects related to inkjet printing & drying of drops
  - Wetting and surface energy
  - Electromechanical behaviour of conducting polymer films
- Ionically conducting polymers
  - Fuel cell membrane materials
  - Diffusion through membranes
  - Structure and morphology
  - Shape memory behavior
- Recycling of polymers and composites



P. Kanakasabai et al., Journal of Power Sources 196 (2011) 946–955



# Dr. Tanmay Basak

PhD, IISc, Bangalore, Professor, Dept. of Chemical Engg

044-2257-4173; tanmay@iitm.ac.in

<http://www.che.iitm.ac.in/~tanmay/>



- Microwave Assisted Material Processing

Computational Electromagnetics

Chemical Reacting Systems

Material Invariant Characteristics

Closed Form Analysis

Scattering Effect

- Computational Fluid Flow and Heat Transfer

Heat Flow visualization and Thermal Management

Thermodynamics and Irreversibility: Entropy Generation Minimization

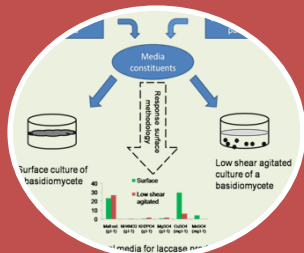
- Finite Element Method and Modeling



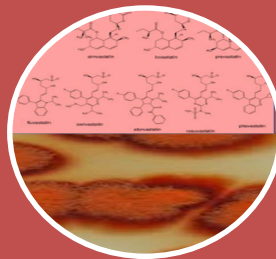
**Dr. Tapobrata Panda**  
**PhD, IIT Delhi, India**  
Professor, Dept. of Chem. Engg.  
044-2257-4160; panda@iitm.ac.in  
<http://www.che.iitm.ac.in/~panda/index.php>



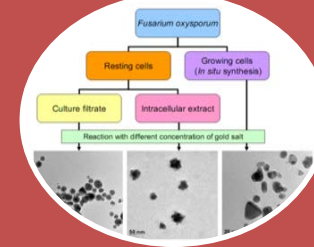
- Bioprocess engineering: Enzyme Design, Bioprocess Optimization, and Metabolic Engineering
- Bio-nanotechnology: Biosynthesis and Applications
- Bio-MEMS: Micro-fluidic Platform for cell Culture, Drug-cell Interaction



Industrial enzyme  
production and  
application



Drug/Metabolic  
inhibitor design



Au and Ag nano-particles  
biosynthesis, application  
and Bio-MEMS

**Biological Engineering**



**Dr. Upendra Natarajan**  
**Ph.D., Institute of Polymer Sci.& Polym. Eng,**  
**University of Akron, USA**  
Professor, Dept. of Chemical Engg.  
044-2257-4184; [unatarajan@iitm.ac.in](mailto:unatarajan@iitm.ac.in)  
<http://www.che.iitm.ac.in/~unatarajan/>



- Molecular Theory, Simulation and Modeling
- Macromolecular Science and Engg.
- Hybrid Materials and Composites

FMCG – Shampoo,  
Conditioner, Detergents,  
Cosmetics,  
Superabsorbents,  
structured dispersions

Polymer-based Coatings,  
liquid dispersions

Advanced structural  
Materials



# Dr. R. Vinu

Associate Professor, Chemical Engineering, IIT Madras

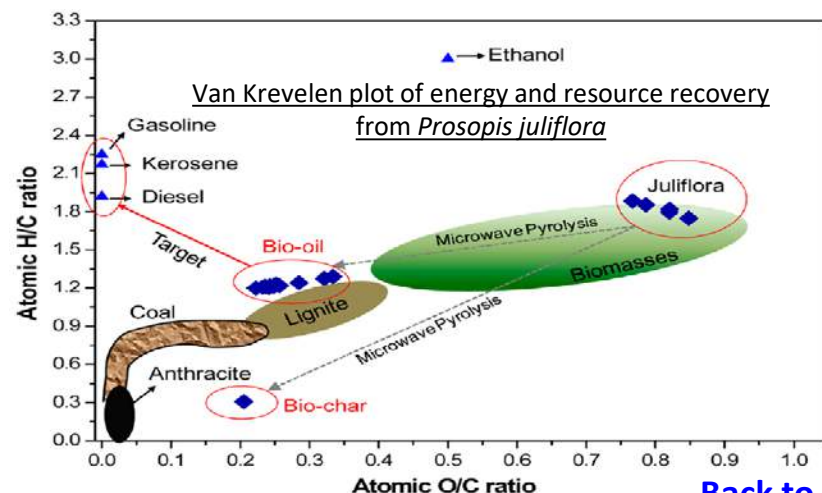
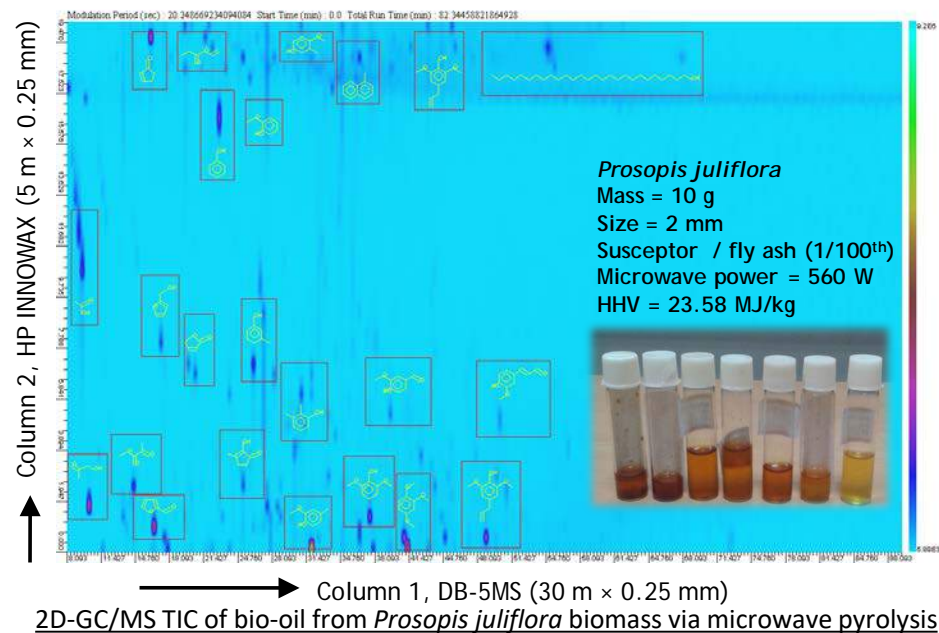
+91-44-22574187, E-mail: [vinu@iitm.ac.in](mailto:vinu@iitm.ac.in)

<https://sites.google.com/site/vinuresearch/>



## Current Research Areas

- Catalytic fast pyrolysis of biomass, algae and polymers in micropyrolysis systems with online analysis using GC/MS and FT-IR
- Microwave assisted pyrolysis of renewable feedstocks (biomass, plastic wastes, MSW) for energy and resource recovery and nanomaterials
- Characterization of solid, liquid and gaseous fuels
- Deconstruction and pretreatment of biomasses using non-conventional techniques
- Characterization and degradation of engine oils
- Selective photocatalytic conversion of biomass constituents
- Microkinetic modeling using continuum and stochastic techniques



[Back to Top](#)





INDIVIDUAL FACULTY PROFILE

# DEPARTMENT OF CHEMISTRY

# LIST OF FACULTY

[Amrendra Vijay \(Profile yet to be uploaded\)](#)

[Anbarasan P](#)

[Archita Patnaik](#)

[Arnab Rit](#)

[Arti Dua](#)

[Ashok Kumar Mishra](#)

[Baskaran S](#)

[Beeraiah Baire](#)

[Bhyrappa P](#)

[Chandrakumar N](#)

[Debashis Chakraborty](#)

[Dhamodharan R](#)

[Dillip Kumar Chand](#)

[Edamana Prasad](#)

[Indrapal Singh Aidhen](#)

[Kartik Chandra Mondal \(Profile yet to be uploaded\)](#)

[Kothandaraman Ramanujam](#)

[Mahiuddin Baidya Md \(Profile yet to be uploaded\)](#)

[Mangala Sundar K \(Profile yet to be uploaded\)](#)

[Masilamani Jeganmohan](#)

[Muraleedharan K.M](#)

[Narasimha Murthy N](#)

[Pradeep T](#)

[Rajakumar Balla](#)

[Ramesh Gardas](#)

[Ranga Rao G](#)

[Sangaranayanan M.V](#)

[Sanjay Kumar](#)

[Sankararaman S](#)

[Sekar G](#)

[Selvam P](#)

[Sundargopal Ghosh](#)

[Varadaraju U.V](#)

[Venkatakrishnan P](#)

[Vidyasagar K](#)



# Dr. Anbarasan P

PHD, Indian Institute of Science, India

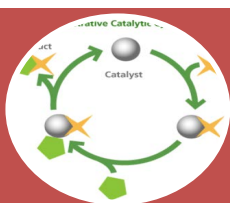
Associate Professor, Dept. of Chemistry

044-2257-4216; anbarasansp@iitm.ac.in

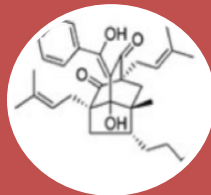
<http://chem.iitm.ac.in/professordetails/profanbarasan/profanbu/>



- Transition Metal Catalysis – Functionalization of Carbenes and Strong Bonds
- Organocatalysis – Development of New Brønsted Acid
- Conversion of sugar and carbon dioxide to valuable chemicals



Catalytic Process



Natural Products



Bio-refinery

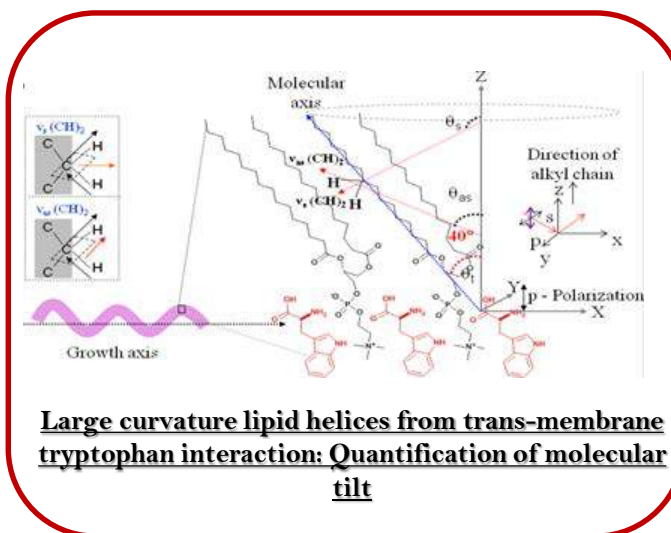
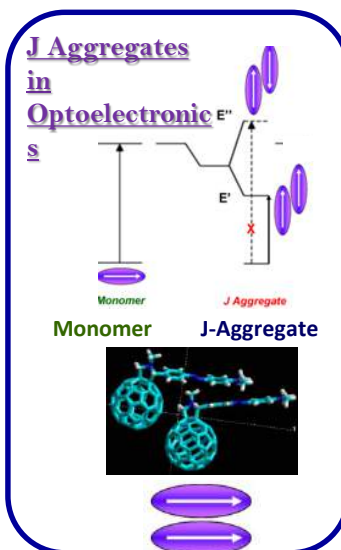
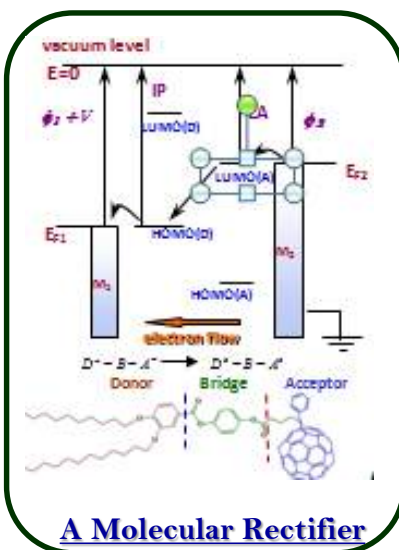
**Synthesis (Application) Driven Catalysis**



**Dr. Archita Patnaik**  
**PHD, Banaras Hindu University, India**  
 Professor, Dept. of Chemistry  
 044-2257-4217; archita@iitm.ac.in  
<http://chem.iitm.ac.in/professordetails/prof.archita/index.html>



- **Molecular Nanoscience and Electronics:** Molecular junctions: Donor-Bridge - Acceptor dyads as molecular rectifiers and configurational switches
- **Colloids and Interfaces:** Molecular self-assembly and functional materials, Stimuli responsive aggregates with finite curvature
- **Colloids and Interfaces:** Real-time polarized spectroscopy of interfaces: Bio-membranes and catalysis





**Dr. Arnab Rit**

Assistant Professor, Department of Chemistry

044-2257-4205; [arnabrit@iitm.ac.in](mailto:arnabrit@iitm.ac.in)

<http://www.iitm.ac.in/info/dept/CY>



## Major Areas of Research

- Synthesis, structure, and catalytic application of organometallic compounds
- Development of new ligand systems for Poly-nuclear complexes
- Novel Main-group compounds for small molecule activation
- Non-transition metal based hydrogen economy



Organometallic synthesis



Catalysis

main Group Elements

Be	B	C	N	O	F
Na	Al	Si	P	S	Cl
K	Ga	Ge	As	Se	Br
Sr	In	Sn	Sb	Te	I

Main-group chemistry

**Organometallic and Main-group chemistry**





# Dr. Arti Dua

PHD, IISc, Bangalore, India

Associate Professor, Dept. of Chemistry

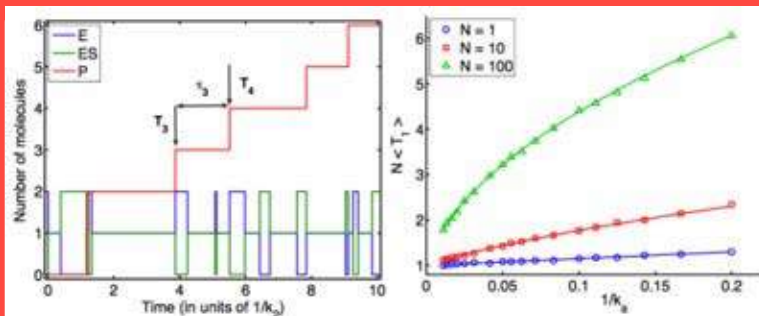
044-2257-4236; arti@iitm.ac.in

<http://chem.iitm.ac.in/professordetails/profartidua/index.htm>

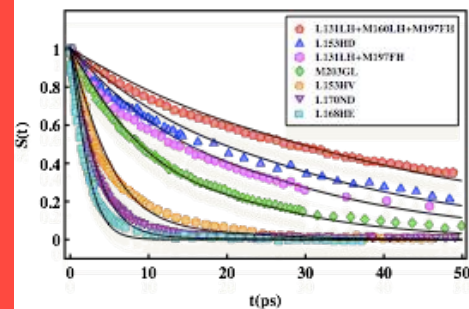


- Stochastic Processes in Chemistry and Biology
- Statistical Mechanics of Polymers and Biopolymers
- Biophysical Chemistry

## BROAD DESCRIPTION OF THE AREA OF RESEARCH



- Stochastic kinetics of chemical and biochemical reactions for small number of reactants.
- Enzyme kinetics at cellular level.
- Stochastic gene expression.
- Single-enzyme catalysis.



- Models of electron transfer reactions in protein matrix.
- Non-Markovian models for protein conformational fluctuations.
- Counterion condensation in polyelectrolytes.



# Dr. Ashok Kumar Mishra

PhD, IIT Kanpur, India

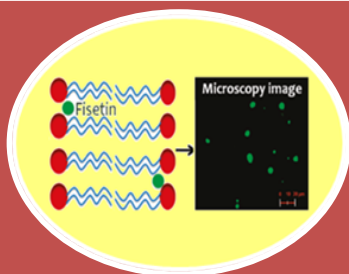
Professor, Dept. of Chemistry

044-2257-4207; mishra@iitm.ac.in

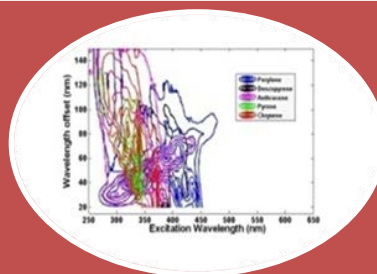
<http://chem.iitm.ac.in/professordetails/profmishra/index.htm>



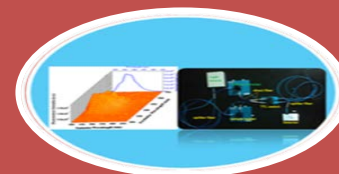
- Developing Fluorescent Molecular Probes and Imaging Dyes
- Introducing New Paradigms in Analysis of Complex Multifluorophoric Systems
- Developing Miniaturized Fiber Optic Fluorimeters with Novel Design Features



Fisetin, an Excited State Prototropism (ESPT) based fluorescent molecular probe introduced for lipid bilayer membranes: Reports on membrane properties and shows potential as an imaging dye.  
(J. Phys. Chem. B 2011, 115, 9962–9970)



The newly introduced 'Total Synchronous Fluorescence Spectroscopy' combines well with chemometric methods for the simultaneous quantification of polycyclic aromatic hydrocarbons in water samples  
(Anal. Methods, 2011, 3, 2616-2624)



'White light excitation fluorescence' (WLEF) introduced as a low cost, portable and non-destructive analytical technique for *in situ* / *online* analysis; viz. Quantification of pharmaceuticals in biofluids, Composition of fuel blends and adulterants in fossil fuels  
(Anal. Methods, 2011, 3, 362-368; Fuel, 10.1016/j.fuel.2013.02.043).



Dr. S. BASKARAN

PHD, IIT Kanpur, India

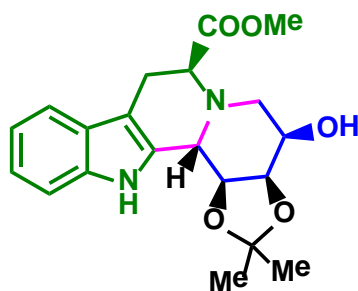
Professor, Dept. of Chemistry

044-2257-4218; sbhaskar@iitm.ac.in

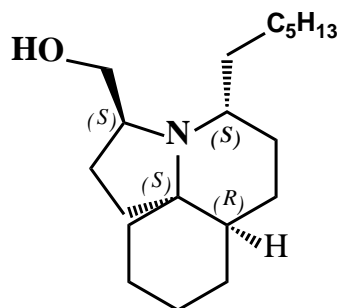
<http://chem.iitm.ac.in/professordetails/profsundarbabubaskaran/index.htm>



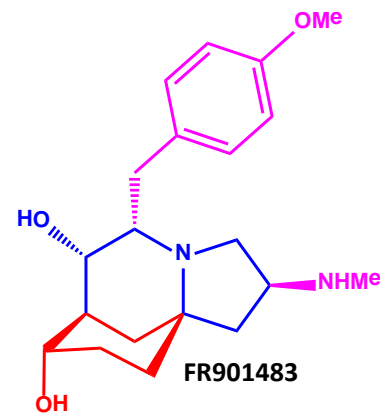
- Development of new strategies in Organic Synthesis
- Synthesis of Biologically active Natural Products
- Drug Design of Pharmaceutical Importance



Antidiabetic agent



(-) Lepadiformine A  
Anticancer agent



FR901483  
Immunosuppressant

Stereoselective Synthesis of Biologically Active Molecules



Dr. Beeraiah Baire

Ph.D., IISc Bangalore, India

Associate Professor, Dept. of Chemistry

044-2257-4206; beerut@iitm.ac.in

<http://chem.iitm.ac.in/professordetails/beeraiahbaire/>

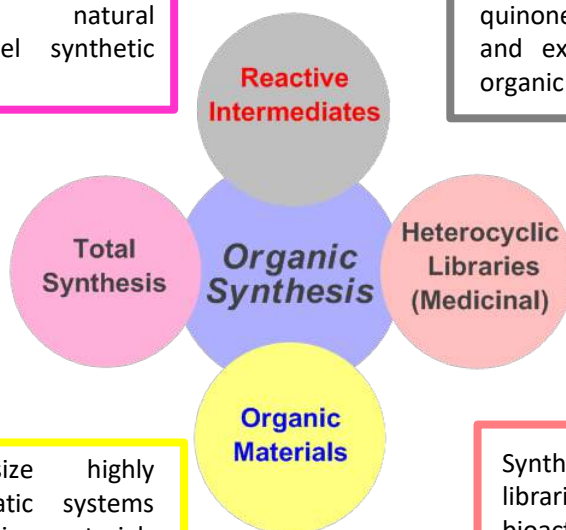


Motivated by the architecturally interesting, biologically and pharmaceutically important natural products to develop novel synthetic methodologies.

Novel synthetic strategies for the generation of reactive intermediates like quinone methids, ketenes and benzyne, and explore their novel reactivity for organic synthesis.

Design and synthesize highly conjugated, rigid aromatic systems which will exhibit interesting materials properties e.g. photochromic.

Synthesis of drug molecules and their libraries. Interested in studying the bioactivity of the newly synthesized libraries for drug leads in collaboration.

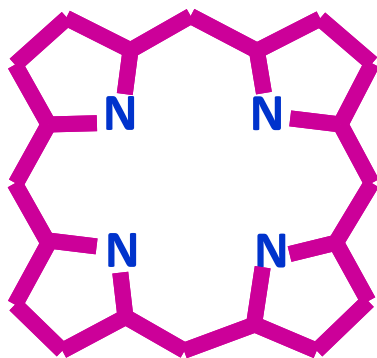




**Dr. Bhyrappa, P.**  
Ph. D., IISc., Bangalore  
**Professor, Department of Chemistry**  
Tel: 44 2257 4222; byra@iitm.ac.in  
<http://chem.iitm.ac.in/faculty/bhyrappa/>

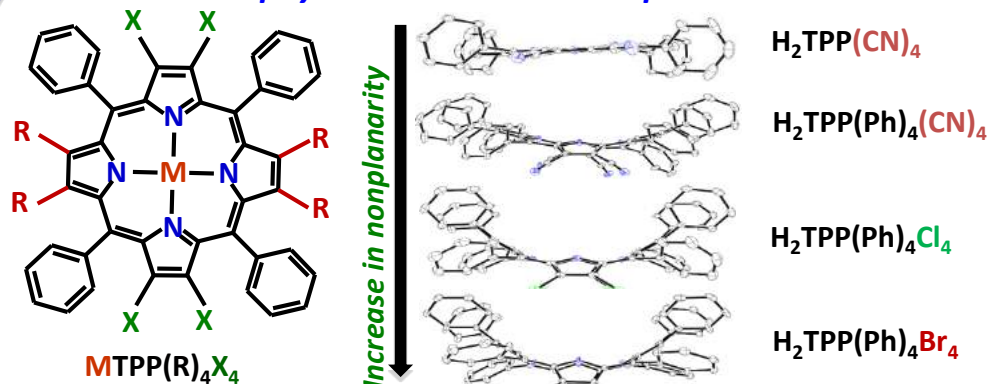


### Major Areas of Research



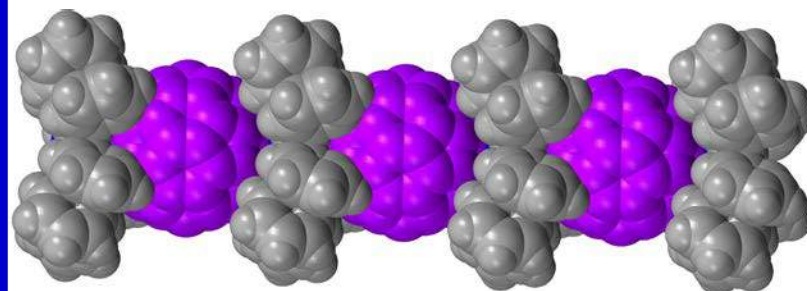
- *Biomimetic Models*
- *Porphyrin Synthesis*
- *Tunable Macrocycle Properties*
- *Supramolecular Chemistry*
- *Materials Chemistry (DSSCs)*
- *Catalysis*

#### *Porphyrins with Tunable Properties*



*Inorg. Chem.* 2006, 45, 4136; *Inorg. Chem.* 2009, 49, 3954.

#### *Porphyrin-Fullerene Cocrystallates*



*Inorg. Chem.* 2010, 49, 8389.

[Back to Top](#)





Dr. N. CHANDRAKUMAR

Ph.D. (IIT Kanpur, India)

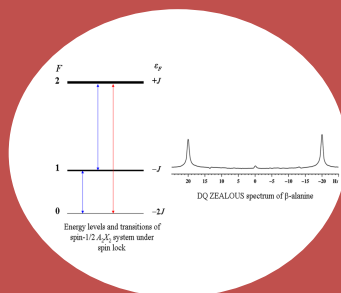
Emeritus Professor, Department of Chemistry

044-2257 4920; [nckumar@iitm.ac.in](mailto:nckumar@iitm.ac.in)

<http://chem.iitm.ac.in/professordetails/chandrakumar/index.htm>

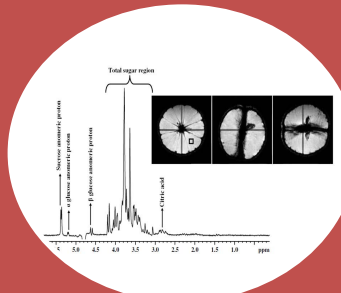


- Spin Dynamics and High Resolution NMR – Methodology development
- Spatially Resolved Magnetic Resonance – NMR Microimaging and MRS
- Dynamic Nuclear Polarization – Multi-band, multinuclear time domain DNP

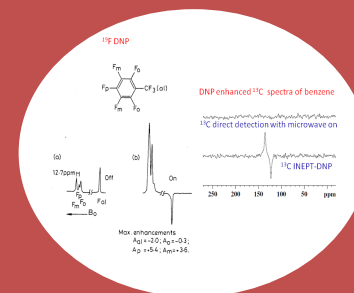


Rotating frame NMR techniques for accelerated spin dynamics, eg. ZEALOUS: a new experiment for “amplifying” homonuclear scalar couplings

Novel optimal homonuclear rare spin correlation experiments in direct and indirect detection modes with enhanced sensitivity



Volume Localized Spectroscopy (MRS) for Process Monitoring, eg. Fruit Ripening  
MRI and MRS techniques for: *in vitro* drug dissolution studies; electrochemical applications, eg. membrane permeability studies and *in situ* fuel cell imaging under load



$^{19}\text{F}$  and  $^{13}\text{C}$  DNP in solution state  
Differential DNP enhancement for structural information  
Spatially resolved DNP

**High Resolution Magnetic Resonance (MR) Spectroscopy and Spatially Resolved MR**



**DEBASHIS CHAKRABORTY (Dr.rer.nat.)**  
**Ph.D., University of Göttingen, Germany**  
**Professor, Dept. of Chemistry**  
**044-2257-4223; dchakraborty@iitm.ac.in**



- Organometallic Synthesis/Catalysts for Biodegradable Polymers and Copolymers
- Organometallic Synthesis/Catalysts for CO<sub>2</sub> Utilization and Sequestering
- Organic Synthesis/Metal Mediated Catalysis for Organic Reactions
- Organometallic Catalysts for Olefin Polymereization



**Polymer from Corn**



**Polymerization using CO<sub>2</sub>**



**Green Catalytic Systems for Organic Synthesis**

**FROM LABORATORY TO INDUSTRY**



# Dr. R. DHAMODHARAN

Ph.D, University of Massachusetts, USA

Professor, Dept. of Chemistry

044-2257-4204; damo@iitm.ac.in

<http://www.iitm.ac.in/http://chem.iitm.ac.in/https://sites.google.com/site/welcometoprofddhamodharangroup/>



- Controlled Radical Polymerization – Block Copolymers of Complex Architectures
- New Applications Using Biopolymers (Chitin, Cellulose, Rubber, Natural Gums)
- Polymer Light Emitting Diodes (PLED) and Electroluminescent (EL) Materials – Synthesis and Applications in Solar Energy Harvesting



Controlled Release of Nutrients  
Minerals and Water to Soil from  
Biodegradable Polymer  
Matrices (Sea Shell)



Environmental Remediation (Oil  
Spill, Metal ion Removal, Waste  
and Dye Water Treatment)



PLED and EL Materials

**BROAD DESCRIPTION OF THE BANDWIDTH/AREA OF RESEARCH**



# Dr. Dillip Kumar Chand

PhD, IIT Kanpur, INDIA

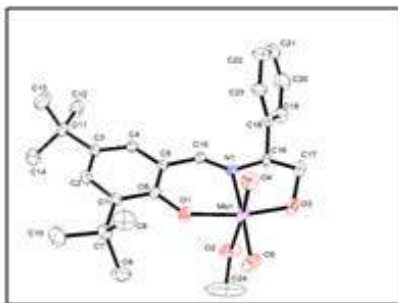
Professor, Dept. of Chemistry

044-2257-4224; dillip@iitm.ac.in

<http://chem.iitm.ac.in/professordetails/profdillip/index.htm>



- Supramolecular Chemistry: Self-assembled coordination cages from palladium(II) and organic ligands.
- Homogeneous catalysis: Molybdenum containing catalysts for organic transformation reactions.
- Nanoscience: Synthesis and functional (e.g. catalysis) aspects of metal nanoparticles.





Dr. Edamana Prasad

PHD, Kerala University, IN

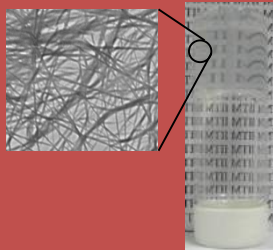
Professor, Dept. of Chemistry

044-2257-4232; pre@iitm.ac.in

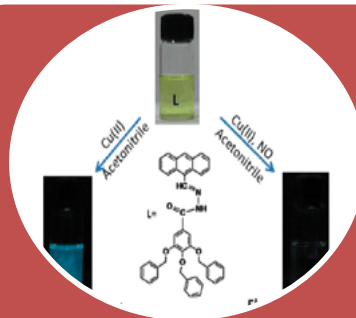
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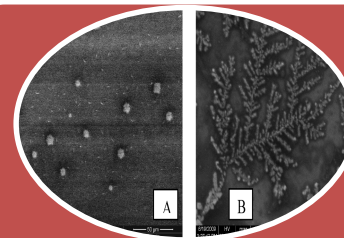
- Self Assembly of Macromolecules
- Photophysics of the Self Assembled Systems



Developing Novel Gel Systems



Developing Sensors for Anions,  
Toxic Metal Ions



Develop Fundamental Knowledge  
about the Mechanism of Self  
Assembly in Macromolecules





# Dr. Indrapal Singh Aidhen

PhD, University of Pune, India

Professor, Dept. of Chemistry

044-22574219; [isingh@iitm.ac.in](mailto:isingh@iitm.ac.in)

<http://chem.iitm.ac.in/professordetails/profsingh/index.htm>



- Synthetic Organic/Carbohydrate Chemistry
- Synthesis of Biologically important Molecules
- Developing Methodologies/Building blocks for Target Driven Synthetic Endeavours

Major research interests have been in three directions. The first direction aims at developing *novel* Synthetic equivalents based on Weinreb amide (WA) functionality and their applications in synthesis of important molecules. The second direction aims at the synthesis of important and challenging targets from the realm of carbohydrate chemistry. The chosen targets belong to the class of C-glycosides and Aza-analogues. The third direction aims at developing new synthetic strategies and building blocks for biologically/medicinally important molecules.

# Dr. Kothandaraman Ramanujam

## Associate Professor, Dept. Chemistry



### Areas of Interest:

Dye Sensitized Solar Cells **Perovskite Solar Cells**

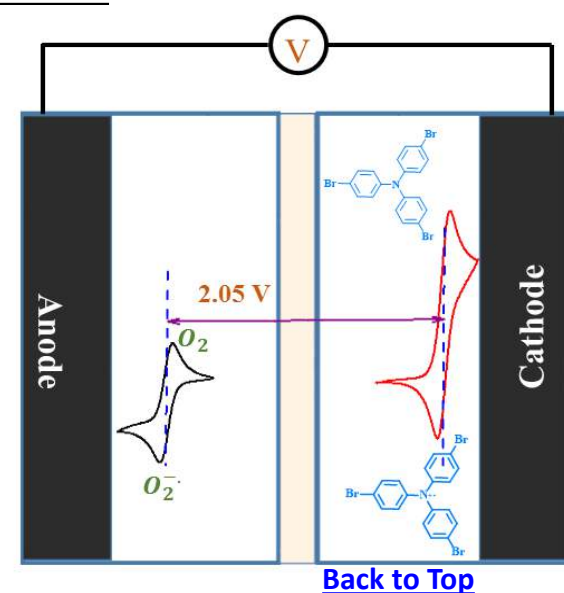
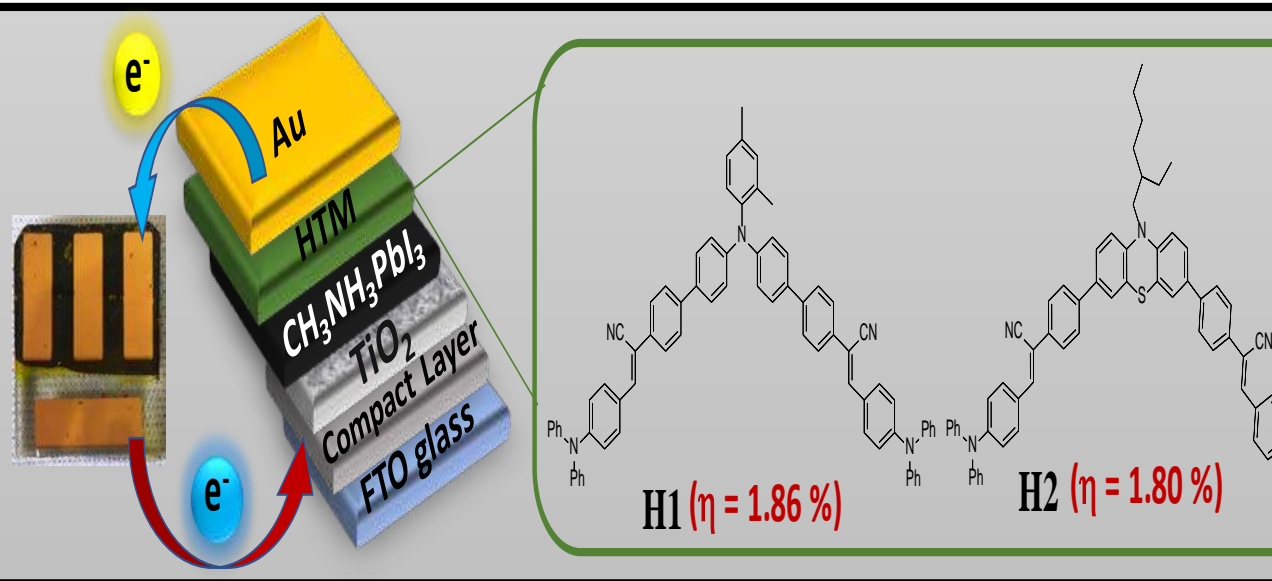
Redox Flow Battery ( Vanadium and Organic)

Organic electrode Materials for Li/Na ion Batteries

Flexible Battery

**Molecularly Imprinted Polymers**

Sensors



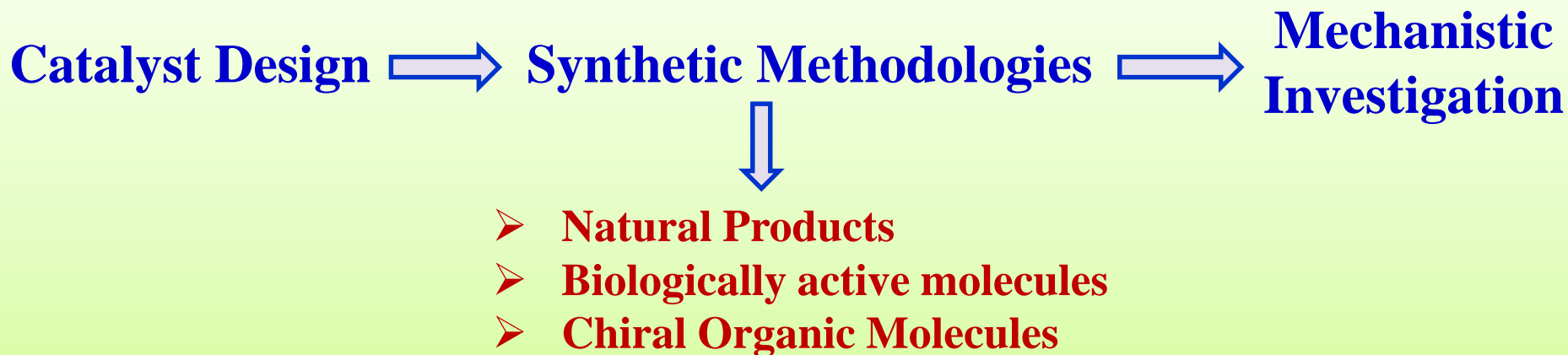


**Dr. Masilamani Jeganmohan**  
**Associate Professor, Department of Chemistry**  
**044-2257-4211, [mjeganmohan@iitm.ac.in](mailto:mjeganmohan@iitm.ac.in)**  
**<http://www.iitm.ac.in/info/dept/CY>**



## **Major Areas of Research**

- ❑ **Transition metal complexes as catalysts in organic synthesis:**
  - ❖ **Metal-catalyzed C-H bond functionalization reactions**
  - ❖ **Metal-catalyzed cyclization and addition reactions**
- ❑ **Asymmetric synthesis by using chiral metal complexes as catalysts**
- ❑ **Natural products and biologically active molecules synthesis**





# Dr. Muraleedharan K. M.

Ph.D. NIIST Trivandrum (Kerala University), India

Professor, Dept. of Chemistry

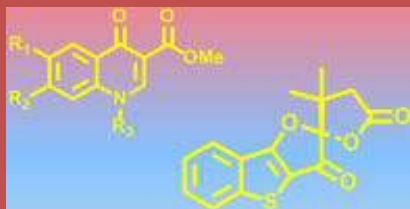
044-2257-4233; mkm@iitm.ac.in

<http://www.chem.iitm.ac.in/professordetails/profmurali/page/index.html>

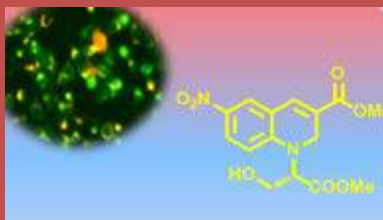


## Research Areas:

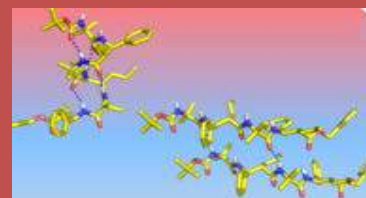
- **Synthesis of biologically active organic compounds**
- **Synthetic peptides for therapeutic applications**
- **Development of soft organic materials through controlled self-assembly**



**Organic  
Synthesis**



**Drug design**



**Synthetic mimics  
of Peptides and  
carbohydrates**

**Bio-Organic and Medicinal Chemistry**



# Dr. N. Narasimha Murthy

Ph.D., IISc, Bangalore

Professor, Dept. of Chemistry

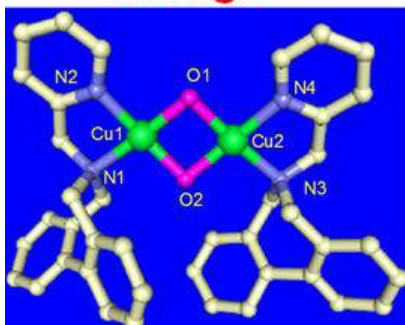
044-2257-4225; murthy@iitm.ac.in

[http://www.chem.iitm.ac.in/Faculty\\_murthy.html](http://www.chem.iitm.ac.in/Faculty_murthy.html)

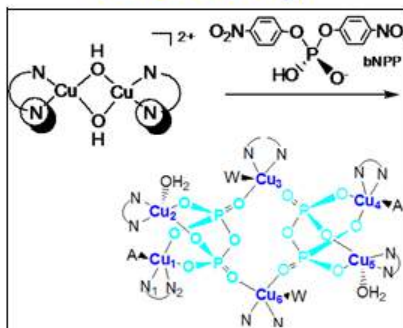


- Bioinorganic chemistry of copper and iron
- Activation of  $O_2$ , stabilization of M- $O_2$  adducts, their spectroscopy and catalysis
- Design of binuclear DNA metallohydrolases model for cleavage of P-O bond
- Self-assembly of iron-oxo aggregates
- $^1H$  NMR and EPR spectroscopy of paramagnetic metal complexes

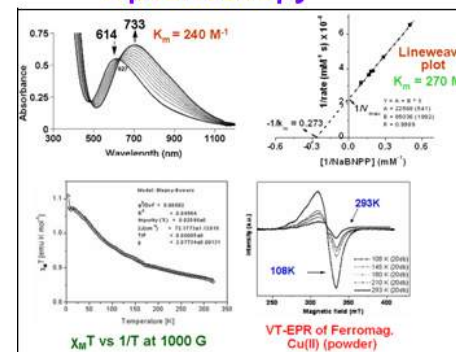
## Design



## Reactivity



## Spectroscopy







# Professor T. Pradeep

## Ph.D. (Indian Institute of Science, India)

Professor, Department of Chemistry

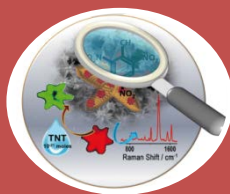
+91-44-2257-4208; [pradeep@iitm.ac.in](mailto:pradeep@iitm.ac.in)

<http://www.iitm.ac.in/component/faculty/138/pradeep/>

Most updated link: <http://www.dstuns.iitm.ac.in/t-pradeep.php>



- **Research Area/Focus 1:** Molecular and nanoscale materials
- **Research Area/Focus 2:** Drinking water purification
- **Research Area/Focus 3:** Ice chemistry



**Advanced  
Sensors**



**Water  
Purification**



**Ice Chemistry**

← Diverse nanomaterials and their properties in the context of affordable clean water; with emphasis on understanding phenomena →



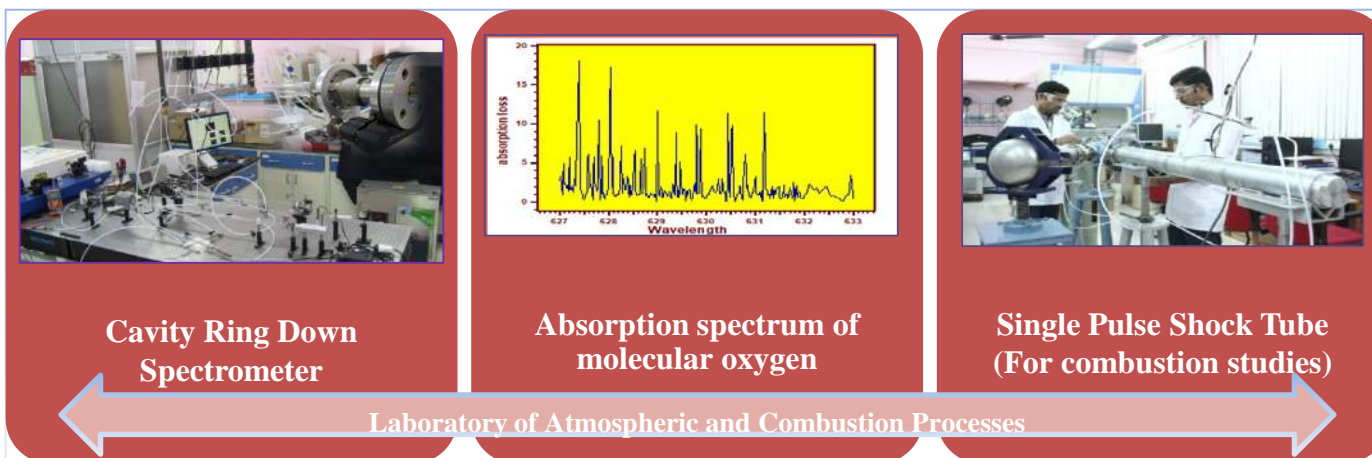
# DR. RAJAKUMAR BALLA

Professor, Department of Chemistry

044 – 2257 4231; rajakumar@iitm.ac.in



- Atmospheric lifetimes of VOCs, CFC/HFC alternatives, biogenically and anthropogenically emitted compounds. Absorption cross-sections and quantum yields of trace and transient species in the Earth's atmosphere; Global Warming Potentials; Ozone depletion and production potentials
- Cavity Ring Down Spectroscopy; Pulsed Laser Photolysis – Laser Induced Fluorescence
- Single Pulse Shock Tube studies on combustion of fuels/bio-fuels – Atomic Resonance Absorption Spectroscopic (ARAS) techniques
- Computational studies and kinetic simulations



All the above are fabricated/developed at IITM

[Back to Top](#)



# Dr. RAMESH GARDAS

PhD, South Gujarat University, India

Associate Professor, Dept. of Chemistry

044-2257-4248; Gardas@iitm.ac.in

<http://www.iitm.ac.in/component/faculty/138/gardas>



- Ionic Liquids
- Solution Thermodynamics
- QSPR and Group Contribution Methods



Green Solvents



Phase Equilibria



Process &  
Product Design

← Experimental and Predictive Thermodynamic Data →



# Dr. G. Ranga Rao

PhD, Indian Institute of Science, India

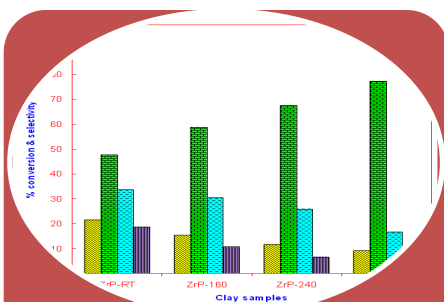
Professor, Dept. of Chemistry

044-2257-4226; grrao@iitm.ac.in

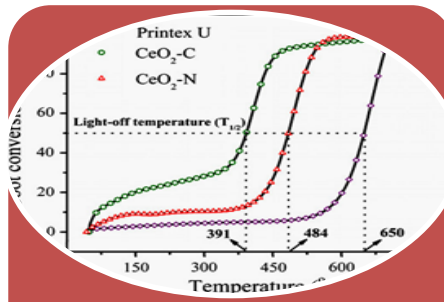
<http://chem.iitm.ac.in/departement.html>



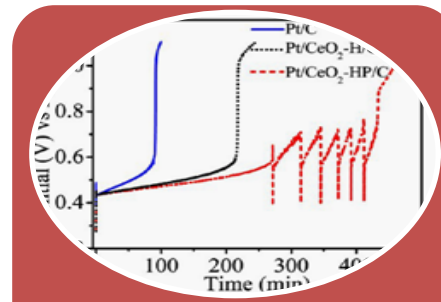
- Surface and nanomolecular catalysis: rare earth oxides, transition metal oxides and polyoxometalate compounds
- Solid state electrochemistry : electrocatalysis and supercapacitors
- Materials chemistry : porous materials, hybrid and functional materials



Pillared catalysts



Soot combustion activity



Eliminating CO poison on Pt

Materials chemistry : synthesis, catalysis, electrocatalysis, solid state electrochemistry



# M. V. Sangaranarayanan

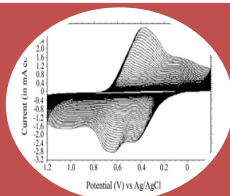
Ph.D, IISc Bangalore

Professor, Department of Chemistry

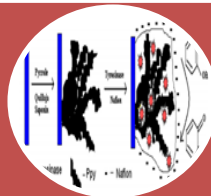
044-22574209; sangara@iitm.ac.in



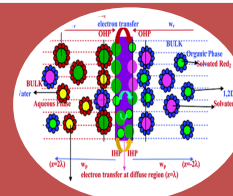
- Modelling of Electrochemical Interfaces
- Biosensors and Supercapacitors
- Electron transfer at liquid/liquid interfaces



Supercapacitors



Biosensors



Liquid/Liquid  
interfaces





# Dr. Sanjay Kumar

## Professor, Chemistry

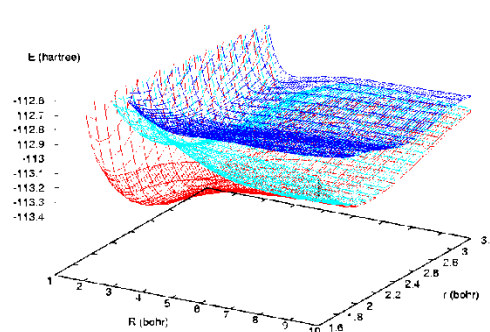
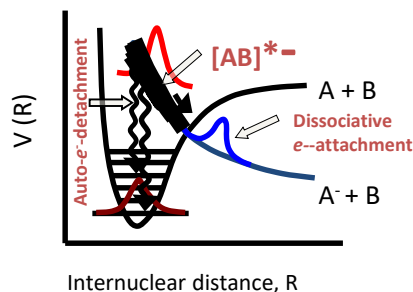
044-2257-4227; sanjay@iitm.ac.in

<http://www.iitm.ac.in/info/fac/sanjay>



### Major Areas of Research

- Theoretical Chemistry, Quantum Molecular Reaction Dynamics
- High level *ab initio* bound-state quantum calculations and quantum dynamics of fundamental elementary chemical reactions
- Ion-molecule and low-energy resonant electron-molecule collisions, nonadiabatic (beyond the Born-Oppenheimer approximation) dynamics
- Computational modeling of chemical (organic) reactions & their mechanistic pathways





# Dr. S. SANKARARAMAN

## PhD, University of Victoria, BC, Canada

Professor, Dept. of Chemistry

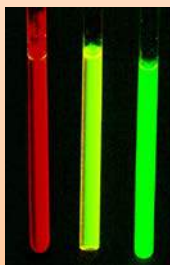
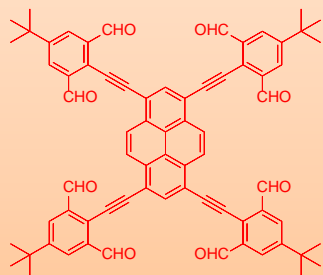
044-2257-4210; [sanka@iitm.ac.in](mailto:sanka@iitm.ac.in)

<http://chem.iitm.ac.in/professordetails/profsankaraman/index.htm>



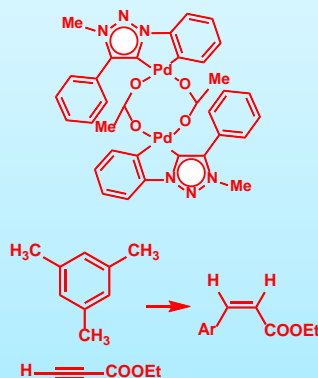
- Synthetic and mechanistic organic chemistry – acetylene and olefin chemistry
- Synthetic Organometallic chemistry and catalysis – NHC-metal chemistry
- Catalytic carbonylative annulation reactions using carbon monoxide gas

### Molecules for photonics and electronics applications



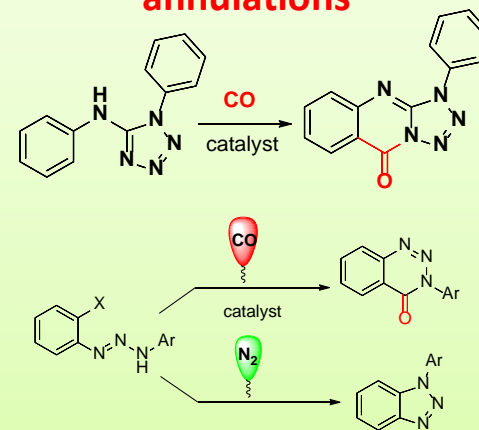
*Org. Lett.* **2006**, 8, 2739-2742  
*Org. Biomol. Chem.*, **2010**, 8, 2260-2266

### NHC-Pd Catalyst (hydroarylation reaction)



*Organometallics*, **2011**, 30, 1689-1694  
*Tetrahedron Lett.*, **2009**, 50, 5834-5837

### Catalytic carbonylative annulations



*J. Org. Chem.*, **2017**, 82, 11487  
*Eur. J. Org. Chem.*, **2016**, 4817

[Back to Top](#)



# Dr. G. Sekar

Ph.D. (IIT Kanpur, India)

Professor, Dept. of Chemistry

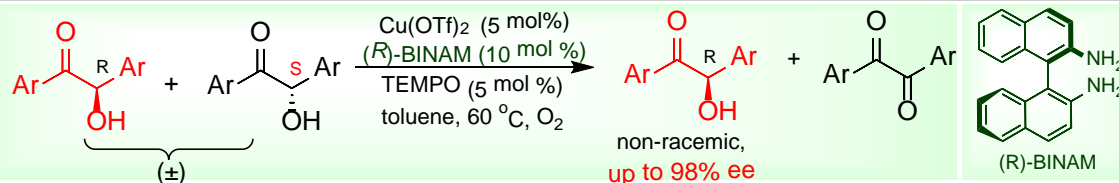
044-2257-4229; gsekar@iitm.ac.in

<http://chem.iitm.ac.in/faculty/sekar/>

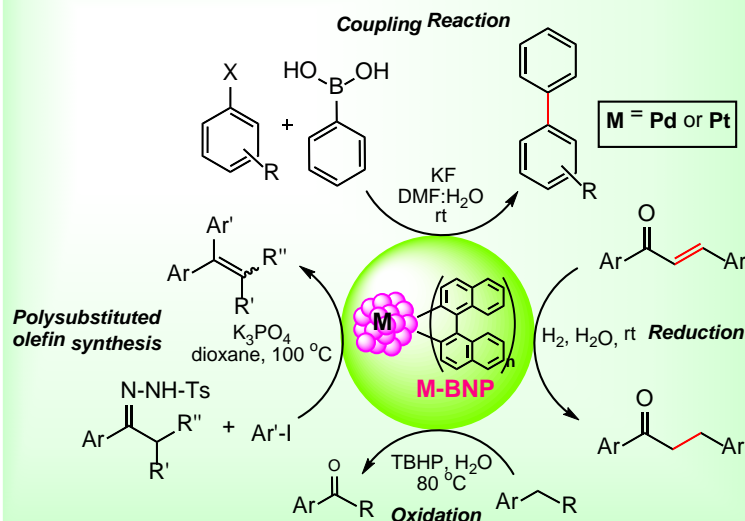


- Asymmetric synthesis
- Metal nanocatalysts
- Halogen bonding catalysts

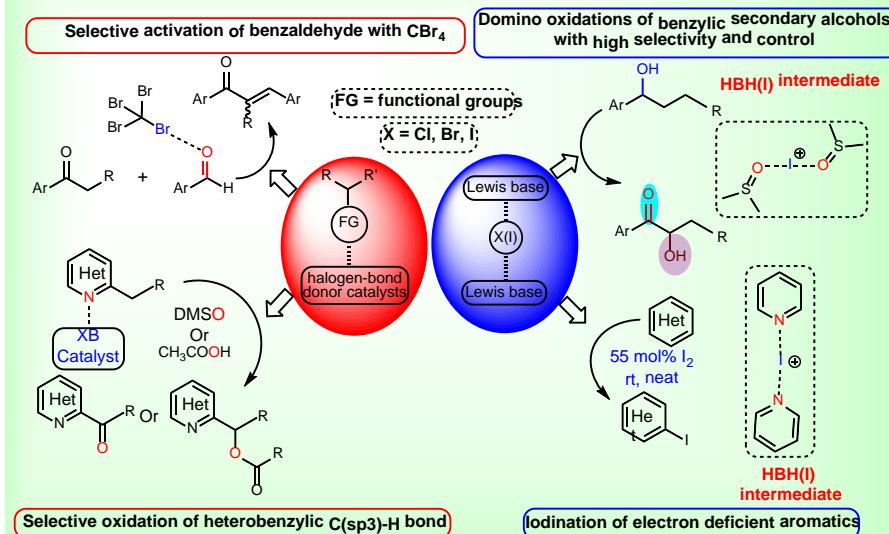
**Enzyme Model:** Biomimetic, Enantiomer Differentiating, Oxidation of Alcohols by Chiral Copper Complex



## Metal nanocatalysts (covalent bond stabilization)



## Halogen bonding catalysts



[Back to Top](#)



# Dr. P. SELVAM

PhD, IIT-Madras

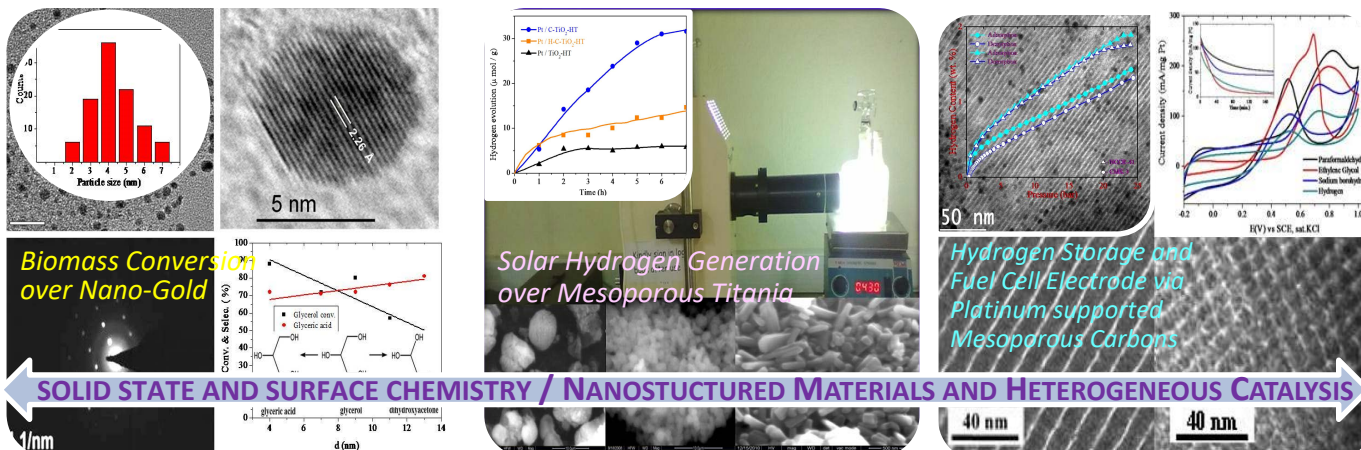
Professor, Dept. of Chemistry & NCCR

044-2257-4235; selvam@iitm.ac.in

<http://www.nccr.iitm.ac.in/staff/selvam.htm>



- GREEN CHEMISTRY AND CATALYSIS, BIOMASS CONVERSION, FUEL CELLS
- $H_2$  ENERGY,  $CO_2$  PHOTOREDUCTION,  $NO_x$  REDUCTION AND VOC ABATEMENT
- ORDERED POROUS MATERIALS (ZEOLITE-TYPE) FOR ORGANIC TRANSFORMATION





# Dr. Sundargopal Ghosh

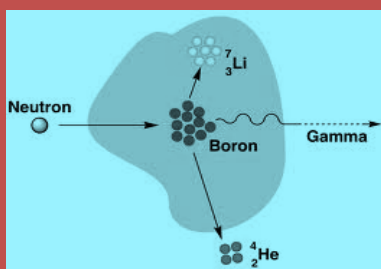
## Professor, Department of Chemistry

(+91) 44-2257-4230; [sghosh@iitm.ac.in](mailto:sghosh@iitm.ac.in)  
<http://chem.iitm.ac.in/professordetails/profghosh>

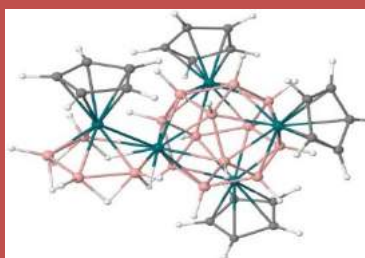


### Major Areas of Research

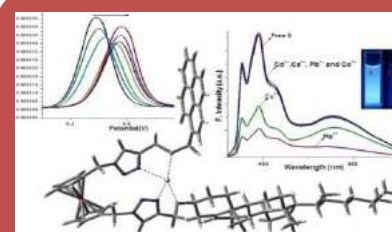
- Synthetic main group cluster chemistry, mainly polyhedral borane.
- Rare-earth metallaborane clusters; Metal-borides from metallaboranes.
- Metallaboranes in catalysis: Functionalization of hydrocarbons; catalytic cyclotrimerization of alkynes.
- Molecular recognition: Design and synthesis of new ferrocene derivatives containing boron centered functionalities.



Boron Neutron Capture Therapy



Supraicosahedral Clusters



MgB<sub>2</sub> the Superconductor  
 Multichannel Probe for Metal Ions



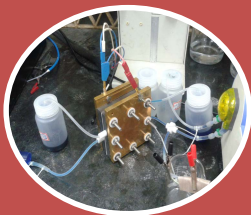


# Dr. U.V. Varadaraju

Ph.D. IISc., Bengaluru, India  
Professor, Department of Chemistry  
044-2257-4215; varada@iitm.ac.in



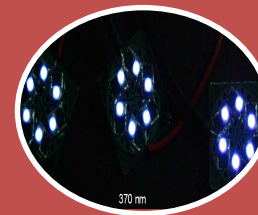
- Redox flow and Li-ion batteries for energy storage
- Environmentally benign rare-earth based pigments
- Rare-earth based phosphors for solid state lighting (LED's)
- Thermoelectric materials for energy conversion (heat-to-electricity)



Prototype of  
Redox flow cell



Rare-earth sulfide pigments



Rare-earth based phosphor  
for white light generation in  
LED's

All the above are fabricated/developed at IITM

[Back to Top](#)



Dr. Venkatakrishnan, P

Ph.D, IIT Kanpur, India

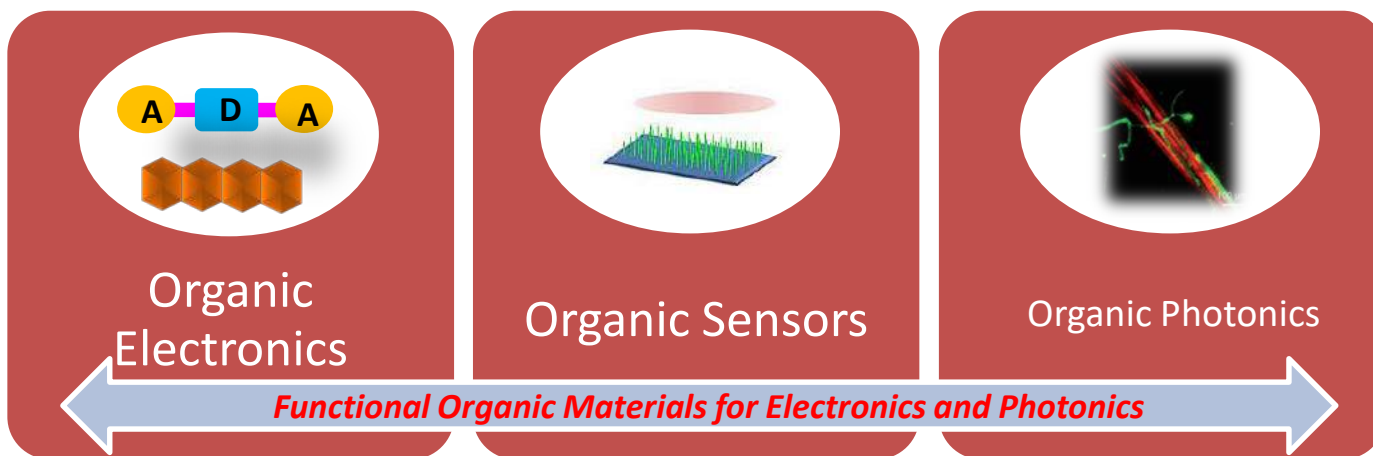
Assistant Professor, Dept. of Chemistry

044-2257-4243; pvenkat@iitm.ac.in

<http://chem.iitm.ac.in/professordetails/Venkatakrishnan.pdf>



- Organic Electronics – Organic Materials for Solar Cells and Transistors
- Organic Sensors – Developing Organic Materials for Solid-State Sensing
- Organic Photonics – Brilliant Organic Emitter Dyes for Bio-Imaging





# Dr. K. VIDYASAGAR

Ph.D., Indian Institute of Science, India

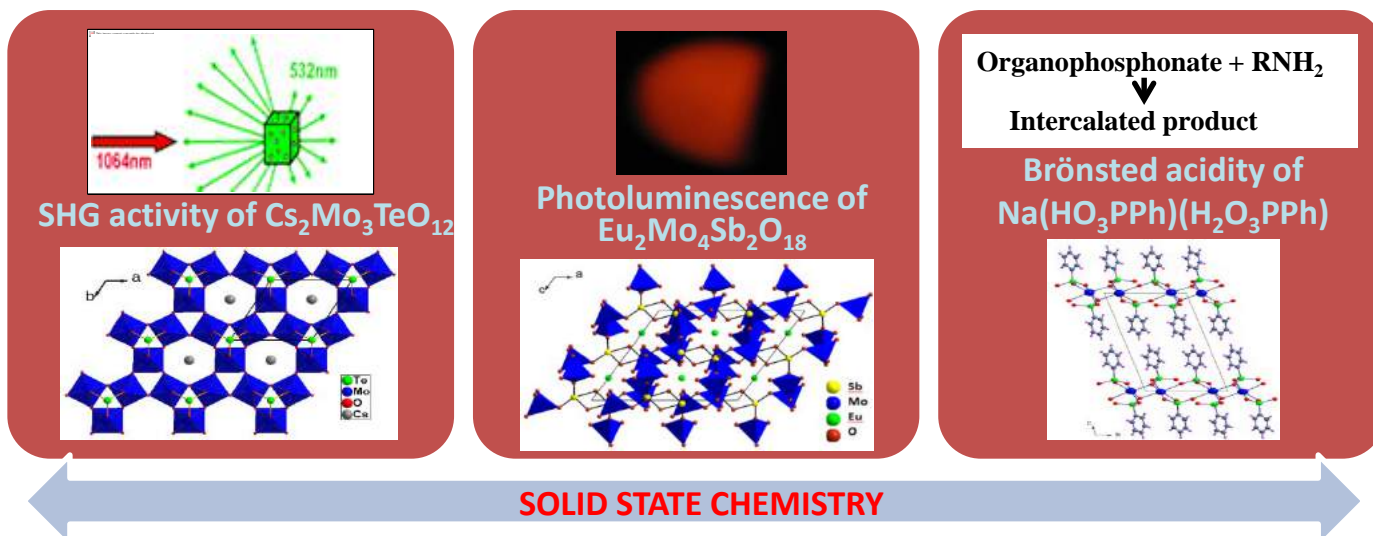
Professor, Dept. of Chemistry

044-2257-4221; kvsagar@iitm.ac.in

<http://chem.iitm.ac.in/professordetails/profvidyasagar/index.htm>



- Syntheses, structure and properties of NEW solid state compounds
- Oxides, Chalcogenides and Organo-phosphonates
- Potential applications: SHG activity, luminescence, ion-exchange etc.





INDIVIDUAL FACULTY PROFILE

# DEPARTMENT OF CIVIL ENGINEERING

# LIST OF FACULTY

[Alagappan Ponnalugu](#)

[Alagusundaramoorthy P](#)

[Amlan K Sengupta](#)

[Ananthanarayanan K](#)

[Arul Jayachandran](#)

[Arun Menon](#)

[Ashwin Mahalingam](#)

[Atul Narayan S. P](#)

[Balaji Narasimhan](#)

[Benny Raphael](#)

[Bhargava Rama Chilukuri](#)

[Boominathan A.](#)

[Dali Naidu Arnepalli](#)

[Devdas Menon](#)

[Dodagoudar G.R](#)

[Gandhi S.R \(Profile yet to be uploaded\)](#)

[Gangolu Appa Rao \(Profile yet to be uploaded\)](#)

[Gitakrishnan Ramadurai](#)

[Indumathi M Nambi](#)

[Karthik K Srinivasan](#)

[Koshy Varghese](#)

[Lakshmi Priya Subramanian](#)

[Lelitha Devi Vanajakshi](#)

[Ligy Philip](#)

[Maji V.B](#)

[Manu Santhanam](#)

[Mathava Kumar S](#)

[Meher Prasad A](#)

[Mohan S](#)

[Murali Krishnan J](#)

[Murty B.S](#)

[Murty C.V.R](#)

[Nageswara Rao B](#)

[Piyush Chaunsali](#)

[Radhakrishna G Pillai \(Profile yet to be uploaded\)](#)



[Raghukanth S.T.G](#)

[Rajagopal K](#)

[Ramamurthy K](#)

[Ravindra Gettu](#)

[Robinson R.G](#)

[Rupen Goswami](#)

[Sachin S Gunthe](#)

[Saravanan U](#)

[Satish Kumar S.R](#)

[Satyanarayana K.N](#)

[Shiva Nagendra S.M](#)

[Sivakumar Palaniappan](#)

[Sivanandan R](#)

[Soumendra Nath Kuiry](#)

[Srinivasan K \(Profile yet to be uploaded\)](#)

[Subhadeep Banerjee](#)

[Sudheer K.P](#)

[Tarun Naskar \(Profile yet to be uploaded\)](#)

[Thyagaraj T](#)

[Veeraragavan A](#)

[Venkatraman Srinivasan](#)

[Venu Chandra](#)



**Dr. Alagappan Ponnalagu**  
Assistant Professor, Civil Engineering  
044-2257-4320; alagappan@iitm.ac.in

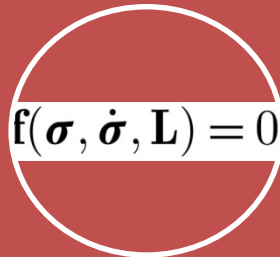


## Major Areas of Research

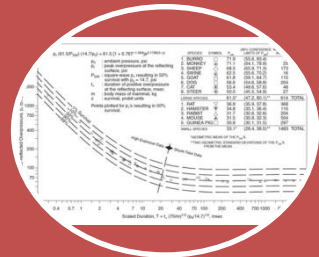
- Modelling of ballistic and blast resistant structures
- Impact studies of fast moving projectile on nuclear domes
- Damage modelling
- Aortic dissection and Aneurysm



Develop experimental setup to study the ballistic and blast impact on structures



Developing a robust model taking into account the current drawbacks



Developing a safety criterion for ballistic and blast prone structures

Dynamic response of viscoelastic materials subjected to ballistic and blast impact



Dr. P. Alagusundaramoorthy

Ph.D., IIT Madras, India

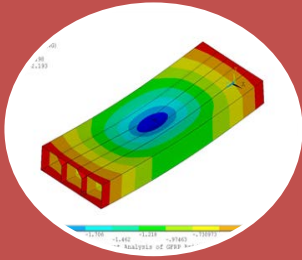
Professor, Dept. of Civil Engineering

044-2257-4276; [aspara0@iitm.ac.in](mailto:aspara0@iitm.ac.in)

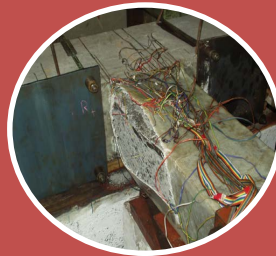
<http://www.civil.iitm.ac.in/faculty#st>



- Advanced Composite Structures
- FRP Composites in Retrofitting and Rehabilitation of Structures
- Heat Straightening Process of Steel Structures



FRP Composites in Civil Infrastructure, Ship Structures, Offshore Oil Platforms and Aircraft Structures



Static and Seismic Strengthening of Concrete, Steel and Masonry Structures with GFRP and CFRP Composites



Heat Straightening Process for Damage in Strong Axis, Weak Axis, Twisting and Bulging of Steel Structural Members



# AMLAN K. SENGUPTA, PE

PhD, Missouri University of Science & Technology Rolla, USA

Professor, Dept. of Civil Engineering

044-2257-4277; [amlan@iitm.ac.in](mailto:amlan@iitm.ac.in)

<http://www.iitm.ac.in/component/faculty/70/amlan/>



- Behaviour of reinforced and pre-stressed concrete members
- Earthquake engineering as applicable to building design
- Assessment of concrete bridge decks for deterioration



Shear Walls



Building Frames



Bridge Decks

**Numerical analysis and experimental investigation of structural concrete members**



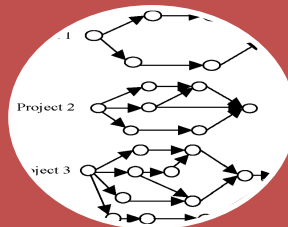
**Dr.K.Ananthanarayanan**  
**PHD, I.I.T., Madras. INDIA**  
Professor, Dept. of Civil Engineering  
044-2257-4278; [kananth@iitm.ac.in](mailto:kananth@iitm.ac.in)  
<http://www.civil.iitm.ac.in/...>



- Resource Constrained Multiple Construction Projects
- Multi-project scheduling and control
- Supply Chain Management in Large Construction Projects



The scheduling of repetitive construction projects with the resource constraints considering idle time and continuous resource deployment.



Performance analysis of scheduling rules in resource-constrained multiple projects.



Improving the efficiency of supply chain within the large construction site to minimize the resource travel time.





**Dr. ARUL JAYACHANDRAN**

**PhD, IIT Madras, India**

**Professor, Dept. of Civil Engineering**

044-2257-4292; aruls@iitm.ac.in



- Stability design of structural steelwork
- Cold-formed/ Light Gauge Steel structures
- Glass structural engineering



LGS / Cold formed steel  
housing



Advanced analysis and  
design of structural  
steelwork



Structural Glass and  
façade engineering

**Steel and glass blended for sustainable structures in India**



# Dr. Arun Menon

Ph.D., University of Pavia, Italy

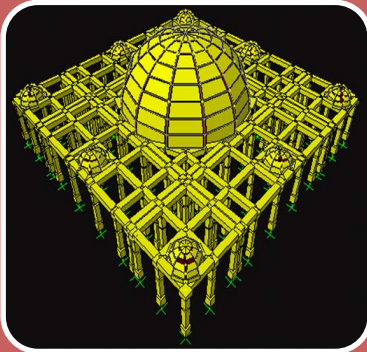
Associate Professor, Dept. of Civil Engineering

044-2257-4299; arunmenon@iitm.ac.in

[http://www.civil.iitm.ac.in/new/?q=arun\\_edu](http://www.civil.iitm.ac.in/new/?q=arun_edu)



- ❖ Structural Safety of Historical Monuments
- ❖ Seismic Behaviour, Assessment and Retrofit of Masonry Structures
- ❖ Seismic Risk Assessment of Structures at Urban Scale
- ❖ Historical Seismicity and Seismic Hazard Analysis



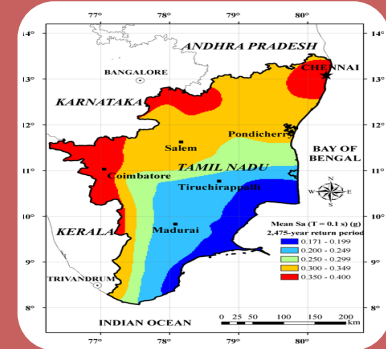
**STRUCTURAL  
MODELLING &  
ANALYSIS**



**SEISMIC BEHAVIOUR  
OF MASONRY**



**FIELD &  
LABORATORY  
INVESTIGATIONS**



**SEISMIC HAZARD  
ANALYSIS**



# Dr. ASHWIN MAHALINGAM

## PHD, Stanford University, USA

Associate Professor, Dept. of Civil Engg

044-2257-4318; mash@iitm.ac.in

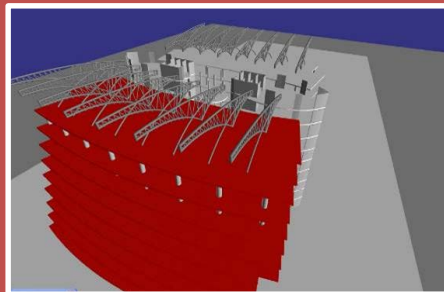
[http://www.civil.iitm.ac.in/new/?q=ash\\_edu](http://www.civil.iitm.ac.in/new/?q=ash_edu)



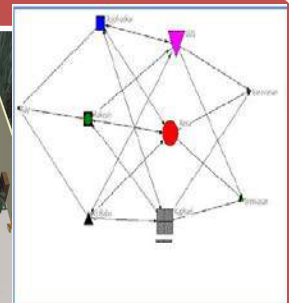
- Infrastructure Policy and Public Private Partnerships
- Virtual Planning, Design and Construction
- Sustainability and Globalization in the Architecture, Engineering and Construction (AEC) Industry



**Infrastructure Policy:** When should PPPs be selected? How can they best be structured? What challenges arise as these projects are operational ?



**Virtual Planning, Design and Construction:** Can Stakeholder Input be brought into planning using IT tools? How can project planning be optimized using visualization? How can technology adoption be enhanced?



**Sustainability and Globalization:** How can Virtual Teams in the AEC industry work together effectively? How can they design and create a sustainable built environment?



**Dr. Atul Narayan SP**

**PhD, Texas A&M University**

**Assistant Professor, Department of Civil Engineering**

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<http://www.civil.iitm.ac.in/atulnryn>



- Bitumen
- Bituminous concrete
- Granular materials
- Cement paste and fresh concrete



**Experimental characterization**

$$f(T, \dot{T}, \dots, D, \dot{D}, \dots) = 0$$
$$T \cdot D - \rho \dot{\psi} \geq 0$$

**Modeling within the  
framework of continuum  
mechanics**



**Prediction of field  
performance**

**Material characterization and performance prediction**

[Back to Top](#)



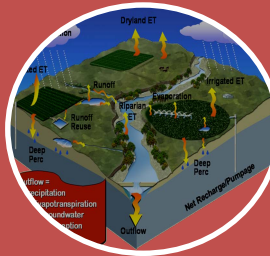
**Dr. Balaji Narasimhan**  
**PHD, Texas A&M University, USA**  
Associate Professor, Dept. of Civil Engineering  
044-2257-4293; [nbalaji@iitm.ac.in](mailto:nbalaji@iitm.ac.in)  
<http://www.iitm.ac.in/component/faculty/70/nbalaji/>



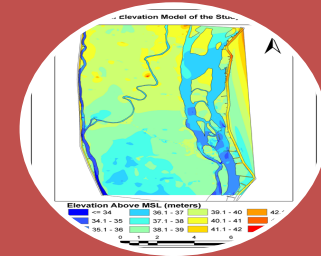
- Remote Sensing and GIS
- Hydrological Modeling
- Irrigation water management



Crop Evapotranspiration,  
Inter-basin water transfer,  
Irrigation efficiency



Impact of climate and  
landuse changes on the  
water resources



Floods & droughts extent,  
magnitude, duration and  
frequency



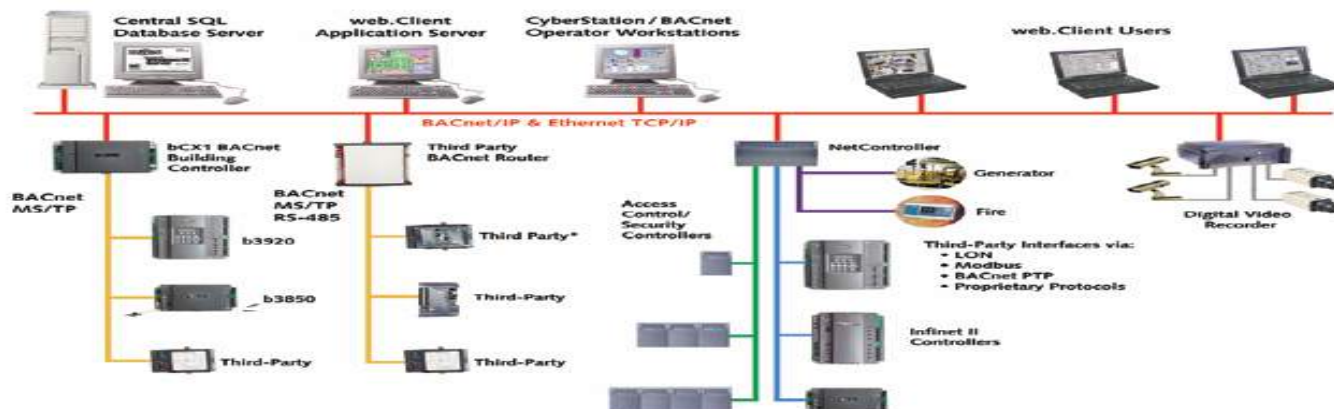
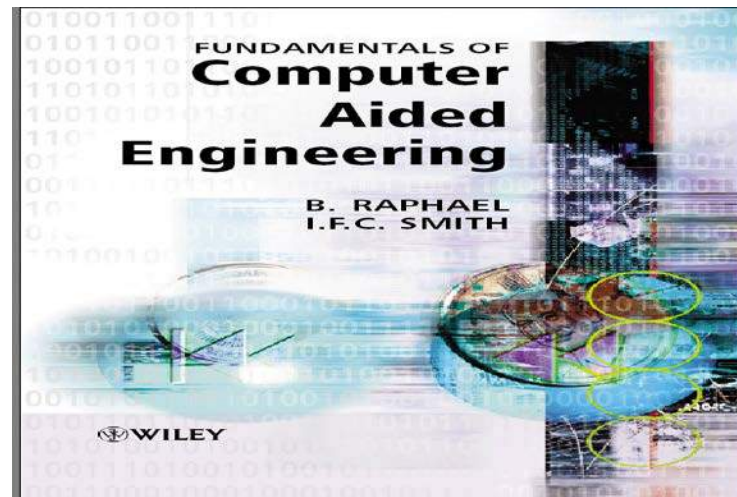


**Dr. Benny Raphael**  
Professor, Civil Engineering  
044-2257-4310; benny@iitm.ac.in  
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## Major Areas of Research

- Building Automation and Control
- Computer Aided Engineering: Modeling, Optimization, Data mining
- Energy efficient buildings: Sustainable and smart building





# Dr. Bhargava Rama Chilukuri

Assistant Professor, Civil Engineering

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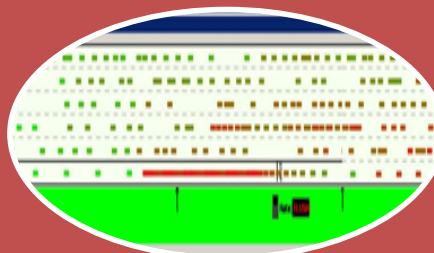


## Major Areas of Research

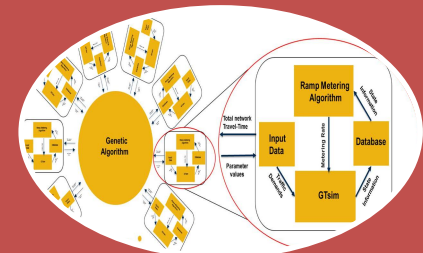
- Traffic Flow Theory of Homogenous and Heterogeneous Traffic
- Numerical Simulation of Traffic Flow Models
- Optimal Control of Traffic Systems



Develop analytical models for homogenous and heterogeneous traffic flow based on empirical data



Numerical simulation of the traffic flow models to validate and fine-tune them



Optimal control of traffic systems and traffic network flow

Traffic Flow Theory and Optimal Control



Dr. A. Boominathan  
Ph. D., MGSU, RUSSIA

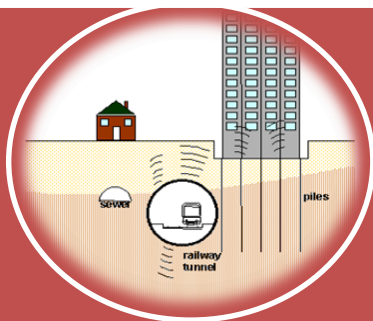
Professor, Dept. of Civil Engineering

044-2257-4275; boomi@iitm.ac.in

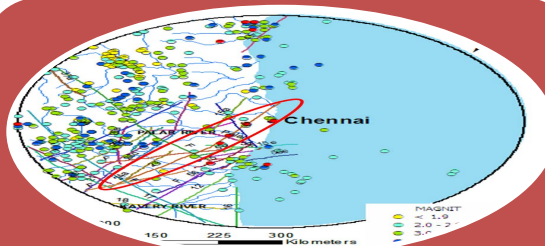
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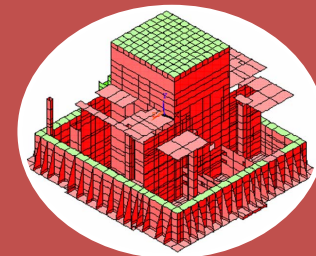
- **Soil Dynamics and Liquefaction**
- **Earthquake Geotechnical Engineering**
- **Foundations subjected to Cyclic and Dynamic loads**



## Underground Train induced Vibrations, Liquefaction Analysis and Ground Improvement



## Seismic Hazard and Site Amplification Analysis, SASW/MASW/Seismic Cross Hole/Refraction Tests



# Seismic-Soil-Pile group-Structure Interaction, SFSI Analysis of Nuclear Structures

## Foundations for Vibratory Machines, Vibration Mitigation , Dynamic Soil/Pile Testing



# Dr. Dali Naidu Arnepalli

## PHD, IIT Bombay, India

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<http://www.iitm.ac.in/component/faculty/70/arnepalli/>



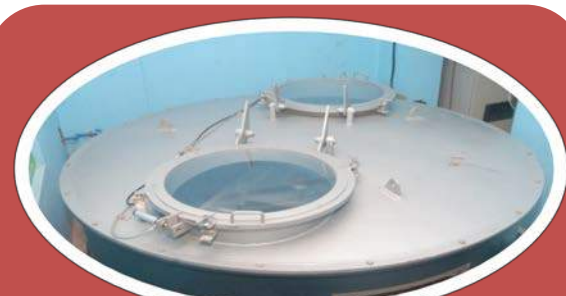
- Geosequestration of Carbon for Mitigation of Green House Gases
- Design of Barrier Systems and Their Long Term Performance
- Geoenvironmental Engineering
- Unsaturated Behaviour of Geomaterials and Geosynthetic Clay Liners



*Geosequestration of Green House Gases*



*Service life Prediction of Geosynthetics*



*Geomaterial Contaminant Interaction*

**FUNDAMENTAL BEHAVIOUR OF GEOMATERIALS**





# DEVIDAS MENON

Professor, Civil Engineering

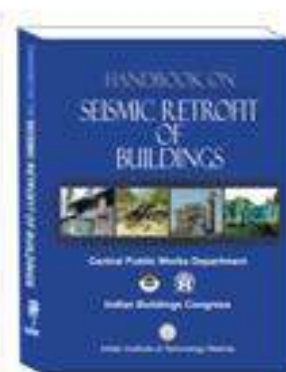
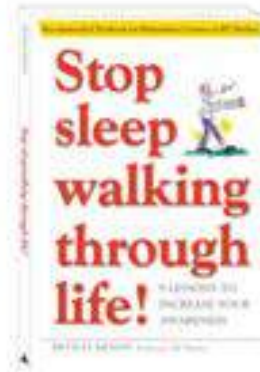
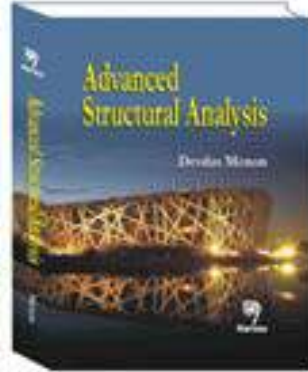
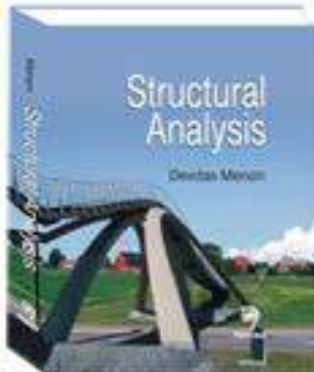
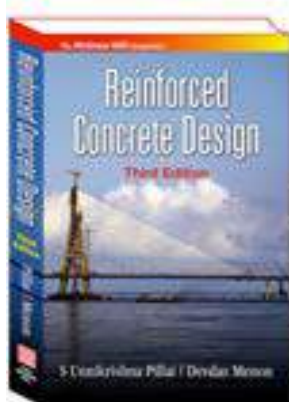
2257 4253 ; 9884078303; dmenon@iitm.ac.in

[www.devdasmenon.com](http://www.devdasmenon.com)



## Major Areas of Interest

- ❖ Structural Concrete - Design
- ❖ Structural Analysis & Reliability
- ❖ Bridge Engineering
- ❖ Affordable Rapid Mass Housing
- ❖ Wind & Earthquake Engineering
- ❖ Self Awareness





# G. R. Dodagoudar

**Professor, Department of Civil Engineering**

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Seismic reliability analysis,  
Computational geomechanics.

**G**

Geotechnical earthquake engineering,  
Seismic-soil structure interaction

Landslide hazard and risk analysis, Fuzzy  
logic in geotechnics.

**R**

Analysis of rain-induced slope instability,  
Seismic microzonation of urban centres

Contaminant transport modelling,  
Stochastic soil dynamics

Nonlinear finite element analysis.

**D**

Analysis and design of piled-raft  
foundation systems,  
Performance-based earthquake  
geotechnics



# Dr. Gitakrishnan Ramadurai

## PHD, Rensselaer Polytechnic Institute, USA

Associate Professor, Dept. of Civil Engineering

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[http://www.civil.iitm.ac.in/new/?q=gita\\_edu](http://www.civil.iitm.ac.in/new/?q=gita_edu)



- Dynamic Traffic Assignment
- Transportation Network Modelling
- Econometric and Optimization Models in Transportation



Intelligent  
Transportation Systems



Sustainable  
Transportation



Pedestrian and Road  
Safety

← Technological and management solutions for a safe and sustainable transportation system →



# Dr. Indumathi M Nambi

## PHD, Clarkson University, U.S.A

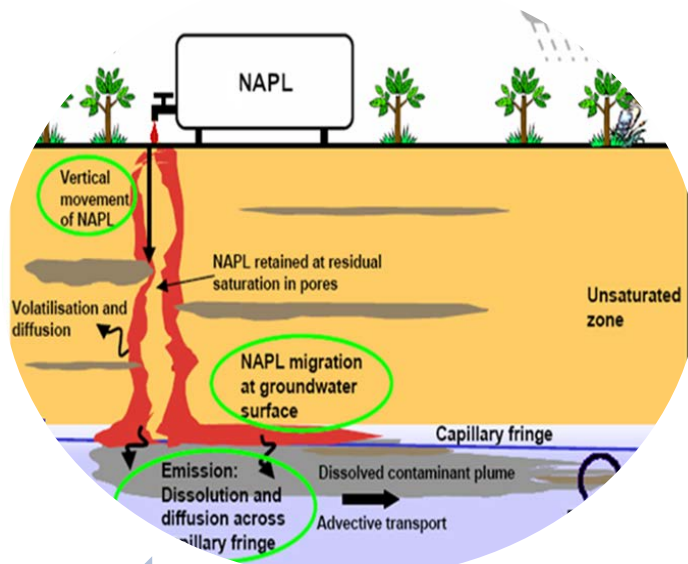
Professor, Dept. of Civil Engineering

044-2257-4289; indunambi@iitm.ac.in

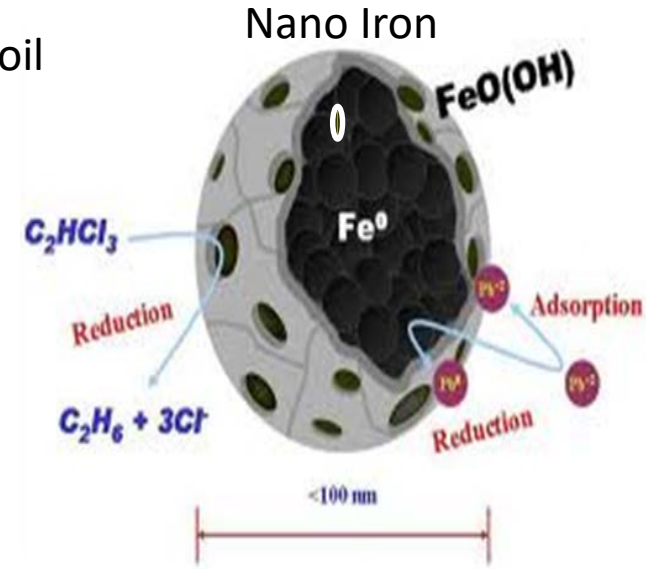
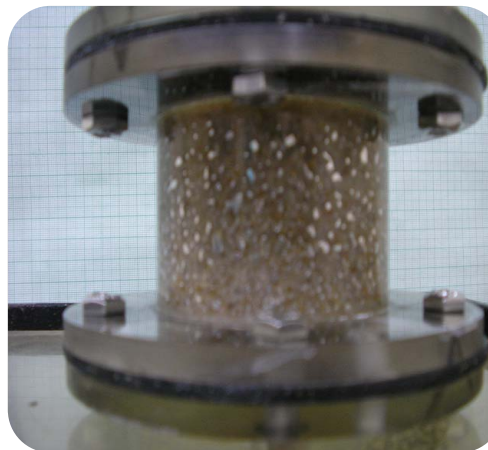
[http://www.iitm.ac.in/indu\\_edu](http://www.iitm.ac.in/indu_edu)



- Ground Water Contamination including NAPL /Transport and Remediation
- Industrial Wastewater Treatment/Physical and Chemical Processes
- Water and Waste Water /Tertiary treatment for reuse



Mercury entrapped in soil



Experimental Studies span from pore scale to lab scale and field scale



# Dr. Karthik K. Srinivasan

## PHD, The University of Texas at Austin, USA

Professor, Dept. of Civil Engineering

044-2257-4282; [karthikks@iitm.ac.in](mailto:karthikks@iitm.ac.in)

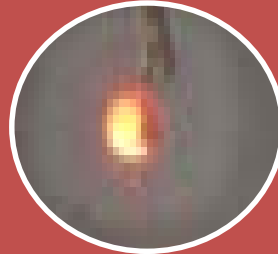
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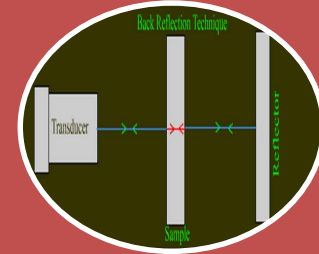
- Travel Demand Modeling
- Transportation Network Optimization and Reliability
- Intelligent Transportation System



Transportation Planning  
and Evaluation



Advanced Traveler  
Information Systems



Transport Routing and  
Congestion Reduction



# Dr. Koshy Varghese

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Professor, Dept. of Civil Engineering

044-2257-4257; koshy@iitm.ac.in

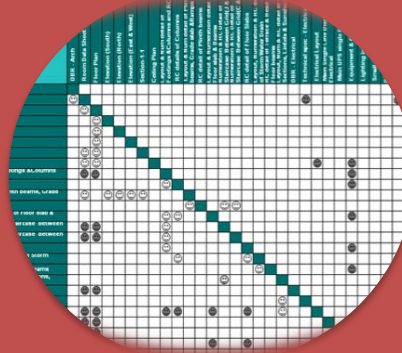
<http://www.civil.iitm.ac.in/people/faculty/koshy/>



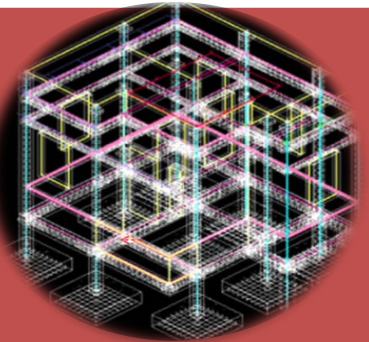
- ❖ Automation in Construction
- ❖ Design Information Management
- ❖ Computer Integrated Project Delivery



Automated Crane  
Lift Planning



Design-Construction Interface  
Management on Fast-Track  
Projects



Building Information Modeling  
for Lean Project Delivery

Automation and Information Technologies for Built Environment Projects





# Dr. Lakshmi Priya Subramanian

## PhD, Georgia Institute of Technology, USA

Assistant Professor, Civil Engineering

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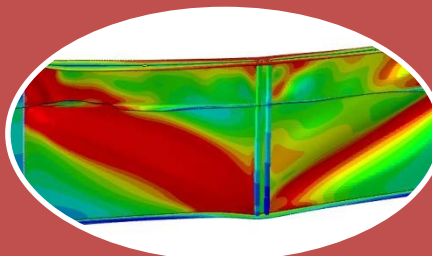


### Major Areas of Research

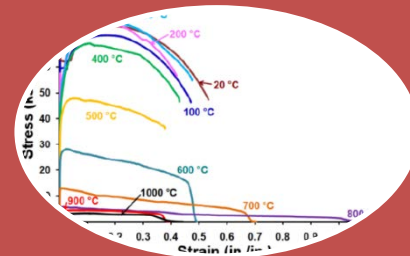
- Stability of steel structures
- Numerical and computational analysis of stability models
- Structural - Fire engineering



Collapse of members  
due to instability



Analysis of stability  
models



Structural fire  
engineering

# Dr. Lelitha Devi Vanajakshi

## Ph.D. - Texas A&M University, USA

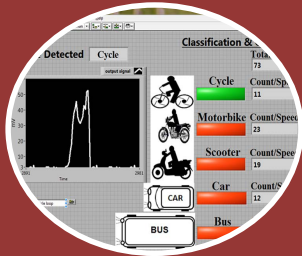
### Professor, Dept. of Civil Engineering

044-2257-4291; [lelitha@iitm.ac.in](mailto:lelitha@iitm.ac.in)

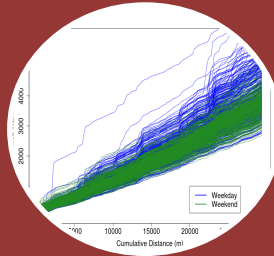
<http://www.iitm.ac.in/component/faculty/70/lelitha/>



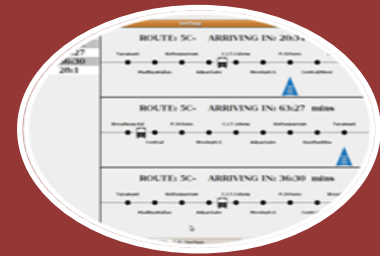
- ❖ Traffic Flow Modeling
- ❖ Traffic Operations
- ❖ Intelligent Transportation Systems



Traffic Data Collection –  
Development of sensors,  
Evaluation of sensors



Data Analysis and Modeling–  
Traffic data analysis,  
Empirical and mathematical  
modeling of transportation  
systems



Intelligent Transportation  
Systems Applications –  
Prototype development and  
field implementations

Modeling, Development and Implementations of ITS Solutions for Indian Traffic



**Dr. Ligy Philp**  
**PHD, IIT Kanpur, India**  
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<http://www.iitm.ac.in/....> [http://www.civil.iitm.ac.in/new/?q=ligy\\_edu](http://www.civil.iitm.ac.in/new/?q=ligy_edu)



- Bioremediation of Contaminated Water, Soils, Air and Aquifers
- Water Treatment and Rural Water Supply
- Domestic and Industrial Wastewater Treatment, Recycle and Reuse



To cleanup soils , aquifers and air contaminated with organic and inorganic toxic pollutants



Water quality assessment and providing tailor made centralized and point of use water treatment technologies



Sustainable Wastewater management using centralized/decentralized and onsite systems

**Pollution Abatement, Drinking water quality assessment and treatment**



Dr. V.B.Maji

PhD, IISc Bangalore, India

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[http://www.civil.iitm.ac.in/new/?q=maji\\_edu](http://www.civil.iitm.ac.in/new/?q=maji_edu)



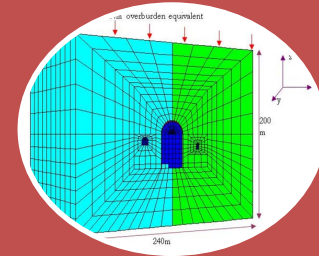
- Rock mechanics / Geotechnical Engineering
- Behaviour of jointed rocks
- Underground excavation and slope stability



Rock mechanics /  
Geotechnical  
engineering



Behaviour of jointed  
rocks



Underground excavation  
and slope stability

**Rock Mechanics / Geotechnical Engineering**



# Dr. Manu Santhanam

## PhD, Purdue University, USA

Professor, Dept. of Civil Engg.

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[http://www.civil.iitm.ac.in/new/?q=manu\\_rp](http://www.civil.iitm.ac.in/new/?q=manu_rp)



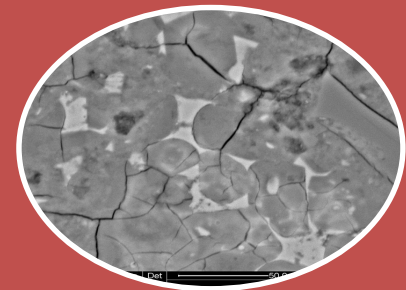
- Chemistry of cementitious materials
- Durability and long term performance of concrete
- Microstructural characterization and non-destructive evaluation of concrete



Special concrete



ND condition assessment



Concrete in aggressive conditions

**Research covers this range of aspects related to concrete applications**





**Dr. S. Mathava Kumar**  
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## Major Areas of Research

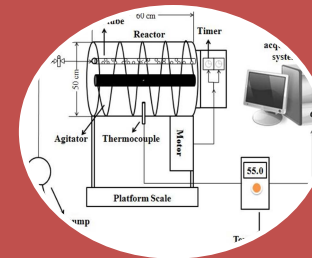
- Water and Wastewater Treatment
- Emerging Contaminants/Micro-Pollutants Removal
- Bioremediation of Contaminated Systems and Biogenic Metal Removal



Technology for Emerging  
Contaminants/Micro-  
Pollutants Removal



Membrane Bioreactor  
for industrial wastewater  
treatment



Reactor for high-rate  
composting of solid  
waste

Application of technologies for water, wastewater and solid waste management

[Back to Top](#)



**A. MEHER PRASAD**

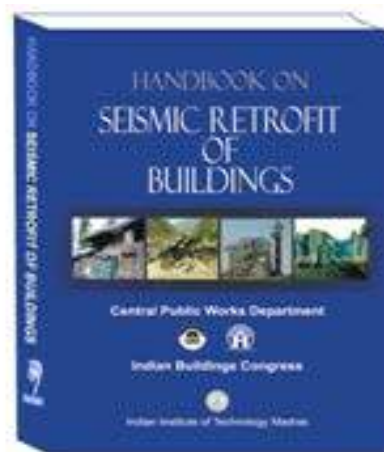
Professor, Civil Engineering

T: 044 2257 4260; M: 9444017194; E: prasadam@iitm.ac.in



## Major Areas of Interest

- ❖ Structural Dynamics
- ❖ Structural Analysis & Reliability
- ❖ Structural Health Monitoring
- ❖ Affordable Mass Housing
- ❖ Wind & Earthquake Engineering
- ❖ Computational Mechanics





**Dr. S. MOHAN**

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**Professor, Dept. of Civil Engineering**

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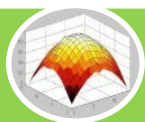


## Areas of Expertise

- **Environmental Systems Modeling**
- **Water and Wastewater Treatment**
- **Sustainability Engineering**
- **Environmental Impact Assessment**
- **Water Resources Systems Modeling**
- **Hydraulic Modeling of Rivers, and Lakes**
- **Ground Water Assessment and Modelling**

## Current Research Works

- **Modeling of Ground Level Ozone using Data Mining**
- **Assessment and Remediation of the Pollution in Wetlands**
- **Real – time Groundwater Control for Mining Operations**
- **Treatment of Leachate from Municipal Solid Waste Open Dumpsite using Combined Bioreactor – Composite Block Technique**
- **Optimization of Water Use and Waste Generation in Pharmaceutical Industries through Green Engineering Principles**
- **Assessment and modelling the fate of Persistent and Bioaccumulative (P&B) Emerging Contaminants (ECs) in wastewater**
- **Advanced Oxidation Process for Open Dumpsite Leachate Treatment**
- **Modeling of Microbial Contaminant Transport in Water Distribution Systems**
- **Municipal Solid Waste Treatment using Bioreactor Landfill Technology**
- **Effluent Management in Textile Industry**
- **Development of Integrated Operation of Multi-Reservoir System with Meta Heuristics Modelling**
- **Treatment of beach sands contaminated during oil-spill**
- **Plasma Reactor Technology for Hazardous waste Management**



Contaminant Transport Modeling & Data Mining



Sustainable Environment and Development



Water, Air, and Land Pollution Abatement

EARTH ALLOWS YOU TO STAND; LET IT STAND THE WAY IT IS

[Back to Top](#)



# Dr. J. Murali Krishnan

## PHD, IIT Madras, India

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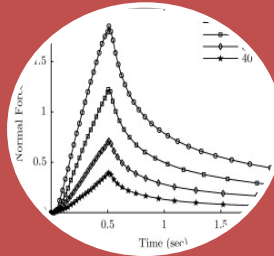
[http://www.iitm.ac.in/....](http://www.iitm.ac.in/...)



- Asphalt Rheology
- Viscoelasticity
- Pavement Engineering



Development of  
Binders



Non-linear  
Models



Stress-strain  
analysis

From binder rheology to pavement engineering



Dr. B. S. Murty

PHD, Washington State Univ., Pullman, USA

Professor, Dept. of Civil Engineering

044-2257-4262; bsm@iitm.ac.in

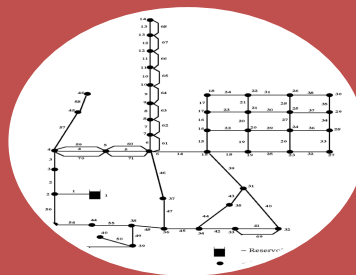
<http://www.iitm.ac.in/...> [http://www.civil.iitm.ac.in/new/?q=murty\\_edu](http://www.civil.iitm.ac.in/new/?q=murty_edu)



- Open-Channel Flow Modeling
- Closed Conduit Flows
- Groundwater Resources Management



Modeling of flow and transport of pollutants in open channels for quantity and quality management



Analysis of steady and transient flows in pipe systems, optimal design, condition assessment



Simulation and management models for groundwater resources utilization and aquifer remediation

← Computational Hydraulics for Management of Water Resources →





# C. V. R. Murty

PhD, CalTech, USA

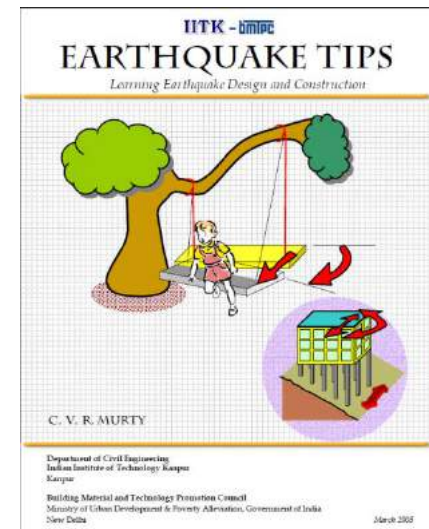
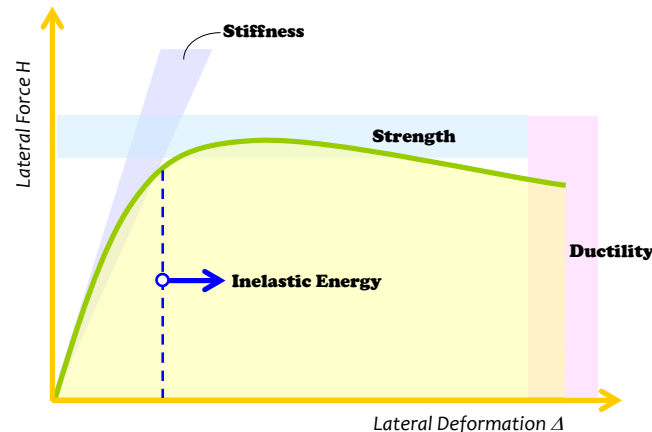
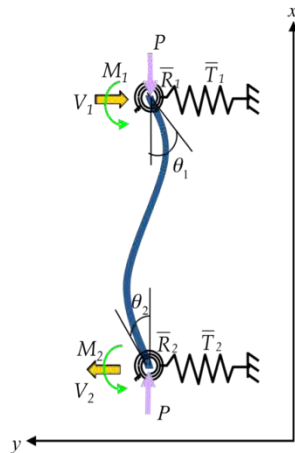
Professor, Department of Civil Engineering

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www.iitm.ac.in/cvrm



- Nonlinear Seismic Behaviour of Structures
- Earthquake-Resistant Design of Buildings and Bridges
- Seismic Design Codes; Books in Earthquake Engineering



Geometric and Material Nonlinearity

Displacement-Based Seismic Design  
Earthquake Engineering

Codes and Books



# Dr. B Nageswara Rao

## PhD, University of Iowa, USA

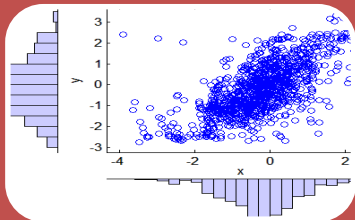
Professor, Dept. of Civil Engg.

044-2257-4285; [bnrao@iitm.ac.in](mailto:bnrao@iitm.ac.in)

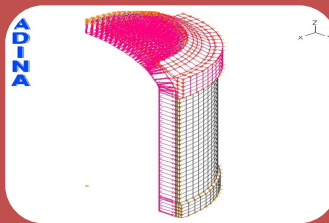
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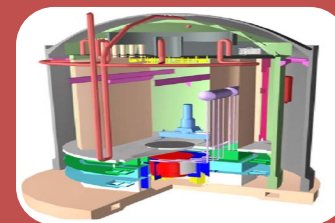
- Computational solid mechanics, finite element analysis, meshless analysis
- Fracture mechanics, micromechanics and homogenization methods
- Structural reliability & optimization, fuzzy structural analysis, dimension reduction methods



Data Analysis–Statistics,  
Distribution



FEM/Meshless–Stress/Displ./  
Damage/Fatigue/Creep/  
Fracture/Corrosion



Probabilistic Methods,  
Reliability, Sensitivity, Design  
Optimization, NDE Scheduling



# Dr. Piyush Chaunsali

PhD (University of Illinois at Urbana-Champaign)

Assistant Professor, Civil Engineering

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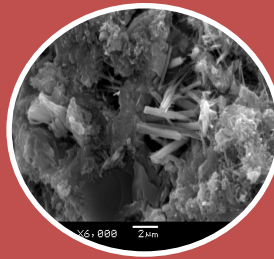


## Major Areas of Research

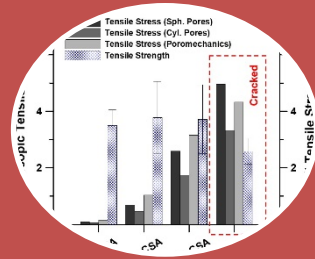
- Cement chemistry and concrete durability
- Processing-microstructure-performance relationships of low CO<sub>2</sub> cements
- Characterization of industrial by-products for their beneficial reuse



Synthesize low CO<sub>2</sub>  
cements from industrial  
by-products



Develop Processing-  
microstructure-  
performance relationship



Large-scale application  
and performance  
modeling

Valorization of industrial by-products in novel cementitious materials



# Dr. Raghukanth S T G

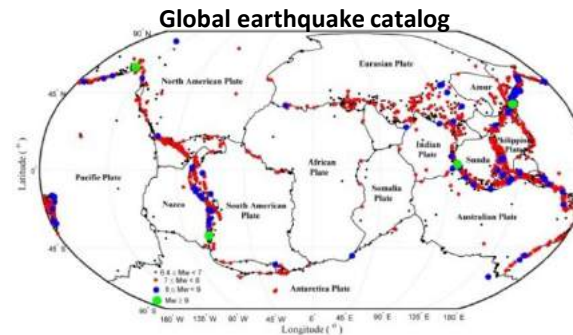
PhD, IISc, Bangalore

Professor, Dept. of Civil Engineering

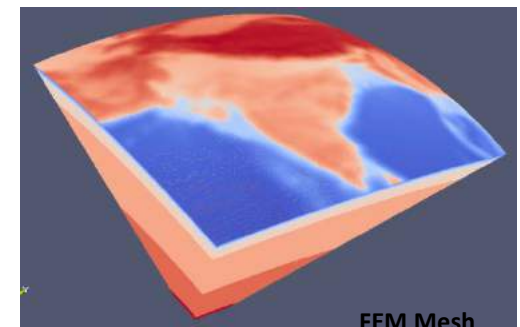
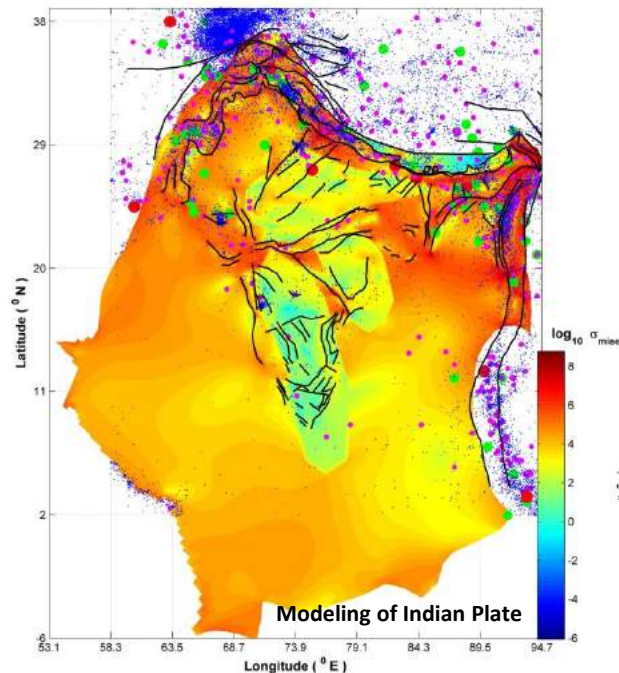
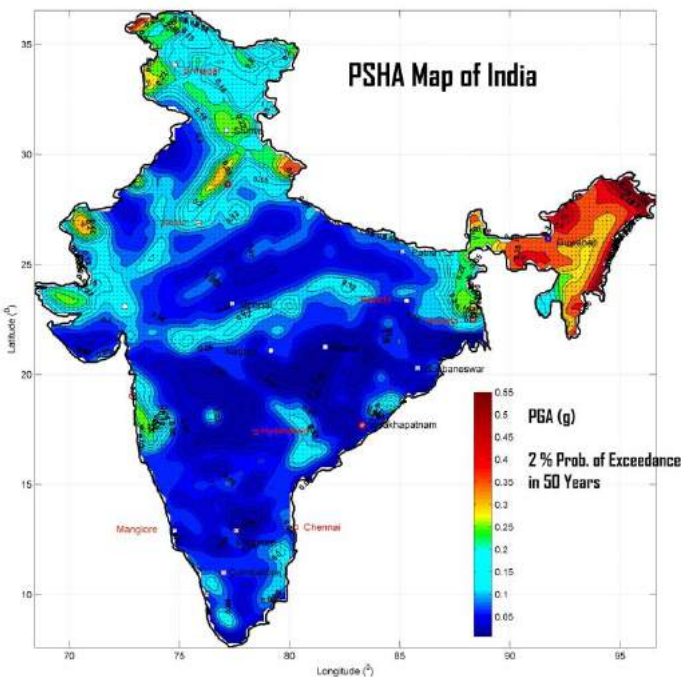
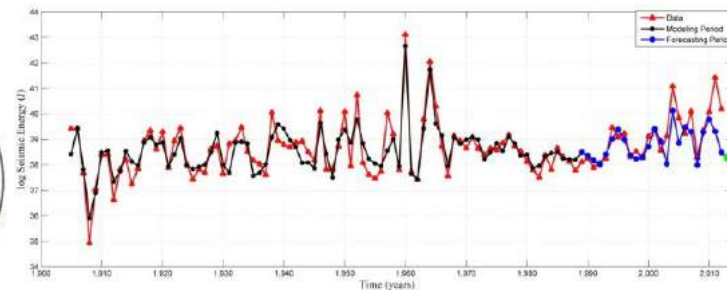
044-2257-4296; raghukanth@iitm.ac.in



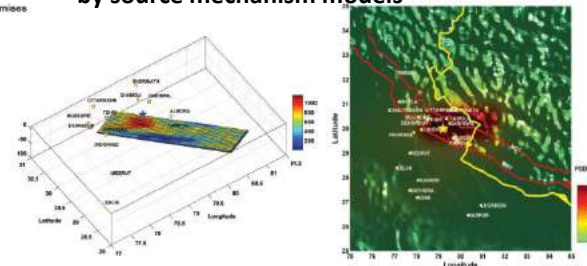
- ❖ Natural Hazards
- ❖ Risk Assessment
- ❖ Wave Propagation
- ❖ Structural Dynamics
- ❖ Earthquake Engineering



Forecasting of Global earthquake energy release



Ground motion simulation for earthquakes by source mechanism models



[Back to Top](#)





Dr. K. Rajagopal

Ph.D. University of Florida, Gainesville, USA

Professor, Dept. of Civil Engineering

044-2257-4263, gopalkr@iitm.ac.in

<http://www.iitm.ac.in/...>



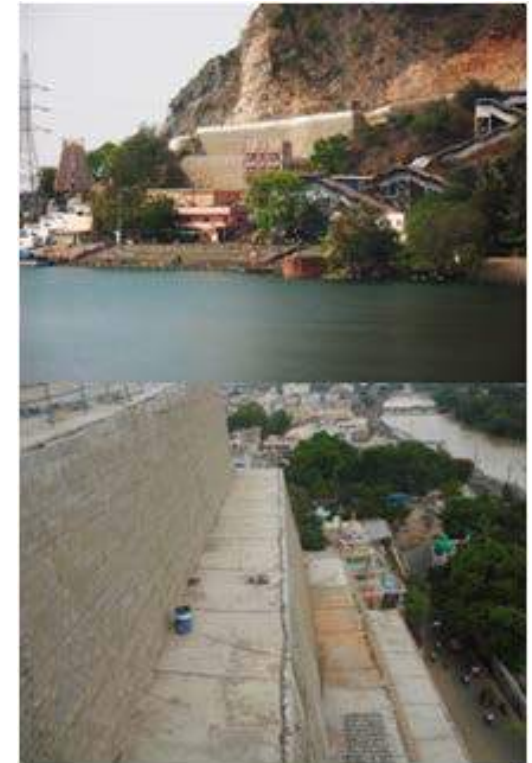
- Geosynthetics and Reinforced Soil Structures
- Ground Improvement
- Finite Elements applied to geomechanics



Geosynthetics for  
Sustainable Shoreline  
Protection



Construction of  
Expedient Road Bases



Construction of Very  
High Retaining Walls  
using Geosynthetics





**K. RAMAMURTHY**  
Professor, Civil Engineering  
T: 044 2257 4265; E: vivek@iitm.ac.in

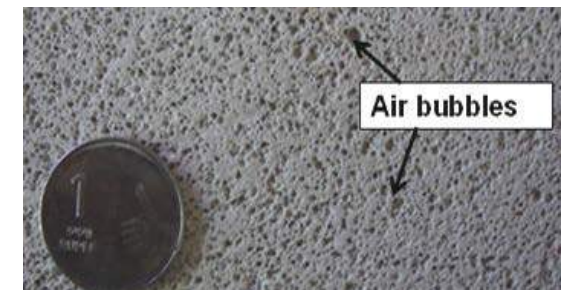


## Major Areas of Research

- Lightweight ash based aggregates
  - Aggregate manufacturing procedures
  - Quality assessment of fly ash aggregates
- Aerated & foam concrete blocks/bricks
  - Manufacturing procedures
  - Effect of admixtures on engg. properties
- Interlocking brick masonry
  - Increasing the construction speed
  - Strength of masonry units/systems



Sintered & cold-bonded  
fly ash aggregates



Aerated concrete system



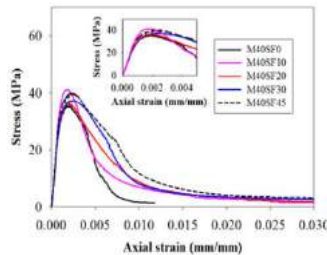
An Interlocking Block Masonry  
System



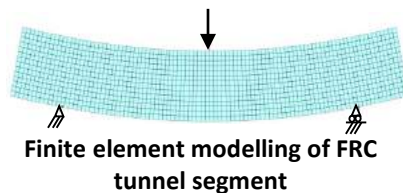
**Dr. Ravindra Gettu**  
**PhD, Northwestern University, USA**  
 Chair Professor, Dept. of Civil Engineering  
 044-2257-4266; gettu@iitm.ac.in



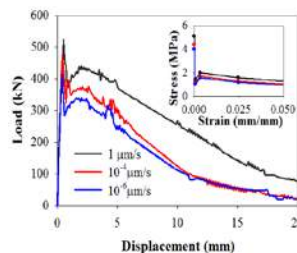
- High Performance concrete, Self Compacting Concrete
- Fibre and Textile reinforced Concrete
- Sustainability assessment of concrete systems



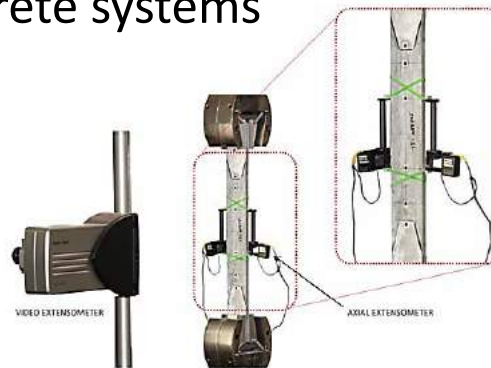
Compressive stress-strain response



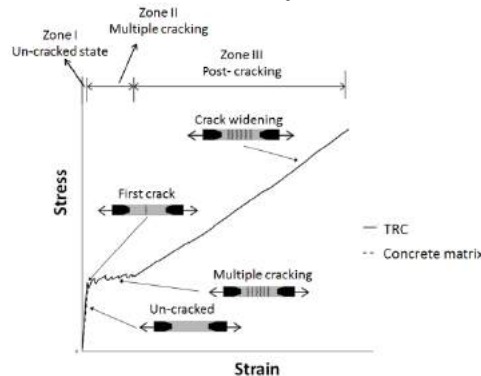
Finite element modelling of FRC tunnel segment



Flexural and tensile (inset) response



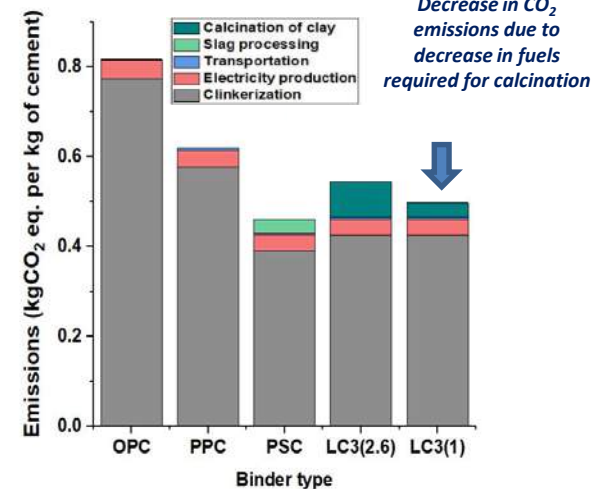
Tensile test setup for TRC



Typical response of TRC with 4 layered textile under tensile loading



Flexural creep testing



LCA of different cements (Indian case)

[Back to Top](#)



Dr. R. G. Robinson  
PhD, IISc, Bangalore, India  
Professor, Dept. of Civil Engineering  
044-2257-4286; robinson@iitm.ac.in  
[http://www.civil.iitm.ac.in/new/?q=rob\\_rp](http://www.civil.iitm.ac.in/new/?q=rob_rp)



- Soft clay engineering
- Ground Improvement
- Physical modelling



Vacuum  
consolidation



Piles in expansive  
soils



Flowable fills

← GEOTECHNICAL ENGINEERING →



# Rupen Goswami

PhD, IIT Kanpur, India

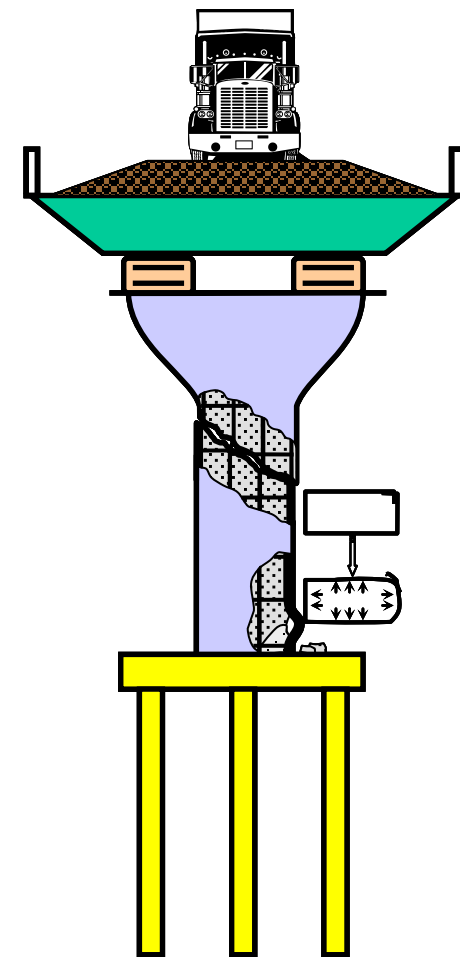
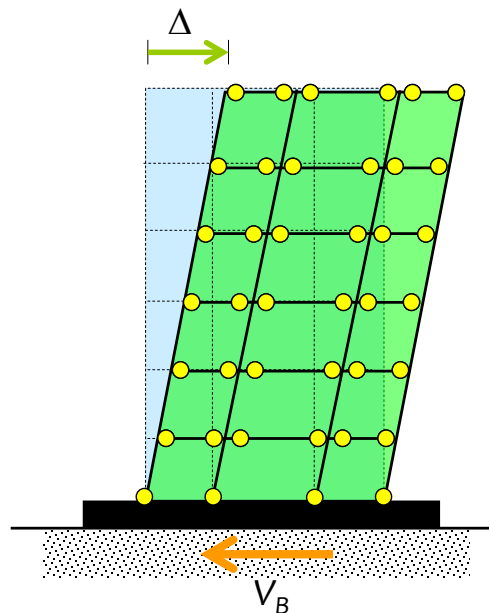
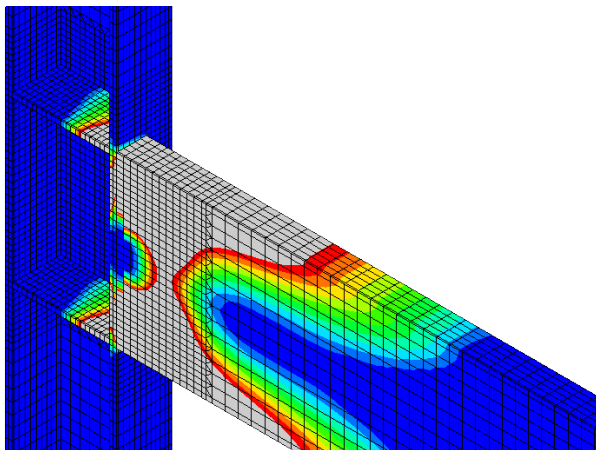
Associate Professor, Department of Civil Engineering

(+91 44) 2257 4301; rg@iitm.ac.in

[http://www.civil.iitm.ac.in/new/?q=rupen\\_edu](http://www.civil.iitm.ac.in/new/?q=rupen_edu)



- Earthquake Resistant Design of Buildings and Bridges
- Nonlinear Behaviour of Structures
- Steel Structures



[Back to Top](#)





# Dr. Sachin S. Gunthe

## Ph.D, Indian Institute of Tropical Meteorology, India

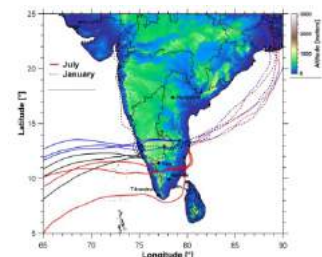
Associate Professor, Dept. of Civil Engineering

044-2257-4308; s.gunthe@iitm.ac.in

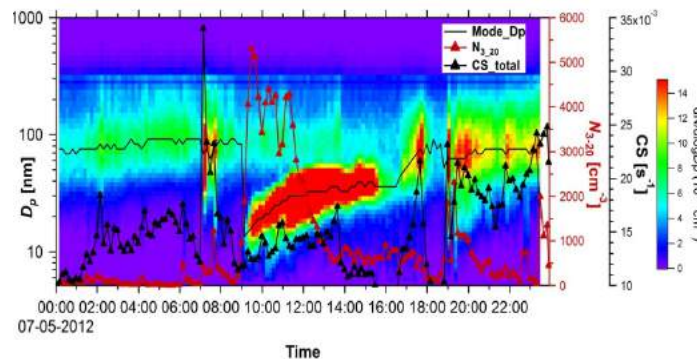
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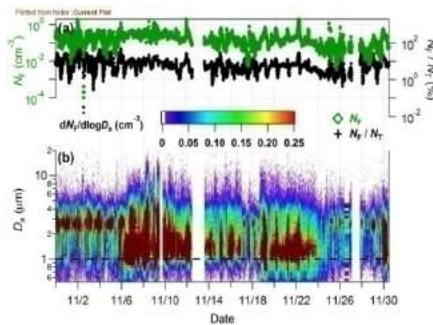
- Properties and interaction of atmospheric aerosols including bioaerosols
- Role of atmospheric aerosols in Earth system science
- Aerosol cloud precipitation interaction - Indian monsoon



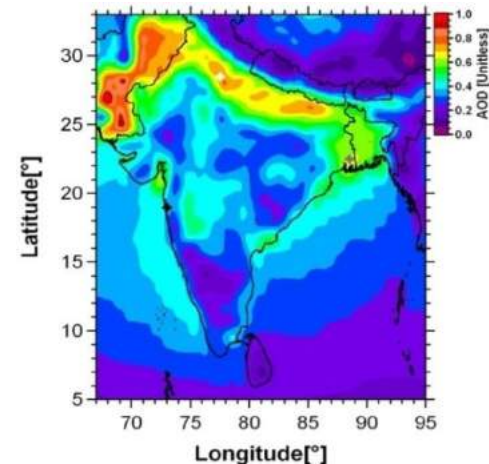
Field campaigns



Time



Laboratory studies



Numerical simulations

[Back to Top](#)





# Dr. U. Saravanan

## PHD, Texas A&M University, USA

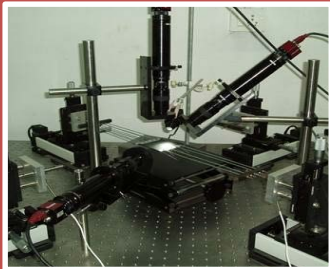
Professor, Dept. of Civil Engineering

Phone : 044-22574314 Email: [saran@iitm.ac.in](mailto:saran@iitm.ac.in)

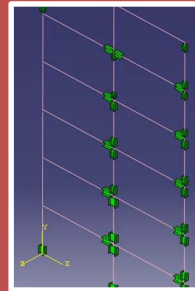
Website : [http://www.civil.iitm.ac.in/new/?q=sar\\_edu](http://www.civil.iitm.ac.in/new/?q=sar_edu)



- Constitutive modeling
- Nonlinear analysis
- Structural health monitoring



Setup for testing  
elastomers



Hybrid model for  
analyzing frames



Determining load  
spectrum on a rail bridge

← Next generation constitutive models and analysis algorithms for safer and economical design →



# Dr. SATISH KUMAR S R

## D.Eng, Nagoya University, Japan

Professor, Dept. of Civil Engineering

044-2257-4287; kim@iitm.ac.in

[http://www.civil.iitm.ac.in/new/?q=satish\\_edu](http://www.civil.iitm.ac.in/new/?q=satish_edu)



- Structural Engineering / Design of Steel Structures
- Structural Engineering / Earthquake Resistant Design & Seismic Testing



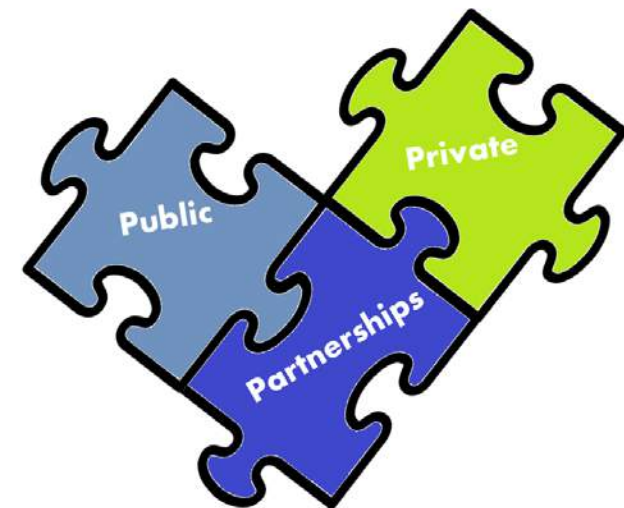


**Dr. K N. Satyanarayana**  
PhD, Clemson University, USA  
Professor, Dept. of Civil Engineering  
044-2257-4268; satyakn@iitm.ac.in  
[http://www.civil.iitm.ac.in/new/?q=satya\\_edu](http://www.civil.iitm.ac.in/new/?q=satya_edu)



### Major Areas of Research

- Infrastructure & Construction Project Management
- Public Private Partnerships – Risk Management, Capacity Building
- Construction Procurement & Contracts
- Construction Mechanisation





# Dr. S.M. Shiva Nagendra

Ph.D., IIT Delhi, India

Professor, Department of Civil Engineering

Indian Institute of Technology Madras

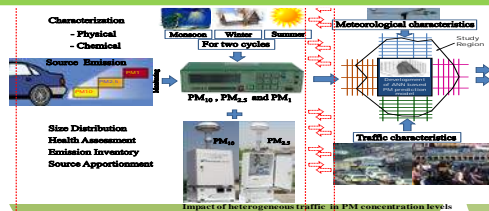
044-2257-4290; [snagendra@iitm.ac.in](mailto:snagendra@iitm.ac.in)

<http://www.iitm.ac.in/component/faculty/70/snagendra/>

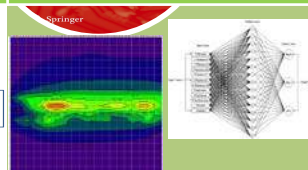


## RESEARCH INTERESTS

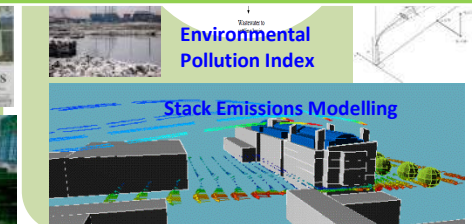
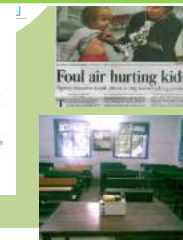
URBAN AIR QUALITY MANAGEMENT	Emission inventory, air quality monitoring, modelling , source-receptor modelling and control strategies
VEHICULAR POLLUTION MODELLING	Deterministic, statistical and artificial neural network approaches
INDOOR AIR QUALITY	Monitoring, modelling and control strategies
INDUSTRIAL AIR POLLUTION CONTROL	Design of air pollution control equipments and environmental impact assessment
ENVIRONMENTAL DATA ANALYSIS	Multivariate data analysis and environmental auditing



Urban Air Quality Management



Indoor Air Quality Management



Industrial Pollution Control

[Back to Top](#)





# Dr. Sivakumar Palaniappan

## PhD, Arizona State University, USA

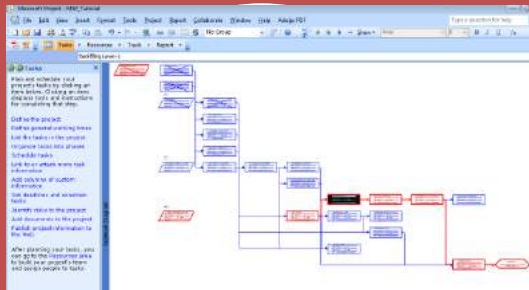
Assistant Professor, Dept. of Civil Engineering

044-2257-4258; [sp@iitm.ac.in](mailto:sp@iitm.ac.in)

[http://www.civil.iitm.ac.in/new/?q=sp\\_edu](http://www.civil.iitm.ac.in/new/?q=sp_edu)



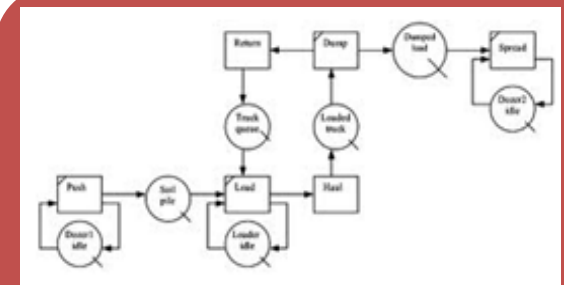
- Construction Project Planning and Control, Information Technology Applications in Project Management
- Sustainable Construction: Life cycle energy use in buildings, carbon footprint of construction processes
- Modelling and Simulation of Construction Processes using discrete event simulation



Planning, Monitoring and Control  
of Construction Projects



Energy use and carbon emissions  
of construction processes



What-if scenarios evaluation for  
construction planning using  
discrete event simulation

**Construction Project Management, Sustainability in Construction, Modelling and Simulation**





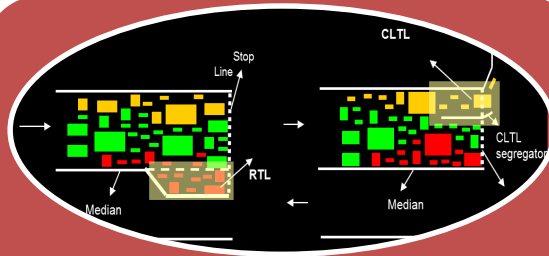
**Dr. R. Sivanandan**  
**Ph. D., Virginia Tech, USA**  
Professor, Dept. of Civil Engineering  
044-2257-4275; [rsiva@iitm.ac.in](mailto:rsiva@iitm.ac.in)  
<http://www.iitm.ac.in/component/faculty/70/rsiva/>



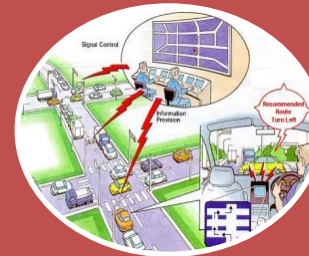
- **Congestion Management**
- **Traffic Simulation and Analysis**
- **Intelligent Transportation Systems (ITS)**



Congestion Analysis Using  
GPS, Traffic Management



Microscopic Simulation of  
Heterogeneous Traffic,  
Capacity Analysis



ATMS and ATIS Modelling  
and Evaluation

**Traffic Analysis and Management, Intelligent Transportation Systems**



# Dr. Somendra Nath Kuiry

Ph.D., IIT Kharagpur

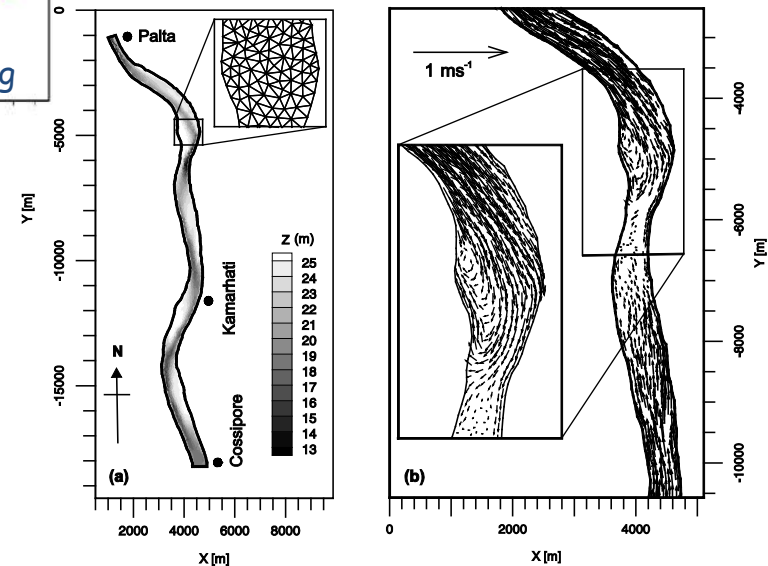
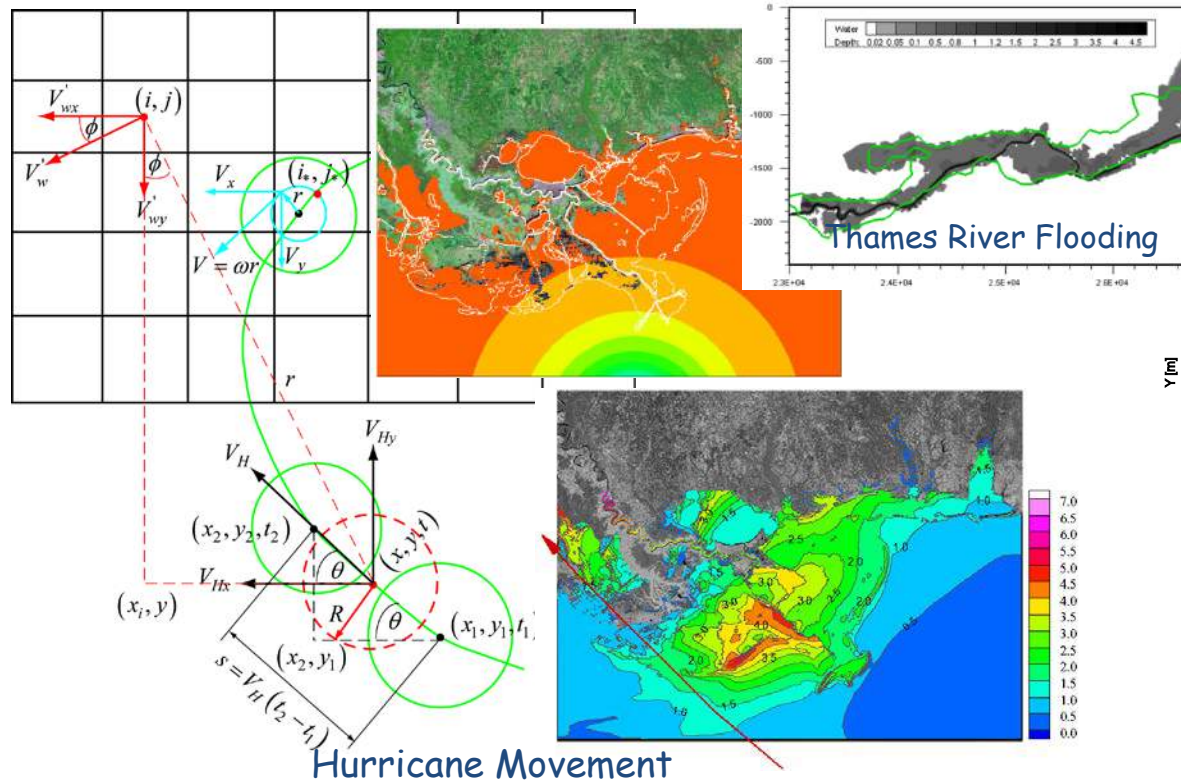
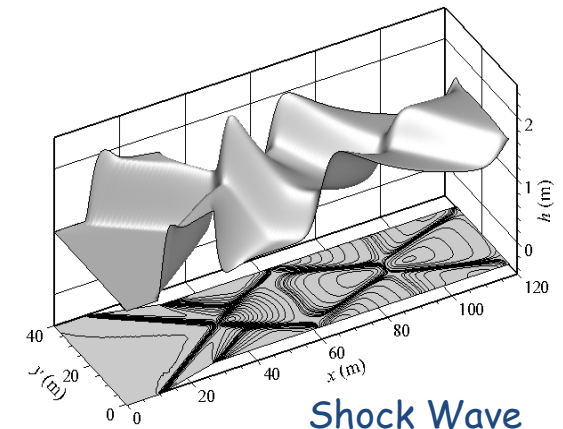
Assistant Professor, Dept. of Civil Engineering

044 -2257 4309; [snkuiry@iitm.ac.in](mailto:snkuiry@iitm.ac.in)

[http://www.civil.iitm.ac.in/new/?q=kuiry\\_edu](http://www.civil.iitm.ac.in/new/?q=kuiry_edu)



- ❖ Computational hydraulics - river, coastal and dam-break flow
- ❖ Modelling of hurricane and tsunami wave propagation
- ❖ Modelling of sediment transport in rivers and coasts
- ❖ Experimental study on dam-break and river flow



[Back to Top](#)



# Dr. Subhadeep Banerjee

## PhD, National University of Singapore

Associate Professor, Dept. of Civil Engineering

044-2257-4304; [subhadeepn@iitm.ac.in](mailto:subhadeepn@iitm.ac.in)

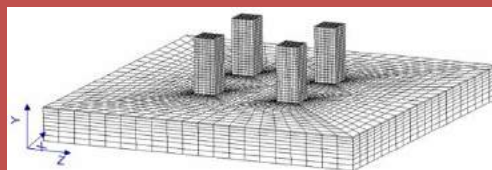
Webpage: [www.civil.iitm.ac.in/new/?q=subh\\_edu](http://www.civil.iitm.ac.in/new/?q=subh_edu)



- Soil Dynamics and Earthquake Engineering
- Constitutive Relationship of Soil
- Finite Element Modelling
- Physical modelling and laboratory testing



**Centrifuge Modelling**



**Numerical Simulations for  
Large Scale Problems**



**Safe and Economic  
Design**

**Advanced earthquake resistant design of foundation**



# Dr. K. P. SUDHEER

## PHD, IIT Delhi, India

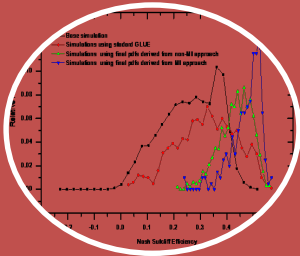
Professor, Dept. of Civil Engineering

044-2257-4288; sudheer@iitm.ac.in

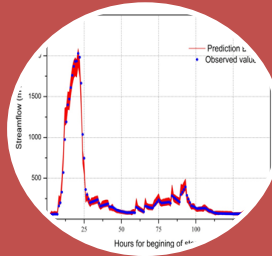
<http://www.iitm.ac.in/component/faculty/70/sudheer>



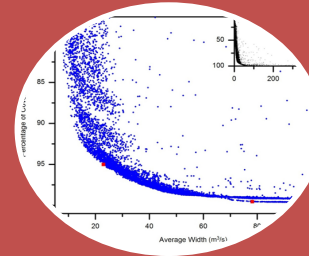
- Hydrologic Modeling
- Predictions in Ungauged Basins (PUB)
- Uncertainty and Sensitivity Analysis



Distributed Hydrological  
Models for PUB



Hydrologic Prediction  
Band



Construction of  
Prediction band

**Employing Distributed Hydrological Models for Water Resources Assessment**





# Dr. T. Thyagaraj

PhD, Indian Institute of Science, India

Associate Professor, Dept. of Civil Engineering

044-2257-4271; ttraj@iitm.ac.in

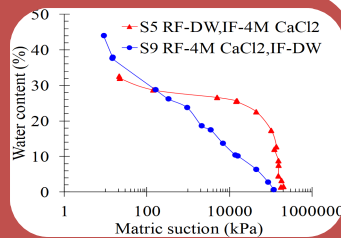
[http://www.civil.iitm.ac.in/new/?q=tt\\_edu](http://www.civil.iitm.ac.in/new/?q=tt_edu)



- Unsaturated soil behaviour
- Ground improvement
- Geoenvironmental engineering



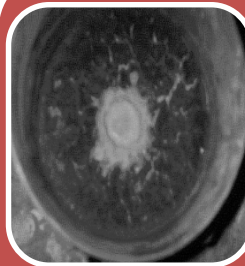
SWC Cell



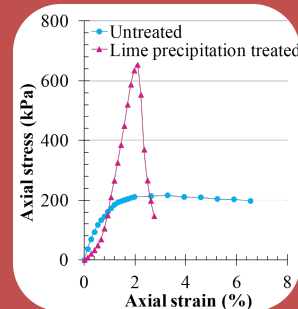
SWCCs

## Ongoing research:

Physico-chemical effects on soil-water characteristic curves of compacted and geosynthetic clay liners



Lime slurry permeation



Stress-strain curves

## Ongoing research:

Deep stabilization of expansive soils by lime precipitation technique



GCL

GCL after 2<sup>nd</sup> drying

## Ongoing research:

Effect of physico-chemical factors on behavior of compacted and geosynthetic clay barriers  
Effect of physico-chemical factors on collapse behaviour of soils





# Dr. A. VEERARAGAVAN

Ph.D, Bangalore University, India

Professor, Dept. of Civil Engineering

044-2257-4272; av@iitm.ac.in

[http://www.civil.iitm.ac.in/new/?q=veer\\_edu](http://www.civil.iitm.ac.in/new/?q=veer_edu)



- **Pavement Engineering / Pavement Management System**
- **Sustainable Road Infrastructure / Recycling of Pavement Materials**
- **Traffic Engineering and Management / Road Safety**



Pavement Maintenance  
and Asset Management of  
Road Infrastructure



Recycling of Pavement  
Materials for Sustainable  
Road Infrastructure



Engineering Measures to  
Enhance Road Safety  
Under Mixed Traffic



Dr. Venkatraman Srinivasan

PhD, University of Illinois Urbana Champaign, USA

Assistant Professor, Civil Engineering

044-2257-4321; venkatraman@iitm.ac.in



## Major Areas of Research

- Process based eco-hydrological models of vegetated land surfaces
- Climate change impact on food and water security
- Experimental manipulation of crop micro climate environment



Develop an experimental greenhouse facility to study plant behavior under various microclimatic conditions



Develop a high resolution 3D explicit architecture plant canopy and root system ecohydrological model



Predict impact of climate change on future food and water security and suggest mitigation measures

Predict the response of vegetation under abiotic stresses and climate change

[Back to Top](#)



# Dr. Venu Chandra

Ph.D, IIT Kanpur, India

Assistant Professor, Department of Civil Engineering

044-2257-4281; vc@iitm.ac.in

[http://www.civil.iitm.ac.in/vc\\_edu](http://www.civil.iitm.ac.in/vc_edu)



- ❖ Experimental Hydraulics
- ❖ Sediment Transport
- ❖ Cohesive Sediment Dynamics
- ❖ River Training and Scour Protection Works



Acoustic Doppler  
Velocimeter

(Velocity measurement)



Annular flume  
(to study about sediments)



Field application

Laboratory to field to prevent sediments at hydraulic structures

[Back to Top](#)



**INDIVIDUAL FACULTY PROFILE**

# **DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**

# LIST OF FACULTY

[Anurag Mittal](#)

[Chandra Sekhar C](#)

[Chester Rebeiro](#)

[Deepak Khemani](#)

[Dharanipragada Janakiram](#)

[Harish Guruprasad Ramaswamy](#)

[Hema A Murthy](#)

[Jayalal Sarma](#)

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[Krishna Nandivada V](#)

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[Manikandan Narayanan](#)

[Meghana Nasre](#)

[Mitesh M Khapra \(Profile yet to be uploaded\)](#)

[Narayanaswamy N S \(Profile yet to be uploaded\)](#)

[Pandu Rangan C](#)

[Prashanth L.A](#)

[Pratyush Kumar](#)

[Raghavendra Rao B.V](#)

[Ravindran B \(Profile yet to be uploaded\)](#)

[Rupesh Nasre](#)

[Shweta Agrawal](#)

[Siva Ram Murthy C](#)

[Sreenivasa Kumar P \(Profile yet to be uploaded\)](#)

[Sukhendu Das](#)

[Sutanu Chakraborti](#)

[Timothy A Gonsalves](#)

[Yadu Vasudev](#)





# Dr. Anurag Mittal

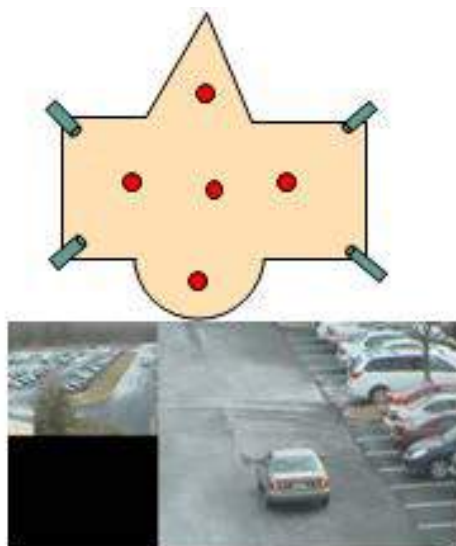
## PhD, Univ. of Maryland College Park, USA

Professor, Dept. of CSE  
044-2257-4372; amittal@iitm.ac.in  
<http://www.cse.iitm.ac.in/~amittal>



## Computer Vision

- Multi-Camera Security and Surveillance
- Contour-based Object Detection & Recognition
- Feature Detection and Description



After Stitching



# Dr. C. Chandra Sekhar

## Ph.D., IIT Madras, India

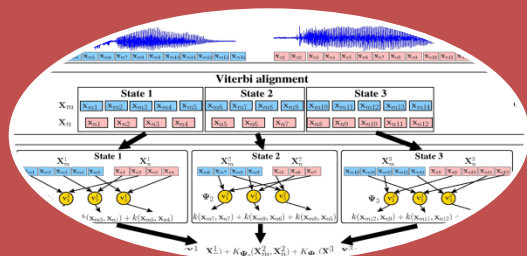
Professor, Dept. of Computer Science and Engineering

044-2257-4363; [chandra@cse.iitm.ac.in](mailto:chandra@cse.iitm.ac.in)

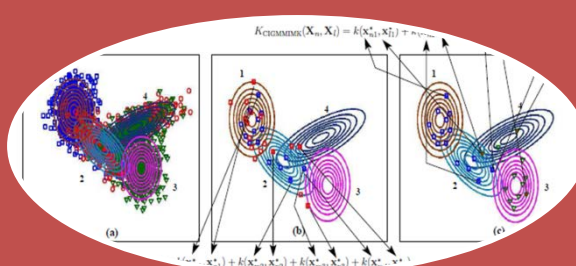
<http://www.cse.iitm.ac.in/chandra>



- Machine Learning for Speech Technology
- Kernel Methods for Pattern Analysis
- Content based Information Retrieval



Support Vector Machines  
based Approaches to  
Acoustic Modeling for  
Speech Recognition



Design of Dynamic Kernels  
for Speech and Image Data



Scene Image Retrieval  
using Kernel Methods



# Dr. Chester Rebeiro

Assistant Professor, Computer Science and Engineering

044-2257-4355; [chester@iitm.ac.in](mailto:chester@iitm.ac.in)

<http://www.cse.iitm.ac.in/~chester/>



## Major Areas of Research

- Hardware Security
  - Side Channel Analysis
  - Hardware Trojans
  - PUFs
- Cryptography
  - Implementations in Hardware and Software
- Operating Systems
  - Secure Operating Systems Design



# Dr. Deepak Khemani

## PHD, IIT Bombay, India

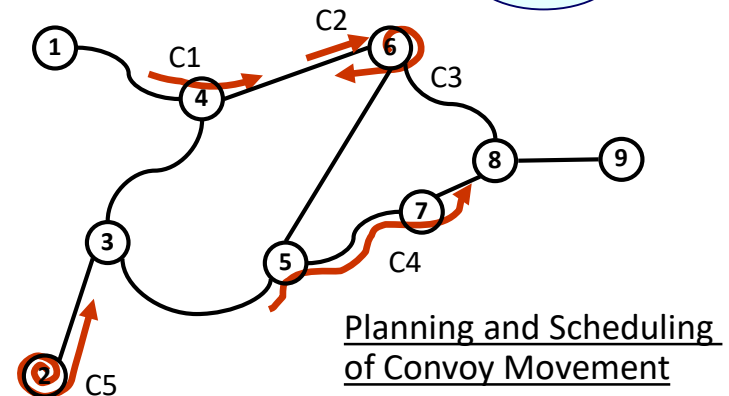
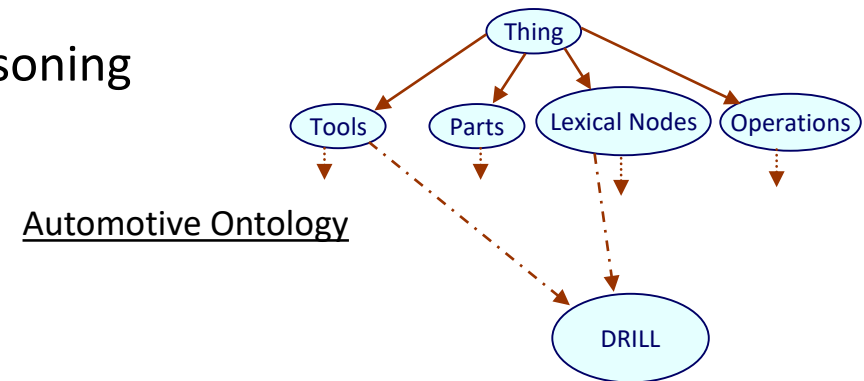
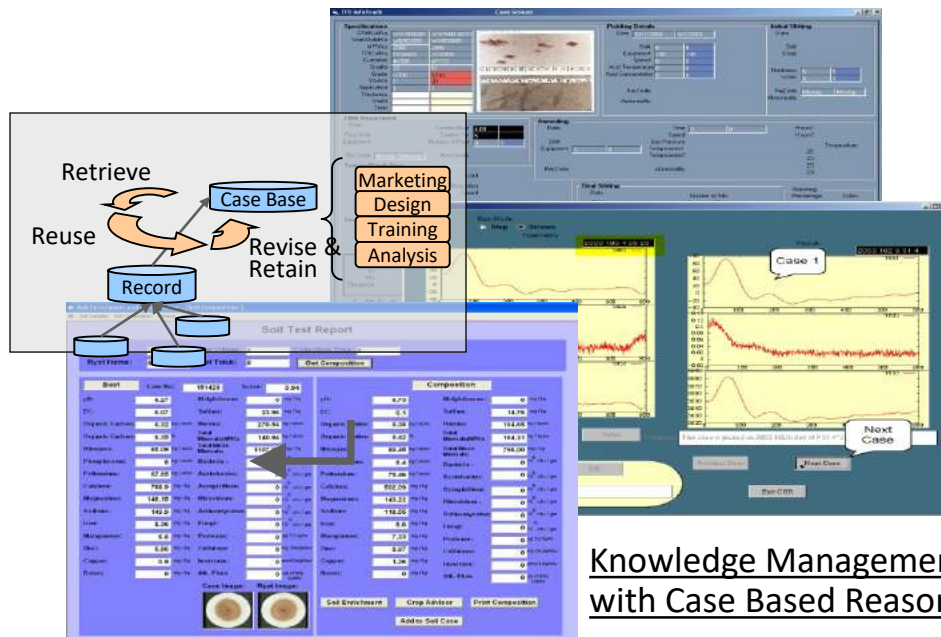
Professor, Dept. of Computer Science and Engineering

044-2257-4365; khemani@iitm.ac.in

<http://www.cse.iitm.ac.in/khemani>



- Artificial Intelligence/Knowledge Representation and Reasoning
- Artificial Intelligence/Automated Planning
- Artificial Intelligence/Memory Based Reasoning







# Dr. Dharanipragada Janakiram

## Professor, Computer Science and Engineering

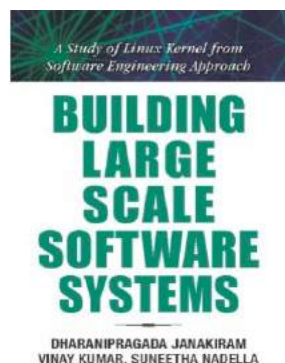
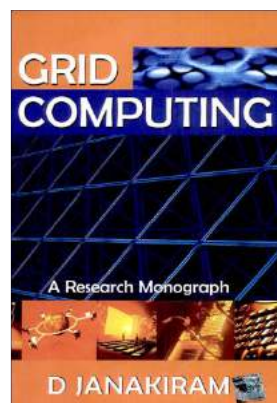
044-2257-4354; [djram@iitm.ac.in](mailto:djram@iitm.ac.in)

<http://dos.iitm.ac.in/djwebsite>



## Major Areas of Research

- Distributed Systems, Grid Computing and Cloud Computing
- Service Oriented Architectures for Operating Systems
- Big Data Analytics and Database Systems
- Internet of Things (IoT)
- Sensor Device Integration into Cloud Systems
- Android Security
- Research Challenges in Building Large Scale Software Systems







# Dr. Harish Guruprasad Ramaswamy

Assistant Professor, Dept. of Computer Science and Engineering

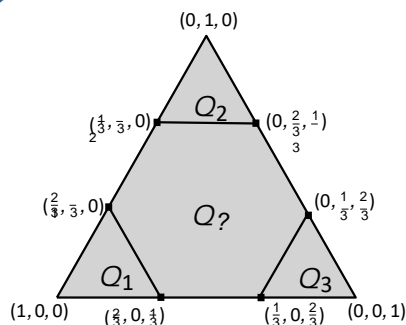
044-2257-4385; hariguru@iitm.ac.in

<http://www.cse.iitm.ac.in/profile.php?arg=MTgzNA==>

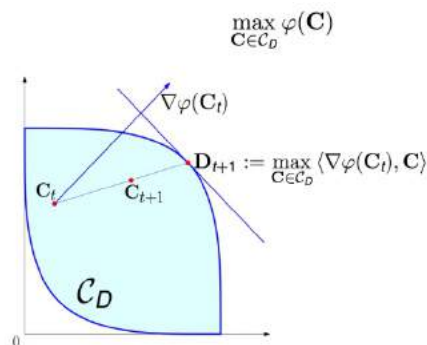


## Major Areas of Research

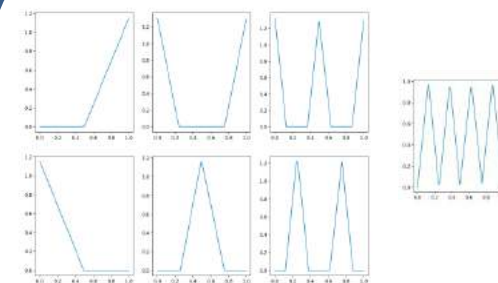
- Machine learning with Noisy/Weak Labels.
- Theoretical Foundations of Deep Learning.
- Optimising Complex Performance Measures in Machine Learning.



Learning with noisy data and noisy predictions.



Constrained classification for complex performance metrics.



Aiding Deep Network Learning with symmetry and invariance.

Geometry and Optimisation based approaches for Machine Learning

[Back to Top](#)



**Dr. Hema A Murthy**

Ph.D., IIT Madras, India

Professor, Dept. of Computer Science and Engineering

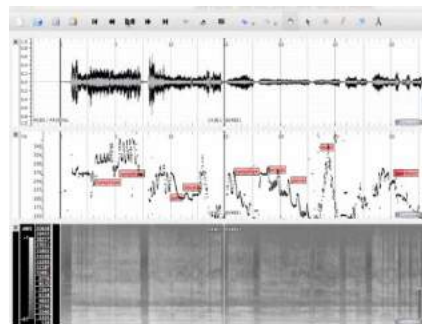
044-2257-4363; hema@cse.iitm.ac.in; <http://www.cse.iitm.ac.in/chandra>



Speech and Music Signal Processing

Network Traffic Analysis

Machine learning for Speech, Music, Network Traffic Data

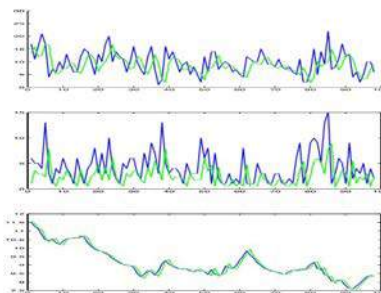


### Music Analysis

- Tonic identification
- Motif discovery
- Transcription of Mridangam strokes

IBM Faculty Award  
2006

### Rais Ahmed Moerial Lecture Award 2012

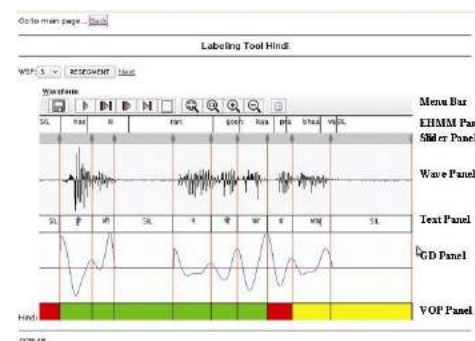


### Network traffic analysis

- User profiling
- Anomaly detection
- Topic Analysis

Screen Reader: Manthan  
Award Finalist 2012

### TTS: GE Research Innovation Award 2013



### Speech Processing

- Segmentation of speech
- Speaker Verification
- Keyword spotting





Dr. John Augustine

Ph.D., Univ. of California, Irvine, USA

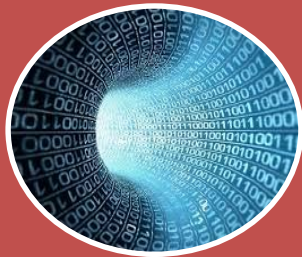
Associate Professor, Dept. of Computer Sci. and Engg.

044-2257-4383; [augustine@cse.iitm.ac.in](mailto:augustine@cse.iitm.ac.in)

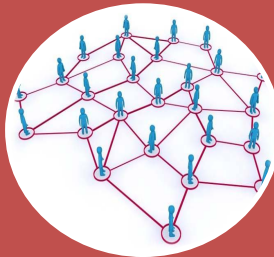
<http://www.cse.iitm.ac.in/~augustine/>



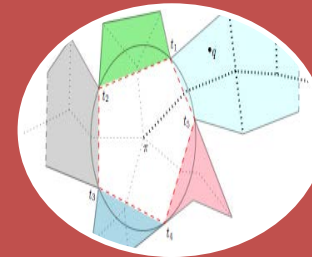
- Algorithms at large including:
  - Distributed Algorithms
  - Computational Geometry
  - Online Algorithms



Big Data



Networks



Geometry



# V. Kamakoti

Reconfigurable Intelligent Systems Engineering (RISE) Lab

Professor, Dept. of Computer Sci. and Engg.

044-2257-4368; veezhi@gmail.com

<http://rise.cse.iitm.ac.in/people/faculty/kama/kama.html>



V. Kamakoti specializes in the areas of VLSI Design and Computer Architecture. His specific interests include power-aware design and testing of digital circuits, secure compute and network architectures, wireless sensor networks and thermal imaging based embedded systems for medical diagnosis.

He is one of the co-founders of the Reconfigurable Intelligent Systems Engineering (RISE) group. The RISE Lab is involved in development of indigenous secure computing and networking platforms.





# Dr. Krishna Moorthy Sivalingam

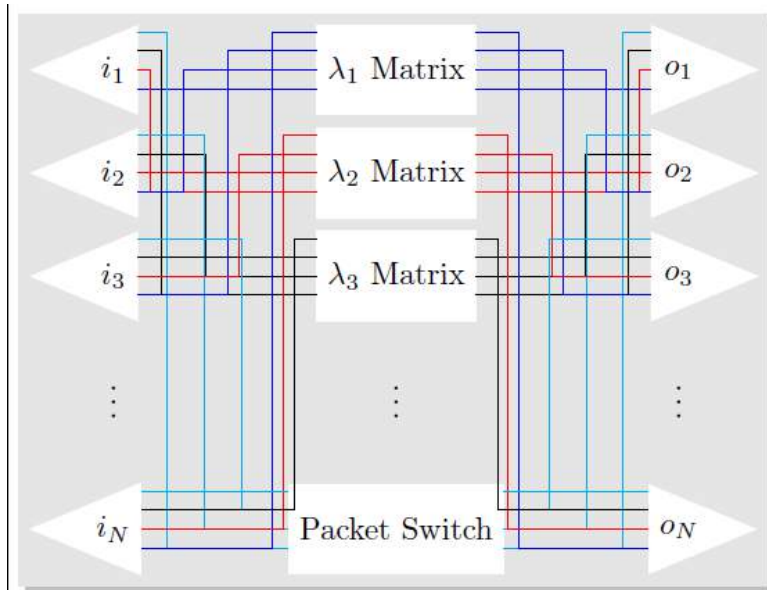
Ph.D., State Univ. of New York, Buffalo, USA  
Professor, Dept. of Computer Science & Engg.

044-2257-4378; [skrishnam@iitm.ac.in](mailto:skrishnam@iitm.ac.in)

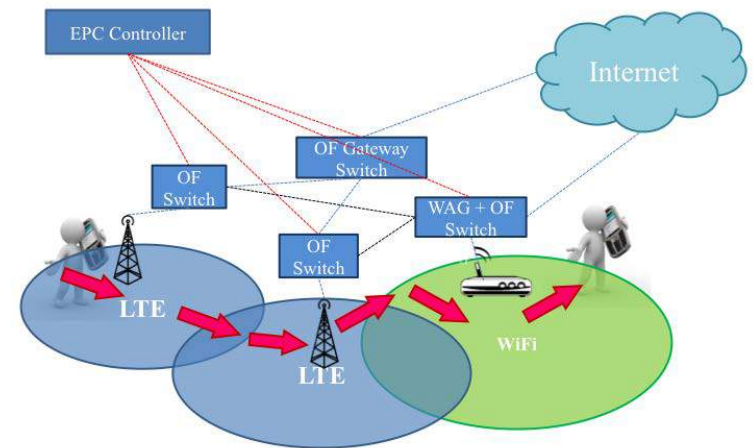
<http://www.cse.iitm.ac.in/~skrishnam>



- Computer Networks: Software Defined Networking, Data Center Networks
- Computer Networks: Wireless Networks, Optical Networks



**Hybrid Optical-Packet DCN Switch**



**SDN Based LTE EPC**

**Network Protocols and Algorithms: Design, Analysis and Implementation**



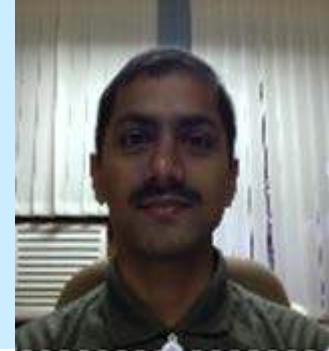
# V. Krishna Nandivada

## PHD, UCLA, USA

Associate Professor, Dept. of CSE

044-2257-4380; [nvk@iitm.ac.in](mailto:nvk@iitm.ac.in)

<http://www.cse.iitm.ac.in/~krishna>



- Compiler Optimizations – Optimizations for multicore systems
- Compiler Optimizations – Semantics preserving optimizations.
- Language design for performance and programmability.
- Software security – Security for mobile applications

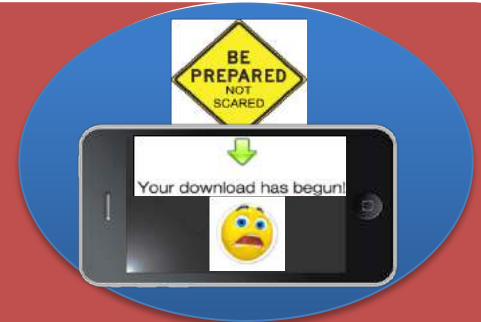


Serial programs and  
Multicore systems

`$ g++ a.cc -o a.out`

Q: `a.cc == a.out`?

Semantics preserving  
compilers



Secure Mobile Apps

**Performance, Programmability and Security in Software Systems**



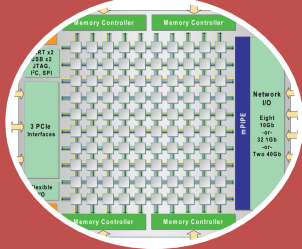
# Dr. Madhu Mutyam

## PHD, IIT Madras, India

Professor, Dept. of CSE  
044-2257-4379; mutyam@iitm.ac.in  
<http://www.iitm.ac.in/mutyam>



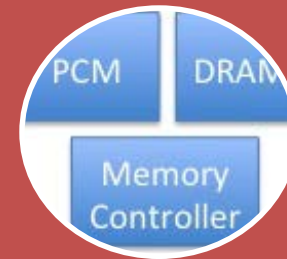
- Multi-core Architectures
- Network-on-Chip
- Emerging Memory Technologies



Shared resource  
management in multi-core  
processors



Optimizing communication  
among cores of a multi-core  
processor



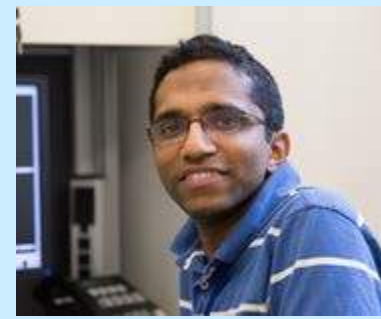
Dealing with hybrid  
memory systems



# Dr. Manikandan Narayanan

Associate Professor, Computer Science & Engg. (CSE)  
Core Faculty, Initiative for Biological Systems Engg. (IBSE)  
Robert Bosch Centre for Data Science and AI (RBC-DSAI)

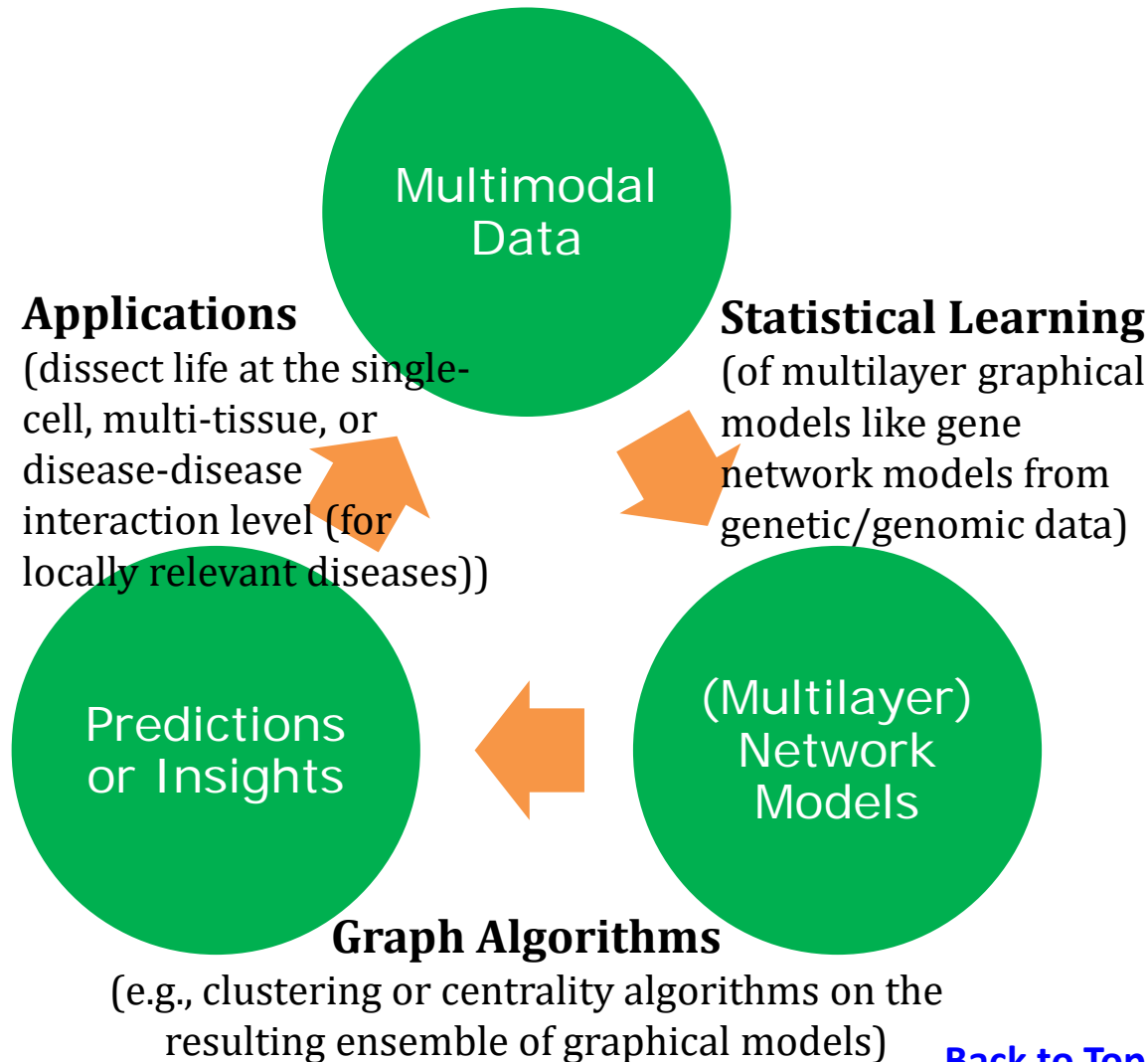
044-2257-4375; nmanik@cse.iitm.ac.in  
<http://www.maninarayanan.com>



## Major Areas of Research

Computational methods  
(multilayer graphical models,  
ensemble graph algorithms)  
that've crucial applications in  
biology and beyond!

- Bioinformatics and Computational Biology; Systems Biology/Genomics of Health and Disease
- Complex (Multilayer) Network Models and Graph Algorithms; Integrative Data science





**Dr. Meghana Nasre**  
 Assistant Professor  
 Computer Science and Engineering.  
 044-2257-4373; meghana@iitm.ac.in  
<http://www.cse.iitm.ac.in/~meghana>

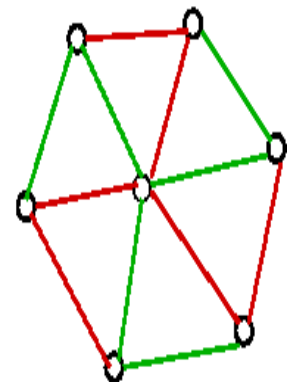
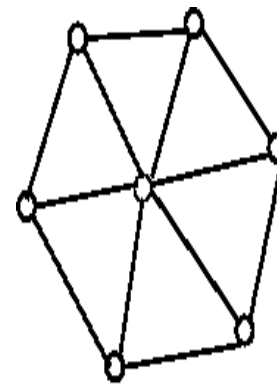
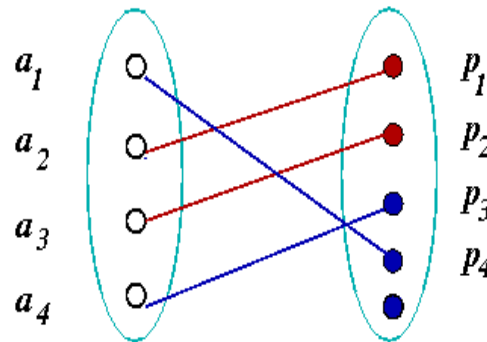


## Major Areas of Research

- Graph Theory, Algorithms.
- Matchings in graphs under preferences.

	$p_1$	$p_2$	$p_3$	$p_4$	$p_5$
$a_1$	1	2	4	3	
$a_2$	1	3	5	4	2
$a_3$	2	1	3		
$a_4$	3	1	2	5	4

*Popular Matching*



*Rainbow Connectivity*





Dr. Pandu Rangan C, FNAE  
Institute Chair Professor,  
Dept. of Computer Science and Engineering  
044-2257-4358; prangan@iitm.ac.in

- Joy of Algorithms
- Challenge of Cryptography
- Excitements of Cryptocurrency



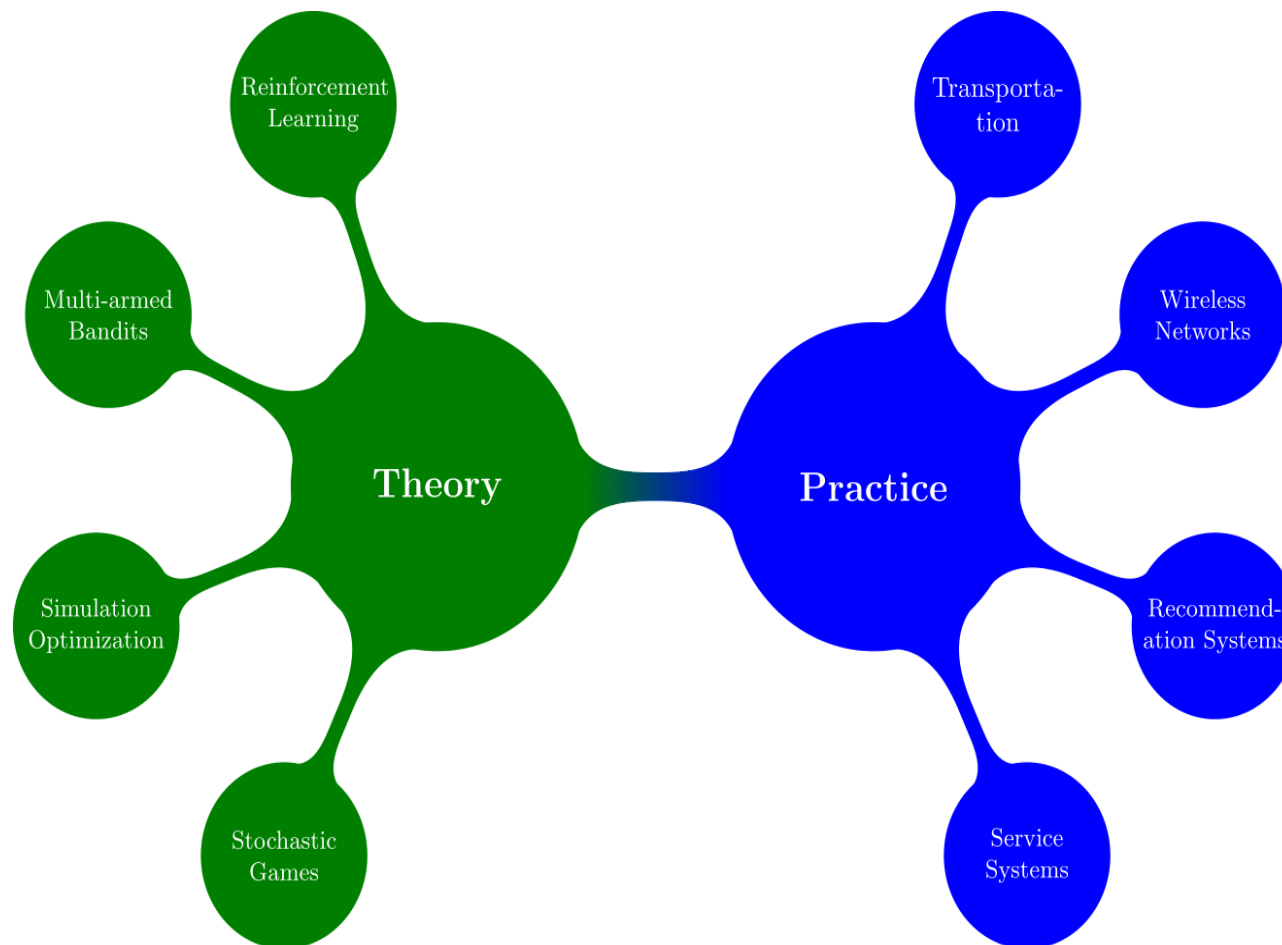
**Prashanth L. A.**

**Ph.D.: Indian Institute of Science**

Assistant Professor, Dept. of CSE

044-2257-4377; prashla@iitm.ac.in

<http://www.cse.iitm.ac.in/~prashla>



**Sequential decision making under uncertainty**

*How to take decisions that maximize the rewards accumulated in the long run?*

Need an algorithm that

- is **efficient**,
- is **autonomous**
- handles **uncertainties** and multiple timescales
- is **model-free** and **scalable**

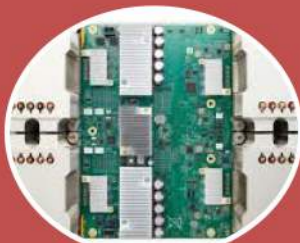
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**Dr. Pratyush Kumar**  
**PHD, ETH Zurich, Switzerland**  
Assistant Professor, Computer Science and Engineering  
044-2257-4388; [pratyush@iitm.ac.in](mailto:pratyush@iitm.ac.in)  
<http://www.cse.iitm.ac.in/~pratyush/>



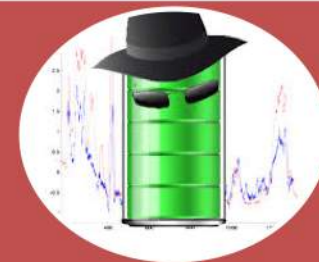
- Combining systems thinking with deep learning to design systems considering non-functional properties of time, energy, security, and variable effort inference
- Correct-by-construction design of cyber-physical systems meeting hard end-to-end timing constraints with application in safety-critical systems



Hardware Accelerators  
for Deep Learning



Formal design of  
Embedded Systems



Adversarial attacks on  
Deep Learning

**Move towards secure and always-available ubiquitous intelligence**



**Dr. Raghavendra Rao B. V.**

Associate Professor, Computer Science and Engineering

044-2257-4381; [bvrr@iitm.ac.in](mailto:bvrr@iitm.ac.in)

<http://www.cse.iitma.c.in/~bvrr>



## Major Areas of Research

- Computational Complexity Theory.
- Algebraic Complexity Theory.
- Combinatorial Commutative Algebra.
- Analysis of Algorithms.
- Computational problems on algebraic and combinatorial structures.



# Rupesh Nasre.

Assistant Professor  
Computer Science and Engineering

044-2257-4374; rupesh@iitm.ac.in  
<http://www.cse.iitm.ac.in/~rupesh>



## Major Areas of Research

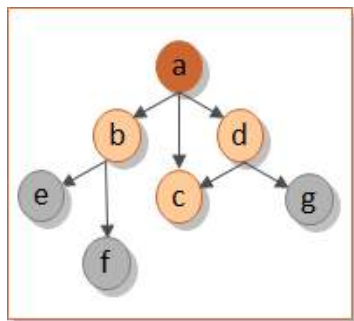
- ◆ Parallelization
- ◆ Compilers
- ◆ Domain Specific Languages

Problem

Algorithm

Modeling

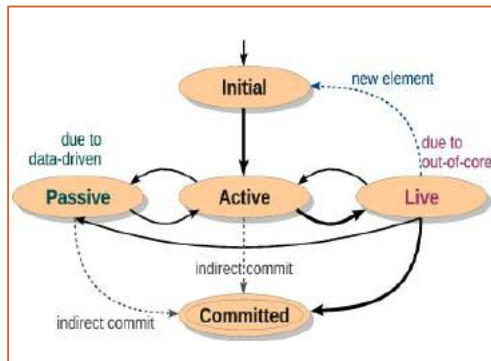
Performance



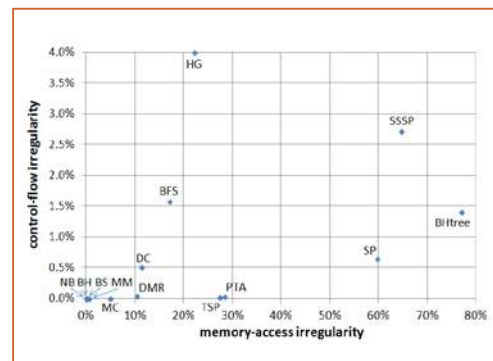
Shortest Paths Computation

```
Graph [nodes(node: Node, dist: Int),  
      edges(src: Node, dst: Node)]  
Source: Node  
InitDist = [nodes(node n, dist d) ←  
            [d ← if (n == source) 0 else ∞]]  
relaxEdge = [nodes(node p, dist dp),  
            nodes(node q, dist dq),  
            edges(src p, dst q),  
            pd + 1 < dq] → [dq ← pd + 1]  
Init ← foreach InitDist  
bfs ← iterate relaxEdge  
main = Init, bfs
```

Language Specification



Optimization and Code Generation



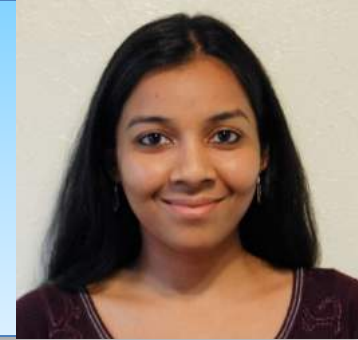
Performance Measurement

[Back to Top](#)

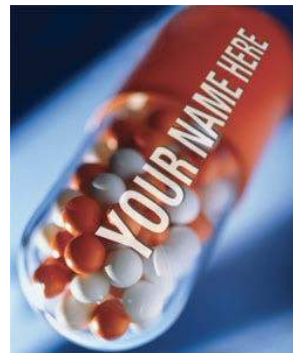




Dr Shweta Agrawal  
PhD, University of Texas at Austin  
Assistant Professor, Computer Science and Engg  
044-2257-4384 Shweta@iitm.ac.in



- Cryptography, particularly **post-quantum cryptography** from hard lattice problems
- Applications of **Blockchain** technology to socially relevant problems
- **Computing on encrypted data** to enable machine learning on encrypted data
- **Resolving conflict between utility and privacy** in age of big data



## Secure Cloud computing

## Patient private medicine

## Patient private medicine



Dr. C. Siva Ram Murthy  
PhD, Indian Institute of Science  
Professor, Dept. of Computer Science and  
Engineering

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- Wireless Networks
- Real-time Systems



# Dr. Sukhendu Das

Professor, Computer Science and Engineering

+91-44-2257-4367; sdas@iitm.ac.in

http://www.cse.iitm.ac.in/~sdas, ..../~vplab



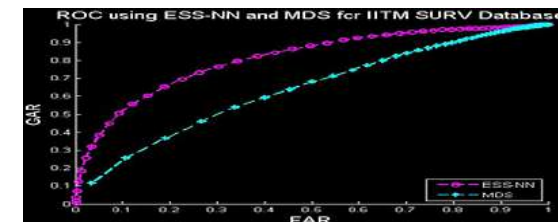
## Major Areas of Research

### CBVR using DMST-CSS and Hyper-strings



### Unconstrained Face Recognition

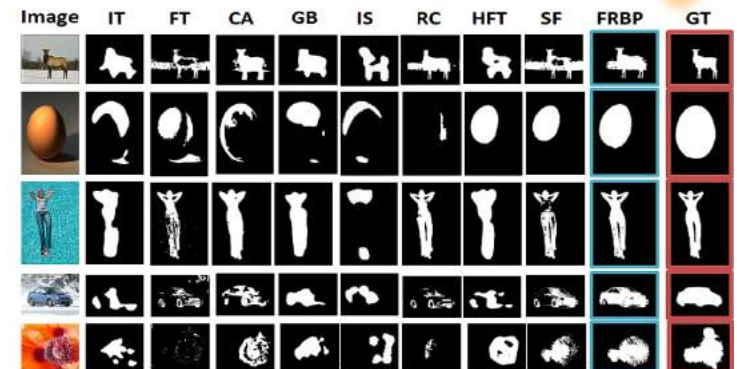
- EDT
- ESS
- Subband



### SLAR for "Smart CBIR"



### Domain Adaptation, Saliency (FRBP), Soft object and biped dynamics



← Unifying Visual Perception and Visualization for cognitive intelligence algorithms →

[Back to Top](#)



# Dr. Sutanu Chakraborti

## PhD, The Robert Gordon University, UK

Associate Professor, Dept. of Computer Science

044-2257-4376; [sutanuc@iitm.ac.in](mailto:sutanuc@iitm.ac.in)

<http://www.cse.iitm.ac.in/~sutanuc/>

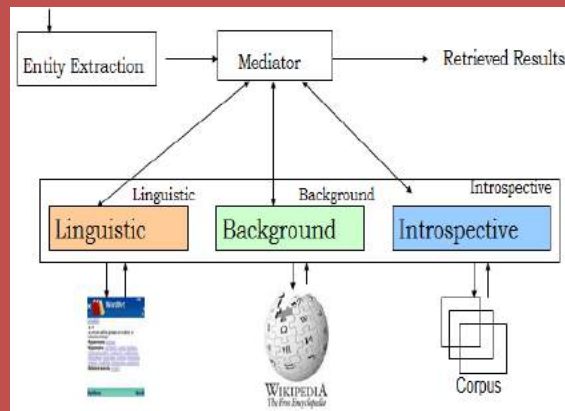


- Text and Web Analytics
- Machine Learning for Knowledge Acquisition
- Cognitive Aspects of Language and Memory

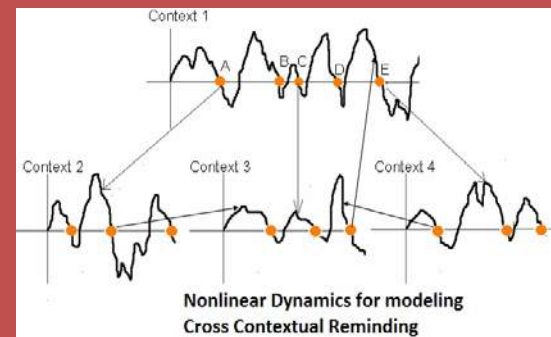
### Search, Recommendation and Corporate Memory Systems



### Machine Learning for Natural Language Processing



### Looking into the Future: Non-conventional models of cognition (language and memory)



**COMPUTATIONAL MODELS OF LANGUAGE, MEMORY AND LEARNING**





# Timothy A. Gonsalves

Professor, Dept. of Computer Science and Engineering

044-2257-4353; [tag@iitm.ac.in](mailto:tag@iitm.ac.in)

<http://www.cse.iitm.ac.in/~tag/>



## Research Interests:

Design and performance of computer and telecom networks. With emphasis on innovative and low-cost product and technology development for Indian and international industry.

Fostering software development in small towns and rural areas.





**Dr. Yadu Vasudev**

**Assistant Professor, Computer Science and Engineering**

044-2257-4386; [yadu@iitm.ac.in](mailto:yadu@iitm.ac.in)

<http://www.cse.iitm.ac.in/~yadu>



## **Areas of Research**

- Sublinear Algorithms
  - Property testing algorithms for large sparse graphs.
  - Distributed algorithms on sparse networks.
- Computational Complexity Theory
  - Complexity of isomorphism problems.
  - Randomness in computation.



INDIVIDUAL FACULTY PROFILE

# DEPARTMENT OF ELECTRICAL ENGINEERING

## LIST OF FACULTY

[Abhishek Sinha \(Profile yet to be uploaded\)](#)

[Amitava Dasgupta](#)

[Ananth Krishnan](#)

[Andrew Thangaraj](#)

[Anil Prabhakar](#)

[Aniruddhan S](#)

[Anjan Chakravorty](#)

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[Arun D Mahindrakar](#)

[Arun Pachai Kannu](#)

[Ashok Jhunjhunwala](#)

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[Christopher S \(Profile yet to be uploaded\)](#)

[Debdutta Ray](#)

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[Deleep R Nair](#)

[Devendra Jaliha](#)

[Enakshi Bhattacharya](#)

[Gaurav Raina](#)

[Giridhar K](#)

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[Ramalingam C.S \(Profile yet to be uploaded\)](#)

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[Shanti Bhattacharya](#)

[Sheetal Kalyani](#)

[Soumya Dutta](#)

[Sridharan K](#)

[Srikrishna Bhashyam](#)

[Srinivasan Umesh \(Profile yet to be uploaded\)](#)

[Srirama Srinivas](#)

[Swarup K.S](#)

[Uday Kiran Khankhoje \(Profile yet to be uploaded\)](#)

[Venkatesh Ramaiyan](#)

[Venkatesh T.G \(Profile yet to be uploaded\)](#)

[Vinita Vasudevan](#)



# Dr. Amitava DasGupta

## PhD, IIT Kharagpur, India

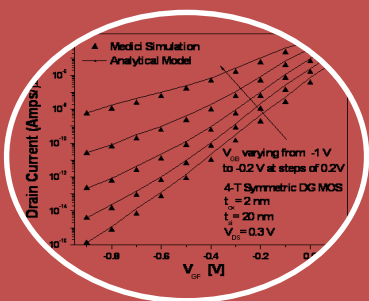
Professor, Dept. of Electrical Engineering

044-2257-4416; [adg@ee.iitm.ac.in](mailto:adg@ee.iitm.ac.in)

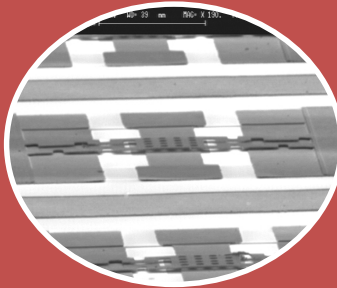
<http://www.ee.iitm.ac.in/~adg/>



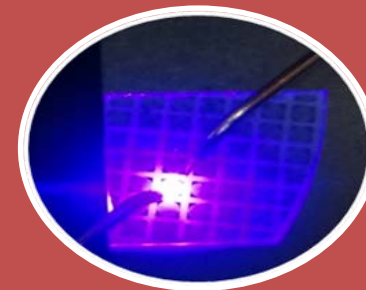
- Research Area/Focus 1: Device Modelling (Mu`GFETs, LDMOS, HEMTs, QM effects)
- Research Area/Focus 2 : MEMS: Design, Fabrication & Characterization
- Research Area/Focus 3 : Silicon and Compound Semiconductor Technology



Subthreshold Current in 4-T  
DG MOSFETs



RF MEMS switch



Violet light emission from  
GaN based LED





# Ananth Krishnan

## Ph.D. from Texas Tech University

Associate Professor, Electrical Engineering

044-2257-4451; [ananthk@iitm.ac.in](mailto:ananthk@iitm.ac.in)

<http://www.ee.iitm.ac.in/~ananthk>



### Major Areas of Research

- Design, Fabrication and Characterization of Plasmonic devices
- Design, Fabrication and Characterization of Optical Metamaterials
- Wafer scale photonic devices



# Dr. Andrew Thangaraj

## PHD, Georgia Tech, Atlanta, USA

Professor, Dept. of Electrical Engineering

044-2257-4424; [andrew@ee.iitm.ac.in](mailto:andrew@ee.iitm.ac.in)

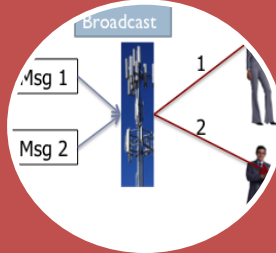
<http://www.ee.iitm.ac.in/~andrew>



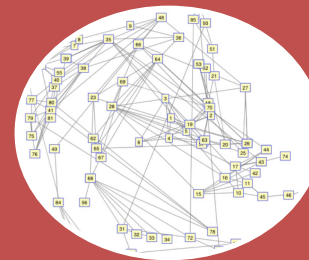
- Theory and implementation of modern error control codes
- Coding for multi-terminal communication problems
- Wireless and wireline network coding



PHYSICAL LAYER  
SECURITY



NEAR CAPACITY  
COMMUNICATIONS



NETWORKS AND  
DISTRIBUTED STORAGE

**CODING FOR COMMUNICATION SYSTEMS AND NETWORKS**



**Dr. Anil Prabhakar**  
Professor, Electrical Engineering  
044-2257-4425; anilpr@iitm.ac.in  
<http://www.ee.iitm.ac.in/user/anilpr/>



## Major Areas of Research

- Fibre lasers for biomedical and industrial applications
- Optical communications, quantum key distribution, optical metrology
- Assistive technologies and rehabilitation engineering



Fibre lasers for surgery



Fibre optic technologies



Alternative and  
augmentative  
communication (AAC)

← Photonics and embedded systems for societal benefit →

[Back to Top](#)



Dr. S. Aniruddhan

PHD, University of Washington, Seattle, USA

Associate Professor, Dept. of Electrical Engineering

044-2257-4468; [ani@ee.iitm.ac.in](mailto:ani@ee.iitm.ac.in)

<http://www.ee.iitm.ac.in/~ani/>



- CMOS RFIC design
- Phase-locked loops and frequency synthesizers
- IC design for Biomedical Applications

Transceivers for Wireless  
Communications

Industrial Electronics

Biomedical  
Instrumentation



**Dr. Anjan Chakravorty**  
**PHD, IIT Kharagpur, India**  
Professor, Dept. of Electrical Engineering  
044-2257-4460; [anjan@iitm.ac.in](mailto:anjan@iitm.ac.in)  
<http://www.ee.iitm.ac.in/~anjan/index.html>



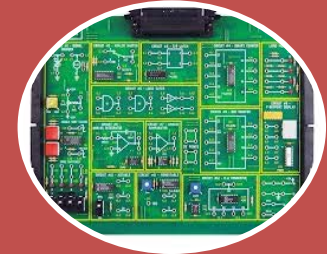
- SiGe Heterojunction Bipolar Transistors/ Modeling of Non-Quasi-Static Effects
- Laterally Diffused MOSFETs/ Modeling of Self-Heating & Snapback Effects
- Nano FETs/ Modeling of Charges and Non-Reciprocal Capacitances



Communication  
Circuits



Automotive  
Circuits



High-Speed  
Digital Switching





# Dr. Arun D. Mahindrakar

## PHD, IIT Bombay, India

Associate Professor, Dept. of Electrical Engineering

044-2257-4445; arun\_dm@iitm.ac.in

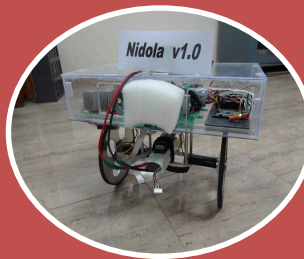
[http://www.ee.iitm.ac.in/~arun\\_dm](http://www.ee.iitm.ac.in/~arun_dm)



- Nonlinear Control/Underactuated robots
- Experimental work /Mobile robots
- Formation control of multiple robots/Aerial vehicles



Underactuated  
robots



Mobile robots



Aerial Vehicles



# Dr. Arun Pachai Kannu

Associate Professor, Electrical Engineering

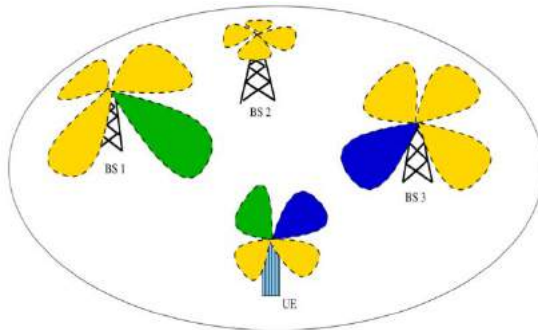
044-2257-4463; arunpachai@ee.iitm.ac.in

<http://www.ee.iitm.ac.in/~arunpachai>



## Major Areas of Research

- Signal Processing in Millimeter Wave Beam-forming Systems
- Massive Random Access and Media Based Modulation Techniques
- Theory and Applications of Sparse Signal Recovery



Detection and Estimation Problems in Wireless Communications



Dr. Ashok Jhunjhunwala  
Professor, Department of Electrical Engineering  
Indian Institute of Technology, Madras - 600 036  
044-2257-0120; ashok@tenet.res.in



## Major Areas of Research

- Telecommunications
- Computer Networks and Fiber Optics
- Solar PV systems
- ICT based Education & Health Care
- Solar DC Technologies
- Electric Vehicles
- Entrepreneurship and Startups
- Technology and Education Policy
- Industry-academia interactions



Development and  
Commercialization of Solar DC  
Technology



Electric Vehicles



Industry and Academia  
Interaction and Incubation



# Dr. Balaji Srinivasan

## PhD, University of New Mexico, USA

Professor, Dept. of Electrical Engineering

044-2257-4426; [balajis@ee.iitm.ac.in](mailto:balajis@ee.iitm.ac.in)

[http://www.ee.iitm.ac.in/facs\\_balajis](http://www.ee.iitm.ac.in/facs_balajis)



- High Power & Ultrashort Pulse Fiber Lasers
- Fiber Bragg Gratings
- Distributed Fiber Sensors

Laser-Based  
Material Processing

Structural Health  
Monitoring

Real-time Power  
Monitoring



# Dr. Bharath Bhikkaji

## PhD, Uppsala University, Sweden

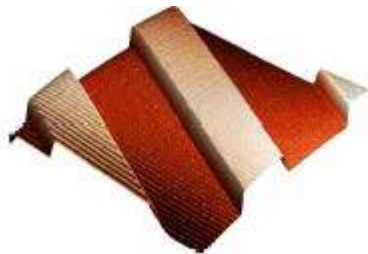
Associate Prof., Dept. of Elec. Engg.

044-2257-4455; [Bharath.Bhikkaji@iitm.ac.in](mailto:Bharath.Bhikkaji@iitm.ac.in)

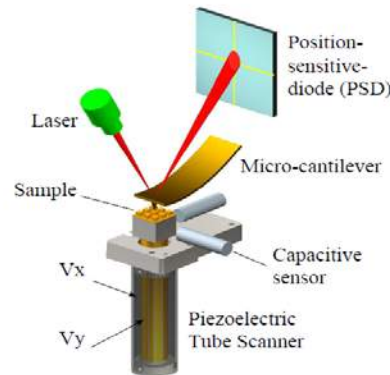
<http://ee.iitm.ac.in/~Bharath>



- Modeling and Control of Flexible Structures
- Vibration control of Smart Structures
- Portfolio Analysis and Selection



Atomic Force  
Microscopes



Nanopositioners



Finance

**System Identification, Control Design & Statistical Signal Processing**





# Dr. Bijoy Krishna Das

## PHD, University of Paderborn, Germany

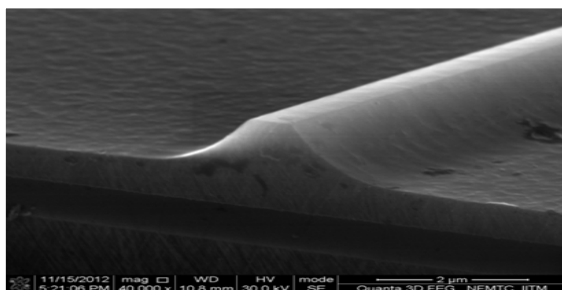
Professor, Dept. of Electrical Engineering

044-2257-4459; bkdas@iitm.ac.in

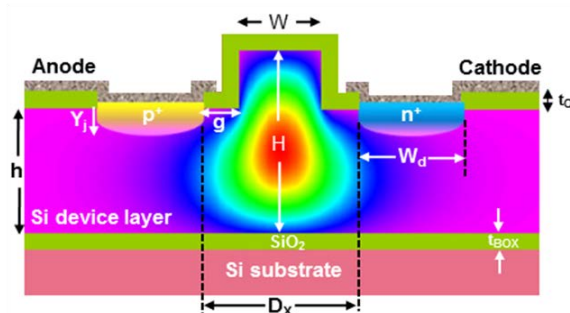
<http://www.ee.iitm.ac.in/~bkdas>



- Silicon Photonics & Optical Interconnect for Communications
- Integrated Optoelectronics for Sensor Devices
- Nonlinear Integrated Optics



Low-loss Trimmed Waveguide Structure in SOI (0.06 dB/mm)



Waveguide PIN Phase-Shifter in SOI (Modeling & Fabrication)



Fiber Pigtailed & Packaged DWDM Channel Interleaver (100 GHz)



# Dr. Bobby George

## PHD- IITM, Post-doc.-TU Graz, Austria.

Associate Professor, Dept. of EE

044-2257-4465; boby@ee.iitm.ac.in

[http://www.ee.iitm.ac.in/facs\\_boby](http://www.ee.iitm.ac.in/facs_boby)



### Sensors and Instrumentation for

- Automotive and Transportation Applications
- Biomedical Applications/Healthcare Technologies
- Industrial Applications



Seat Occupancy Sensor  
for air bag control

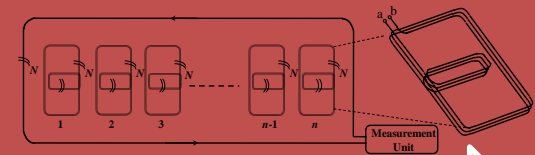
Brake wear  
sensor



Non contact ECG



New Loop sensor for  
intelligent transportation



**Sensors and Electronic Instrumentation**

[Back to Top](#)



# Dr. Debdutta Ray

PHD, TIFR, Mumbai, India

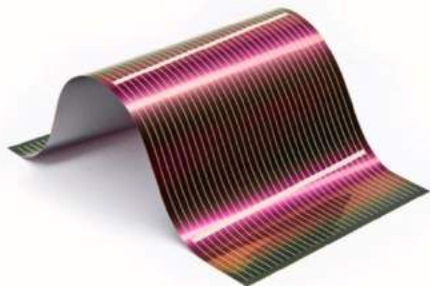
Assistant Professor, Dept. of Electrical Engineering

044-2257-4479; dray@ee.iitm.ac.in

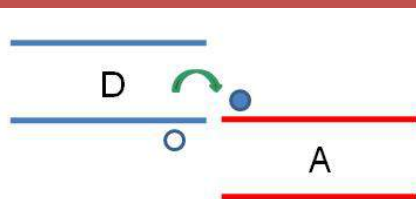


## Research Interests:

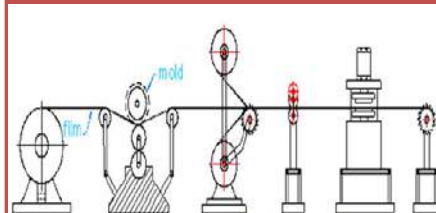
- Organic Solar Cells (OSOL).
- Novel organic devices.
- Study of material for roll-to-roll processing.
- Large area devices.
- Organic field effect transistors (OFET).
- Organic doping.
- Engineering thin film morphology.



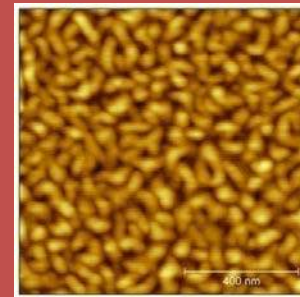
Organic solar cells



Organic doping



Roll-to-roll processing



Engineering morphology

[Back to Top](#)



# Dr. Deepa Venkitesh

## PhD, IIT Bombay, India

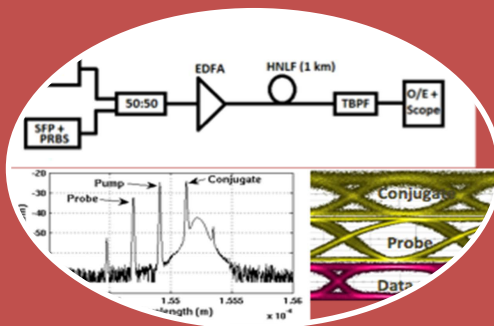
Associate Professor, Dept. of Electrical Engineering

044-2257-4466; deepav@iitm.ac.in

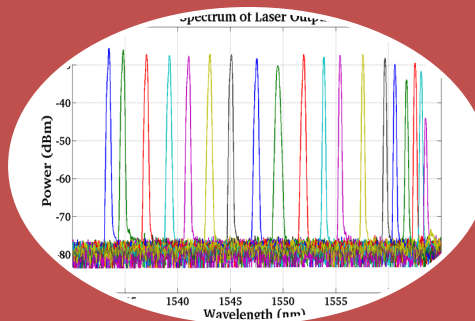
[http://www.ee.iitm.ac.in/facs\\_deepa](http://www.ee.iitm.ac.in/facs_deepa)



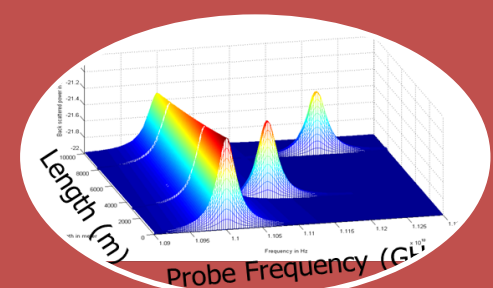
- All-optical signal processing in high-speed communication systems
- Development of fiber lasers for specific applications in different wavelength ranges
- Distributed temperature and strain sensors using nonlinear optics



**Optical Wavelength  
Conversion**



**Tunable fiber laser**



**Distributed  
Temperature and Strain  
sensors**

**Applications of nonlinear optics**

[Back to Top](#)



# Deleep R. Nair

Associate Professor, Dept. of Electrical Engg

044-2257-4471; [deleep@iitm.ac.in](mailto:deleep@iitm.ac.in)

<http://www.ee.iitm.ac.in/user/deleep/>



- Semiconductor devices: Device Design, Fabrication, Characterization and Numerical modeling
- RF MEMS
- Circuit - Device interactions



# Wireless Comm & DSP

## Devendra Jaliha



### Research Areas

- Wireless Communication
- DSP for Communications
- MIMO Receiver Techniques

## Experience

- Professor IIT Madras
- Coordinator, RuTAG-IITM
- Coordinator – Indian Language SMS taskforce

## Research projects

- Indo-UK Cross Layer Energy Efficiency
- DISANET – Emergency Communications
- Tata Power – Battalion Communication System
- Project Guidance: M.Tech (30+), DD (10) B.Tech (30+)

## Research Scholars

(over last 5 years)

	Ph.D.	MS
Completed	1	5
In Progress	2	1
Project Staff	8	

## Awards & Publications

- Journals (15), Conferences (60)
- Sponsored Research projects as PI (total value ~ 680 Lakhs)

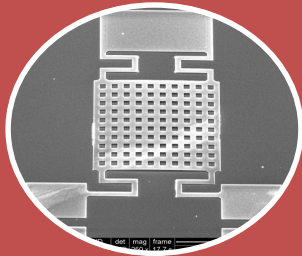
	Since 2008
<a href="#">Citations</a>	150
<a href="#">h-index</a>	6
<a href="#">i10-index</a>	7



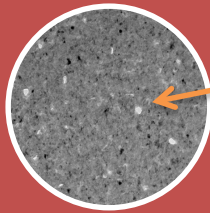
**Prof. Enakshi Bhattacharya**  
**PhD, TIFR Mumbai, India**  
Professor, Dept. of Electrical Engineering  
044-2257-4419; [enakshi@ee.iitm.ac.in](mailto:enakshi@ee.iitm.ac.in)  
<http://www.ee.iitm.ac.in/~enakshi/>



- MEMS and NEMS
- Biosensors and BioMEMS
- Semiconductor materials and devices



**MEMS processes  
and sensors**



20 nm

**Silicon nanoporous  
membranes**



**Bio sensors/MEMS  
digital microfluidics**

**Processes, devices and sensors in amorphous, porous, poly and crystalline silicon**



# Dr. Gaurav Raina

PhD, University of Cambridge

Associate Professor, Department of Electrical Engineering, IIT Madras

Tel: 044-2257-4453 E-mail: gaurav@ee.iitm.ac.in

Web: [http://www.ee.iitm.ac.in/facs\\_gaurav](http://www.ee.iitm.ac.in/facs_gaurav)



## Research Areas

Control and Nonlinear Systems

Performance Modelling of Communication & Transport Networks

Mobile Payments, Security, Commerce



Dr. K. Giridhar

PhD (Univ. of California, Santa Barbara, 1993)

Professor, Dept. of Electrical Engineering

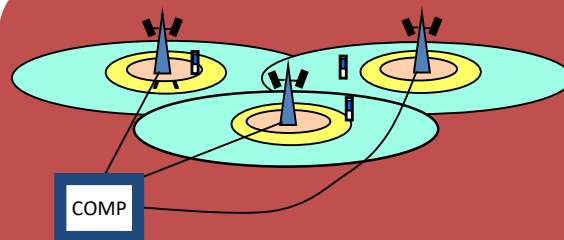
+91 44 2257 4420; giri@ee.iitm.ac.in

<http://www.iitm.ac.in/ee/~giri>

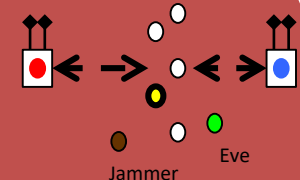
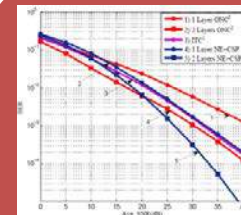
- Adaptive Signal Processing for Broadband Wireless Communications
- Interference Aware Estimation, Detection, Scheduling, and Rate Adaptation
- Wireless Standards, Future Het-Nets, Strategic Comm., and Performance Analysis



LTE/4G+/WiFi Wireless  
Hardware Design & Proof of  
Concept Test-Bed Development



Performance Analysis of MIMO-  
OFDM Mobile Broadband  
Access Networks



Advanced Transceiver  
Algorithms for Interference  
Limited Systems and for  
Strategic Communications

← **Wireless Communications for Civilian and Strategic Use – Research, Design, Analysis** →



Dr. Harishankar Ramachandran

PHD, UC Berkeley, USA

Professor, Dept. of Electrical Engineering

+91 44 2257 4421; [hsr@iitm.ac.in](mailto:hsr@iitm.ac.in)

<http://www.ee.iitm.ac.in/~hsr>



- Physical Layer Optical Links
- Quantum descriptions of Optical Links
- Edge Plasma Physics
- Computational Electro Magnetics

I work on problems where stochastic effects are present, and where quantum corrections need to be computed. Many of my students work on computational problems in Electromagnetics, both in optics and in plasma physics.





# Dr. Jagadeesh Kumar V

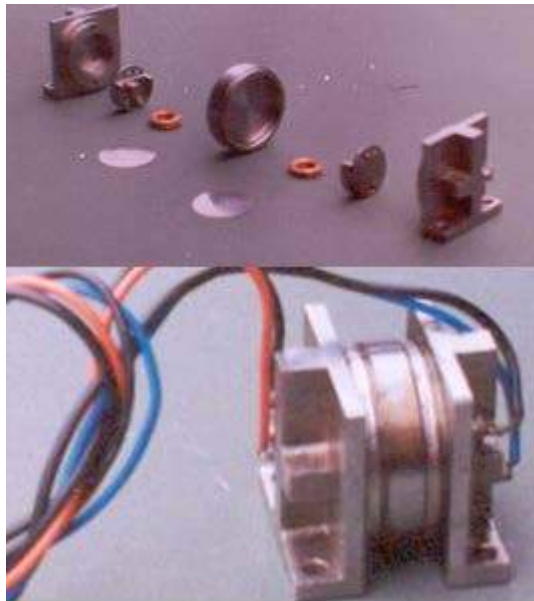
Professor, Electrical Engineering Department

044-2257-6406; vjk@iitm.ac.in

[http://www.ee.iitm.ac.in/facs\\_vjkumar](http://www.ee.iitm.ac.in/facs_vjkumar)



- Electrical, Electronic and Biomedical Instrumentation.
- Sensors and signal conditioning.
- Measurements on properties of ferromagnetic materials.



Variable Reluctance Type  
Pressure Transducer



Calibration free pulse  
oximeter



Brake wear sensor for heavy  
vehicles

**Applying analog and digital electronics for Sensing and Measurements**

[Back to Top](#)



**Dr. B. Kalyan Kumar**  
**Ph.D., IIT Kanpur, India**

**Associate Professor, Dept. of Electrical Engineering,**

**044-2257-4446; [bkalyan@iitm.ac.in](mailto:bkalyan@iitm.ac.in)**

**<http://www.iitm.ac.in/component/faculty/72/bkalyan/>**



- Power System Stability
- Flexible AC Transmission Systems (FACTS)
- Power Quality
- Power System Optimization



# Dr. Shreepad Karmalkar

## PHD, IIT Madras, India

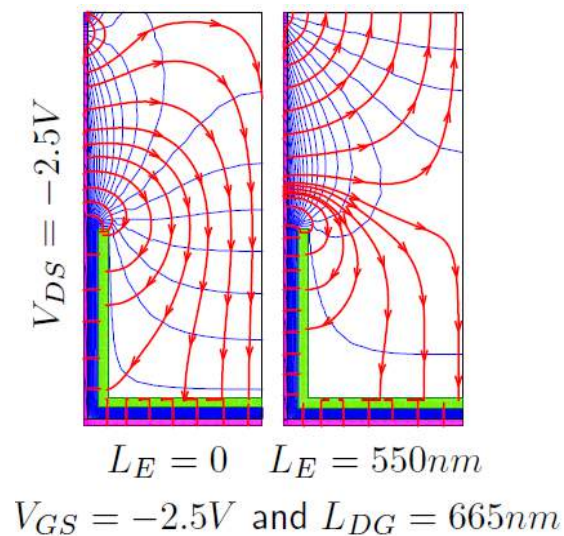
Professor, Dept. of EE

044-2257-4409; [karmal@ee.iitm.ac.in](mailto:karmal@ee.iitm.ac.in)

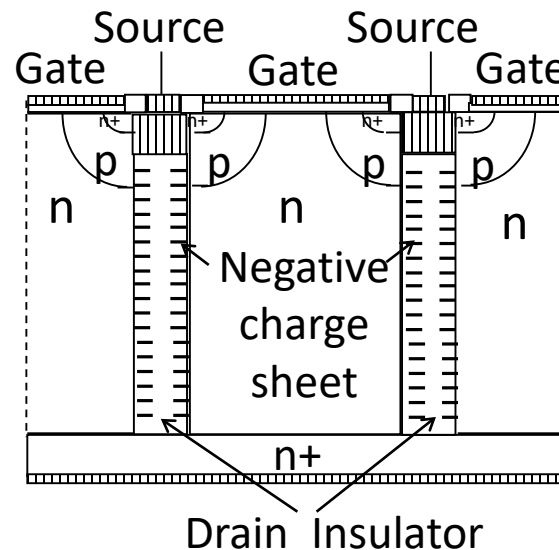
<http://www.ee.iitm.ac.in/~karmal/>



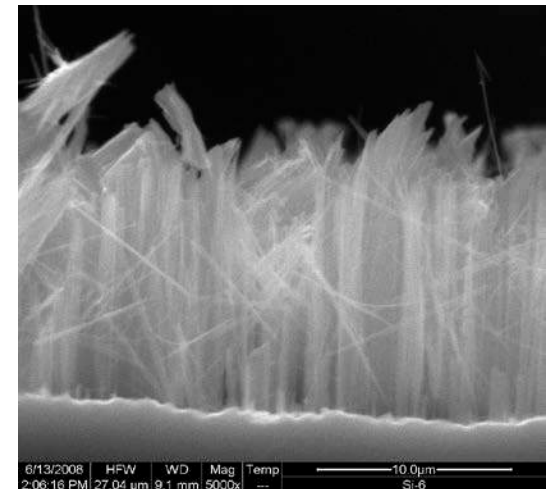
- Semiconductor Device Modeling and Fabrication
- Nanotechnology
- Education



**Nanowire devices**



**Power MOSFET (SiC, Si, Superjunction), GaN HEMT**



**Electroless processing**



**Dr. S Krishna**  
**PhD, Indian Institute of Science, India**  
Assistant Professor, Dept. of Electrical Engineering  
044-2257-4448; [krishnas@iitm.ac.in](mailto:krishnas@iitm.ac.in)  
<http://www.ee.iitm.ac.in/~krishnas>



## ● Power System Stability Analysis and Control

Problems I have worked on:

- Under frequency load shedding scheme
- Detection of voltage collapse and corrective action
- Strategy for transient stability improvement using braking resistor and excitation system
- On-line dynamic security assessment: computational aspects



# Dr. Krishna Jagannathan

## Ph.D., Massachusetts Institute of Technology

Associate Professor, Dept. of Electrical Engineering

044-2257-4469; [krishnaj@ee.iitm.ac.in](mailto:krishnaj@ee.iitm.ac.in)

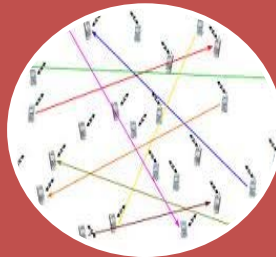
<http://www.ee.iitm.ac.in/~krishnaj/>



- Wireless Networks: Resource Allocation, Cross Layer Control
- Distributed Control and Optimization of Complex Networks
- Stochastic Modelling and Performance Analysis



LTE Resource Allocation



Large Wireless Networks  
& Distributed Operation



Real-Time Road Traffic  
Control

**NETWORK CONTROL AND OPTIMIZATION**





# Dr. Krishna Vasudevan

## PHD, IIT Madras, India

Professor, Dept. of Electrical Engineering

044-2257-4428; [krishna.vasudevan@iitm.ac.in](mailto:krishna.vasudevan@iitm.ac.in)

[http://www.ee.iitm.ac.in/facs\\_krishna](http://www.ee.iitm.ac.in/facs_krishna)



- PMSM/BLDC Motor drives
- Power Electronics for Renewables
- Grid Integration of Renewables

Motor control , Electric  
vehicles, Electromagnetic  
Actuators

Power Converters for  
solar, battery applications

Power Converters and  
control for grid integration



# Dr. Lakshminarasamma

## PHD, IISc Bangalore, India

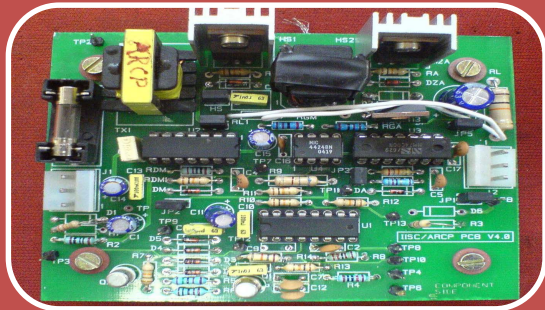
Associate professor, Dept. of Electrical Engineering

044-2257-4462; lakshmin@iitm.ac.in

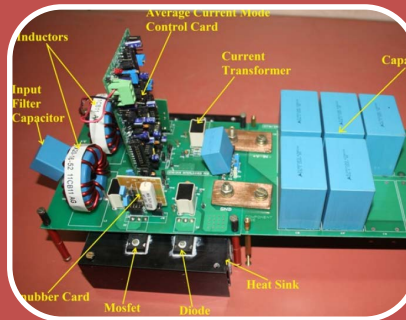
[http://www.ee.iitm.ac.in/facs\\_lakshmin](http://www.ee.iitm.ac.in/facs_lakshmin)



- DC DC Power Converters, Modeling, Analysis and Design
- High Frequency Converters and Inverters for Renewable Energy Applications



33 W 500 kHz DC DC Converter Designed and Implemented for space craft Applications.



2 kW Interleaved Boost DC DC Converter High Power Applications, Operated in Interleaved and Paralleling



A 500 W 100 kHz 48 – 400 V Soft switching DC DC Bridge converter  
Finds Applications for Aircraft, solar/Fuel cell fed power supplies



# Dr. Mahesh Kumar

## PHD, IIT Kanpur, India

Professor, Dept. of Electrical Engineering

044-2257-4429; maheshk@iitm.ac.in

[http://www.ee.iitm.ac.in/facs\\_mahesh](http://www.ee.iitm.ac.in/facs_mahesh)



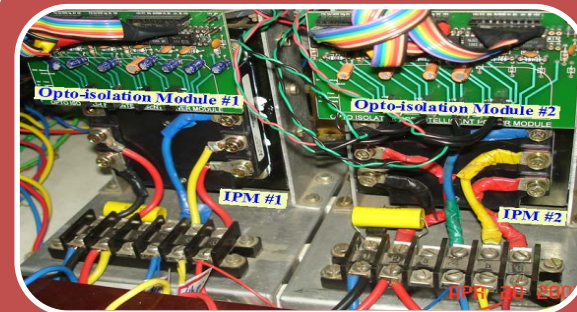
- Power Quality Monitoring, Analysis and Interpretation
- Application of Power Electronics in Power Systems: Custom Power Devices
- Renewable Energy Grid Interactive and Grid OFF Systems



Based on monitored data of industrial plants, their detailed performance evaluations are carried out. Also, based on the study of analyzed data, interpretation can be made to avoid serious consequences of power quality problems.



Custom Power Devices are used to eliminate power quality related problems such as unbalance, reactive power, harmonics etc., in power distribution systems. Control, Design and development of these devices are the core issues which are being addressed.



Custom power devices are basically power electronic based controllers and find numerous applications in renewable energy systems. Efficient grid interactive inverters, their design and control for optimal power sharing with the local grid and loads are important aspects which are explored and investigated.



# Dr. R. Manivasakan

## PhD, IIT Bombay

Assistant Professor, Electrical Engineering

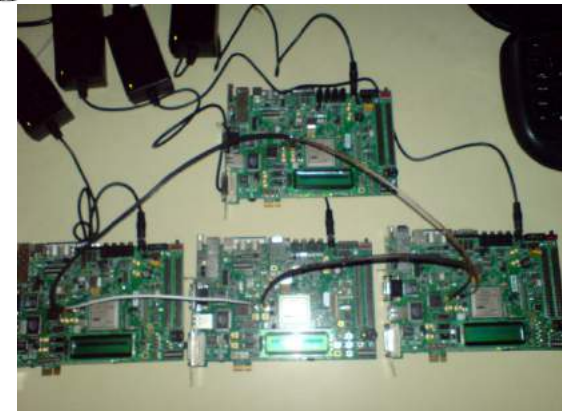
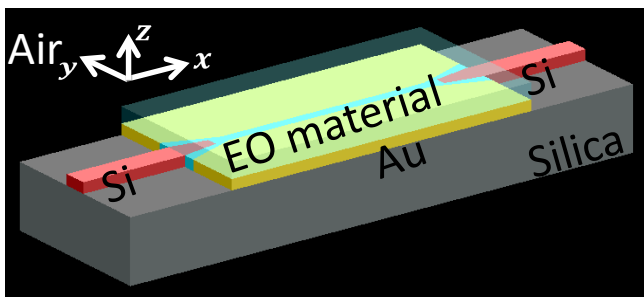
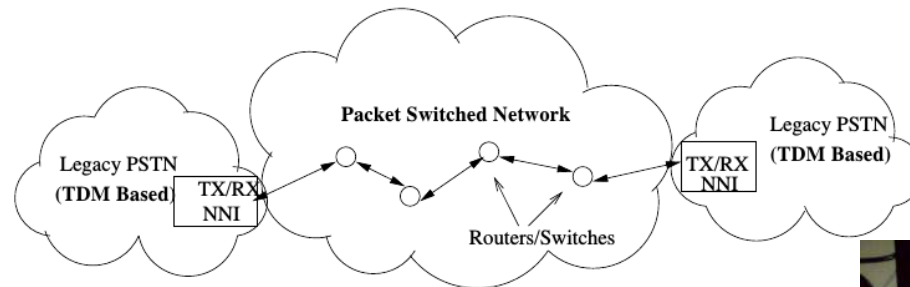
044-2257-4330; rmani@ee.iitm.ac.in

<http://www.ee.iitm.ac.in/~rmani/>



### Major Areas of Research

- Optical Networks: PHY and Layer 2
- Queueing Theory and its Applications to Communication networks
- TDM over PSN



Performance Analysis of Communication Networks (Optical and Wireless)

[Back to Top](#)



# Dr. C Mathiazhagan

Asst. professor, Electrical Engineering

044-2257-4431; mathi@ee.iitm.ac.in



## Major Areas of Research

- Analog and digital circuits, Instrumentation





Dr. Mohanasankar Sivaprakasam  
PhD - University of California Santa Cruz, USA  
Associate Professor, Dept of Electrical Engg

+91-9884511692; mohan@ee.iitm.ac.in



- Healthcare technologies
- Biomedical devices and instrumentation
- Medical signal/image processing



Screening



Diagnosis



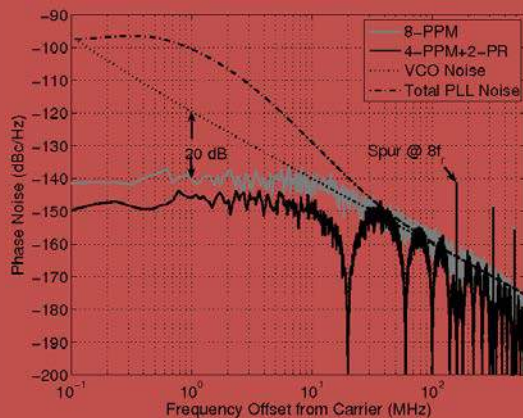
Therapeutic



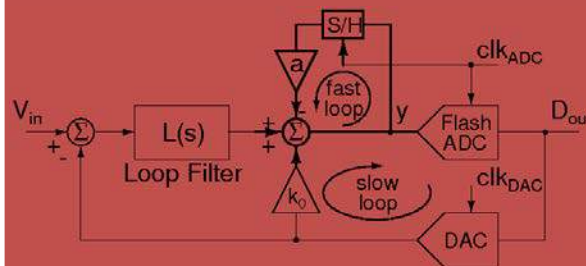
**Dr. Nagendra Krishnapura**  
**PhD, Columbia University, USA**  
Associate Professor, Dept. of Electrical Engineering  
044-2257-4444; nagendra@iitm.ac.in  
<http://www.iitm.ac.in/~nagendra>



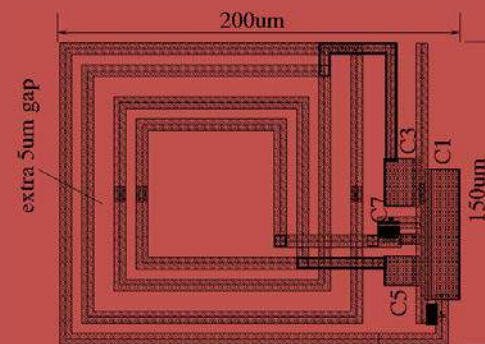
- Analog integrated circuit design
- RF integrated circuit design
- Circuits and systems education



Randomization  
reduces PLL spurs



Additional fast loop  
overcomes speed  
limit of  $\Delta\Sigma$  ADC



Multi-tap inductor  
enables compact  
filters

Increase speed and precision, and reduce power and area of ICs

[Back to Top](#)



# Dr. Nandita DasGupta

## PHD, IIT Madras, India

Professor, Dept. of Electrical Engineering

044-2257-4422; nand@ee.iitm.ac.in

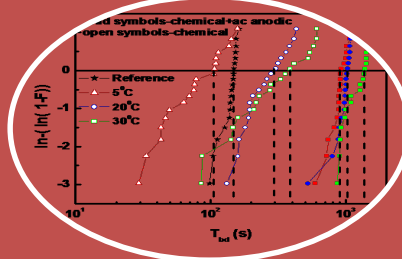
<http://www.ee.iitm.ac.in/~nand/>



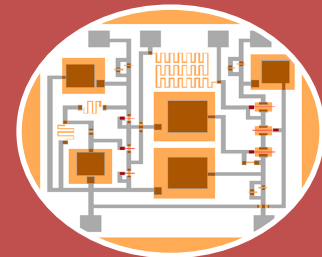
- Research Area/Focus 1: Thin oxides and High-k Dielectrics
- Research Area/Focus 2 : III-V Semiconductor Devices
- Research Area/Focus 3 : Micromachining for MEMs & photonic devices



Pigtailed InGaAs/InP p-i-n  
Photodetector with  
micromachining for fibre  
coupling



Improvement in the reliability of  
thin oxides with ac anodization



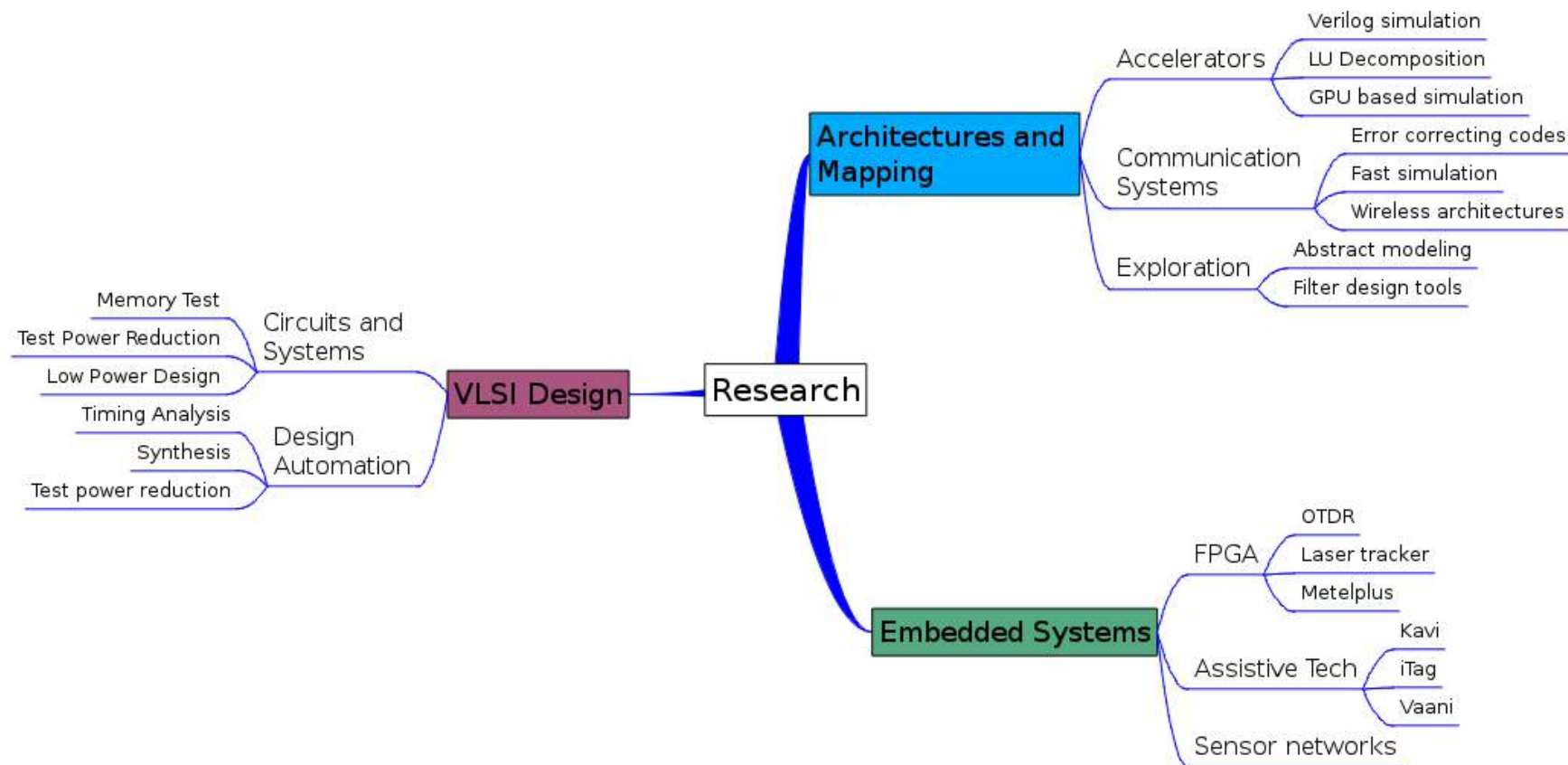
GaAs MESFET-based  
Transimpedance preamplifier



# Dr. Nitin Chandrachoodan

PhD, Univ. of Maryland, College Park, USA  
Associate Professor, Dept. of Electrical Engg.

044-2257-4432; [nitin@iitm.ac.in](mailto:nitin@iitm.ac.in)  
<http://www.ee.iitm.ac.in/~nitin/>



**Digital Systems Design and Design Automation**



# Dr. Pradeep Kiran Sarvepalli

PhD, Texas A&M University, USA

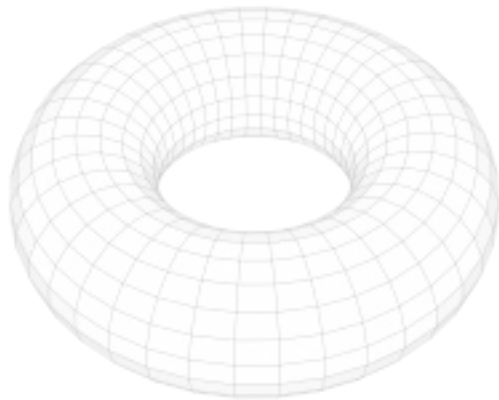
Assistant Professor, Electrical Engineering

044-2257-4473; sarvepalli@iitm.ac.in

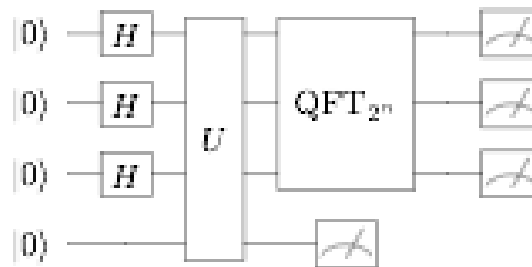
<http://www.ee.iitm.ac.in/~pradeep>



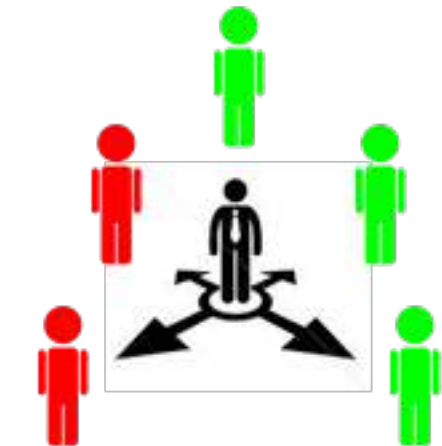
- Classical and quantum error correction
- Quantum algorithms
- Quantum cryptography



Topological quantum codes  
on surfaces



Quantum algorithms



Quantum secret sharing

Quantum information processing

[Back to Top](#)





# Dr. Radha Krishna Ganti

## PHD, University of Notre Dame

Associate Professor, Dept. of EE

044-2257-4467; rganti@ee.iitm.ac.in

<http://www.ee.iitm.ac.in/~rganti/>



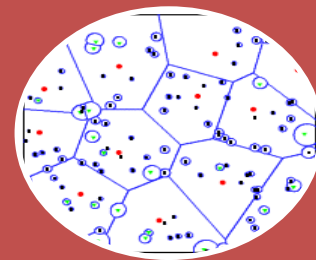
- Wireless Networks
- Stochastic Geometry
- Information Theory



Implementation of  
superposition coding on  
SDR

$$\mathbb{P}(SIR \geq \theta) = \frac{1}{1 + \rho(\theta, \alpha)}$$

Probability, Stochastic  
Geometry, Information  
Theory



HetNets, Cellular  
Networks, Adhoc  
Networks

**BROAD DESCRIPTION OF THE BANDWIDTH/AREA OF RESEARCH**



# Dr. A. N. Rajagopalan

## PhD, IIT Bombay, India

Professor, Dept. of Electrical Engineering

044-2257-4433; [raju@ee.iitm.ac.in](mailto:raju@ee.iitm.ac.in)

<http://www.iitm.ac.in/~raju>



Shape from  
Motion Blur



Digital Heritage Reconstruction



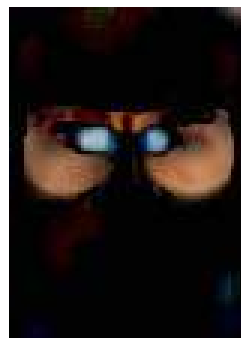
Non-Uniform De-  
blurring n HDR



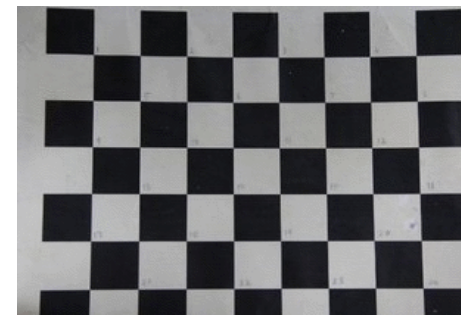
Super-resolution Matting



Face Recognition in  
Occlusion and Blur



Underwater Imaging



[Back to Top](#)



**Dr. Ramkrishna Pasumarthu**  
**PHD, University of Twente, The Netherlands**

Associate Professor, Dept. of Electrical Engg

044-2257-4470; [ramkrishna@iitm.ac.in](mailto:ramkrishna@iitm.ac.in)

<http://www.ee.iitm.ac.in/~ramkrishna>



- Mathematical Modeling
- Control of physical systems
- Simulations of Large scale infrastructures

Cloud Computing

Industrial  
Automation

Computational  
mechanics



**Dr. R. Sarathi**  
**PhD, IISc, Bangalore, India**  
**Professor, Dept. of Electrical Engineering**  
044-2257-4436; [rsarathi@iitm.ac.in](mailto:rsarathi@iitm.ac.in)  
<http://www.iitm.ac.in/info/fac/rsarathi>



- **Condition monitoring of power apparatus adopting Multi sensor fusion Technique**
- **Pulsed power technique for nano particle production and sterilisation of liquid foods**
- **Development of high performance nanocomposites for electrical insulation**

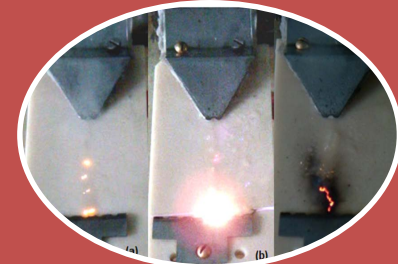


Theoretical and experimental studies to identify the location of discharges in power apparatus especially in transformers by measuring UHF signals generated by discharges and by triangulation process



Facility for generation of nano particles by wire explosion process and for use of nano aluminium for Rocket propellant.

Pulsed power technique for sterilisation of liquid foods.



Optimisation of nano fillers in nano composites for obtaining good electrical, thermal and mechanical properties for various electrical insulation applications.



# Dr. Shanthi Pavan

## PhD, Columbia University New York, USA

Professor, Dept. of Electrical Engg

044-22574437; [shanthi@ee.iitm.ac.in](mailto:shanthi@ee.iitm.ac.in)

<http://www.ee.iitm.ac.in/~shanthi/faculty.html>



- Analog Mixed Signal Design : A/D and D/A conversion, filters
- Microwave IC Design : Broadband equalization and beamforming
- Sensor Interfaces : Bio and inertial sensor read electronics

Data Converters & Filters

High Speed Data Links &  
Beamforming

MEMS Accelerometers  
and Gyroscopes,  
Biosensors





**Dr. Shanti Bhattacharya**

Professor, Electrical Engineering

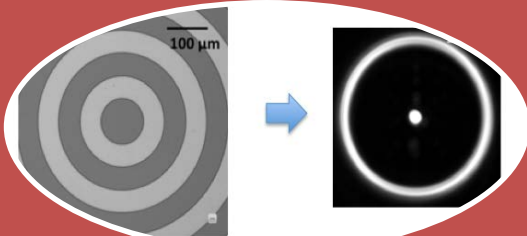
044-2257-4438; shantib@iitm.ac.in

<https://sites.google.com/site/appliedopticsgroup/>

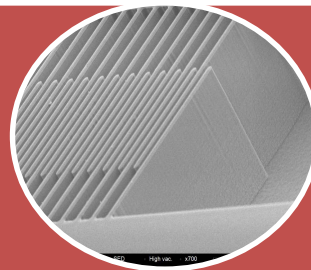


## Major Areas of Research

- Design and fabrication of diffractive optical elements
- Design and fabrication of Optical MEMS
- Fibre and free space-based Optical Metrology systems (eg OCT, spectroscopy)



Diffractive optics for Beam Shaping.  
Converting a Gaussian beam into a focused ring



Comb drive for actuation of micro-optics

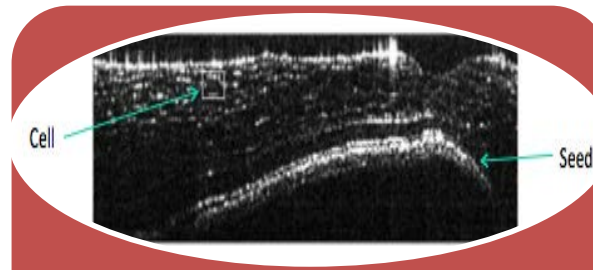


Image measured with a fibre based OCT system working at 1550nm. Cucumber Slice  
- Depth: 1.4 mm in air; Width: 8 mm

Devices, Systems, Components to control light, extract information, make measurements.

[Back to Top](#)



# Dr. Sheetal Kalyani

## PHD, IIT Madras, INDIA

Associate Professor, Dept. of Electrical Engineering

044-2257-4474; [skalyani@iitm.ac.in](mailto:skalyani@iitm.ac.in)



- Robust statistics based estimation/detection approaches and outlier detection.
- Applications of extreme value theory to problems in wireless networks/systems.
- Statistical learning theory and its applications.

Receiver algorithms and link abstraction for OFDM/OFDMA based systems

Analysis of model misspecification and robust solutions

Cross layer optimization across MAC and PHY layers in wireless systems



# Dr. Soumya Dutta

PHD, JNCASR, Bangalore, India

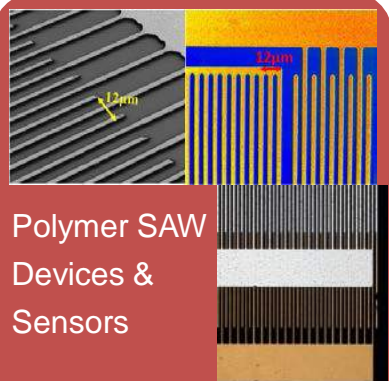
Assistant Professor, Dept. of Electrical Engineering

044-2257-4472; [s.dutta@ee.iitm.ac.in](mailto:s.dutta@ee.iitm.ac.in)

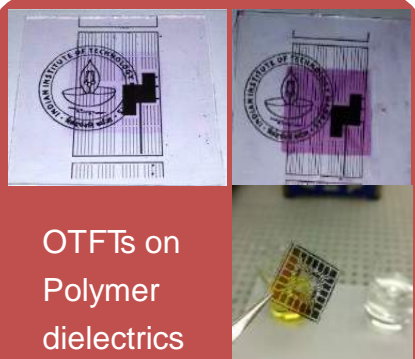
<http://www.ee.iitm.ac.in/user/s.dutta/>



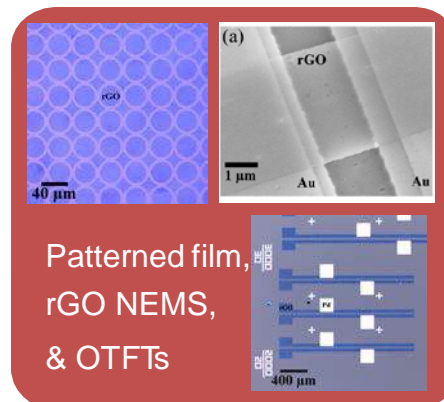
- ❖ Organic Solar Cell (OSC) /Perovskite Solar Cells
- ❖ Organic Thin Film Transistors (OTFTs) and Circuits
- ❖ Reduced Graphene Oxide (rGO) based NEMS and Microelectronic Devices
- ❖ Ferroelectric Polymer based Surface Acoustic Wave (SAW) Devices
- ❖ Organic LED and AMOLED Display



Polymer SAW  
Devices &  
Sensors



OTFTs on  
Polymer  
dielectrics



Patterned film,  
rGO NEMS,  
& OTFTs



Printed Film OSC &  
State-of-the-art Facility

[Back to Top](#)



# Dr. K. Sridharan

## Ph.D, RPI, New York

Professor, Dept. of Electrical Engineering

044-2257-4423; sridhara@iitm.ac.in

<http://www.ee.iitm.ac.in/~sridhara>

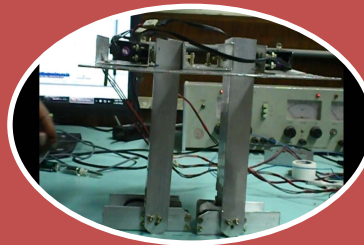


### Research Areas:

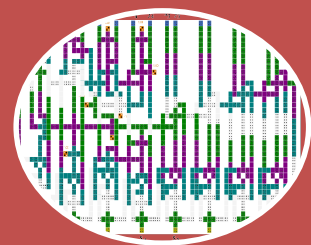
- VLSI Architectures for autonomous systems and DSP; FPGA-based design and implementation
- Sensor-based planning and control for mobile robots, cooperative robot navigation and rendezvous
- Video stabilization and stitching –Algorithms and VLSI architectures
- Design of digital circuits in emerging device technologies, reliability studies



FPGA-based  
Robotics



Cooperative  
Robotics



Digital Nano-  
circuits





Dr. Srikrishna Bhashyam

PHD, Rice University, USA

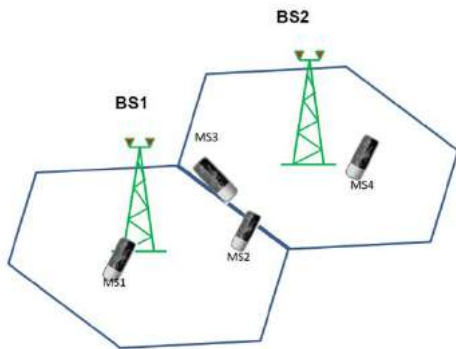
Professor, Dept. of Electrical Engineering

044-2257-4439; [skrishna@iitm.ac.in](mailto:skrishna@iitm.ac.in)

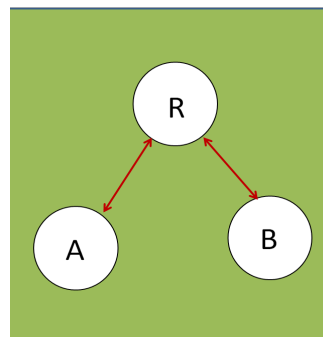
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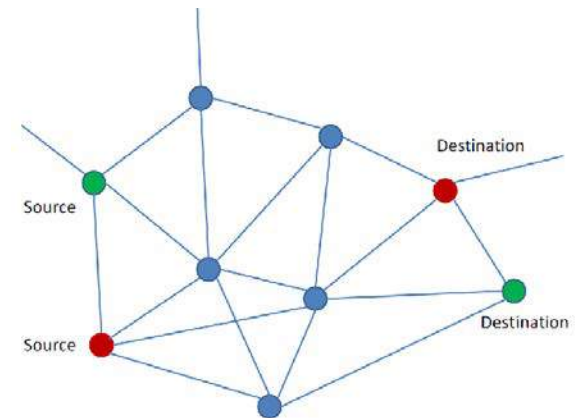
- Multi-hop multi-flow wireless communication: Capacity, protocols and codes
- Network resource allocation: Centralized and distributed optimization
- Statistical signal processing methods



Cellular Networks



Wireless LANs



Sensor Networks

COMMUNICATION AND INFORMATION THEORY





**Dr. Srirama Srinivas**  
**PHD, NIT Warangal, India**  
Associate Professor, Dept. of Electrical Engineering  
044-2257-4447; srsrini12@iitm.ac.in



- Multilevel Inverters, PWM control & diagnostics
- Integration of distributed energy systems with utility grid
- Control algorithms for DC-DC and DC-AC Converters

Electrical  
machines & Drives

Microgrids

Renewable Energy



Dr. K. S. Swarup

PHD, IISc Bangalore, India

Professor, Dept. of Electrical Engineering, IITM

044-2257-4440; ksswarup@iitm.ac.in

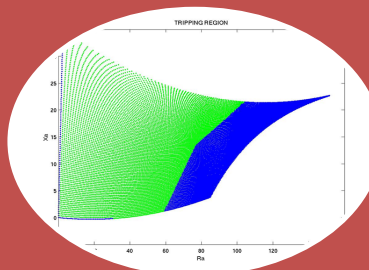
[http://www.ee.iitm.ac.in/facs\\_swarup](http://www.ee.iitm.ac.in/facs_swarup)



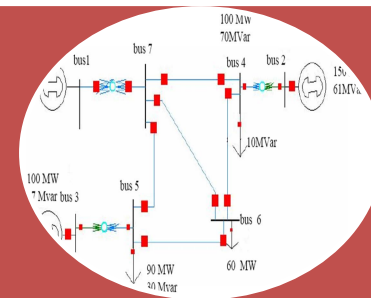
- Power Systems, Operation, Optimization, Planning, Deregulation and Control.
- Energy Management Systems / SCADA, Smart Grid, Automation and Protection.
- Soft Computing, Intelligent Systems, Evolutionary Computational Intelligence.



Power System  
Operation, Optimization  
and Planning



Energy Management  
Systems, Automation  
and Protection



Intelligent Networks for  
Power Grids

← ENERGY MANAGEMENT SYSTEM APPLICATIONS FOR POWER GRIDS OF THE FUTURE →



# Dr. Venkatesh Ramaiyan

## PhD, Indian Institute of Science, Bengaluru

Assistant Professor, Dept. of Electrical Engineering

044-2257-4464; [rvenkat@iitm.ac.in](mailto:rvenkat@iitm.ac.in)

<http://www.iitm.ac.in/~rvenkat>



- Distributed Medium Access in Ad hoc Wireless Networks
- Cross-layer Resource Allocation and QoS Provisioning in Cellular Networks
- High Rate Communication Networks for Control Applications



WiFi Hot Spots



3G/4G Browsing



Sensor Networks

← Provisioning and Performance Evaluation in Wireless Networks →



# Dr. Vinita Vasudevan

## PhD, IIT Bombay, India

Professor, Dept. of Electrical Engineering

044-22574442; [vinita@iitm.ac.in](mailto:vinita@iitm.ac.in)

<http://www.ee.iitm.ac.in/~vinita>

- Circuits/Noise, Timing, Power, leakage analysis
- VLSI CAD/Reduced order modelling
- System simulation and optimization

### Some problems I have worked on:

- Fast and accurate statistical timing analysis of digital circuits
- Analysis of clock jitter in sigma-delta converters
- Optimum scheduling of data parallel tasks in partially reconfigurable systems



INDIVIDUAL FACULTY PROFILE

# DEPARTMENT OF ENGINEERING DESIGN



# LIST OF FACULTY

[Asokan Thondiyath](#)

[Balkrishna C. Rao](#)

[Ganapathy Krishnamurthy \(Profile yet to be uploaded\)](#)

[Kavitha Arunachalam](#)

[Krishna Kumar R](#)

[Nilesh J Vasa](#)

[Palaniappan Ramu](#)

[Ramanathan M](#)

[Rengaswamy Jayaganthan \(Profile yet to be uploaded\)](#)

[Sandipan Bandyopadhyay](#)

[Saravana Kumar G](#)

[Shankar Ram C.S](#)

[Srikanth Vedantam](#)

[Tuhin Subhra Santra](#)

[Venkatesh Balasubramanian](#)



# Dr Asokan Thondiyath

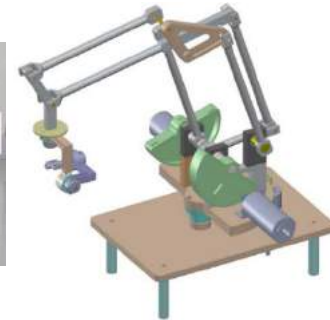
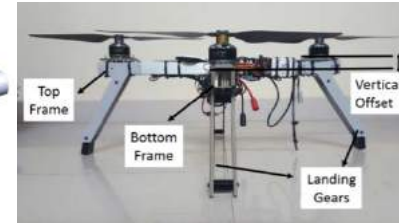
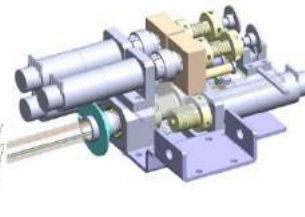
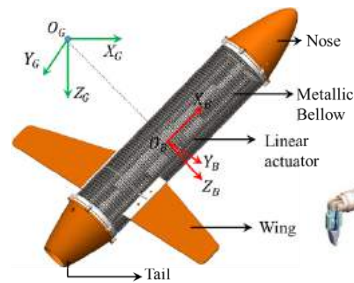
Professor, Department of Engineering Design

044-22574707; asok@iitm.ac.in

<http://ed.iitm.ac.in/~asokan>



- Robotics
- Mechatronics
- Automation
- Medical Devices



## Design

- Autonomous underwater robots
- Surgical robots
- Variable buoyancy systems
- Medical / rehabilitation devices
- Aerial robots
- Multimodal robots
- New Product Development

## Dynamics

- Mathematical modelling and Simulation
- Analysis of 6dof motion dynamics
- Dynamic path planning and obstacle avoidance
- Localisation and Mapping

## Control

- Guidance, Navigation and Control for Autonomous operation
- Control algorithms for improved performance
- Hybrid Control architectures for robot control



# Dr. Balkrishna C. Rao

Associate Professor, Engineering Design

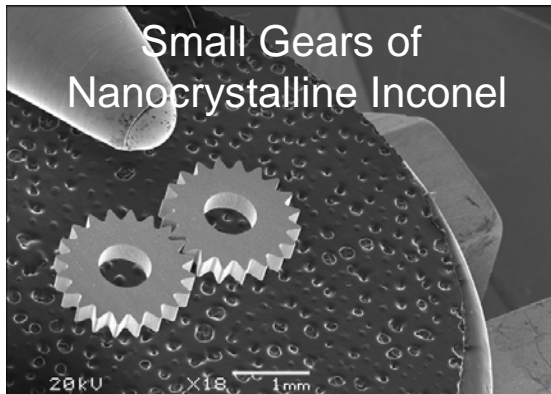
044-2257-4660; [balkrish@iitm.ac.in](mailto:balkrish@iitm.ac.in)

<http://ed.iitm.ac.in/~balkrish/>



## Major Areas of Research

- Severe Plastic Deformation (SPD) for creating nanocrystalline metals and alloys
- Sustainable manufacturing and additive manufacturing of metals
- Innovations for a sustainable future





# Dr. Kavitha Arunachalam

## Indian Institute of Technology Madras, India

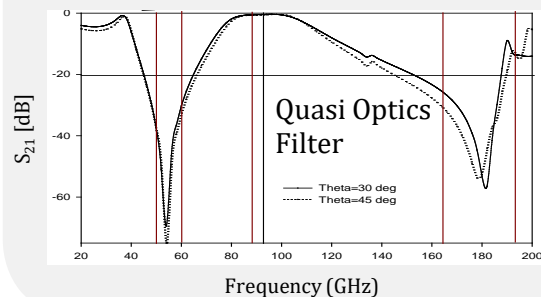
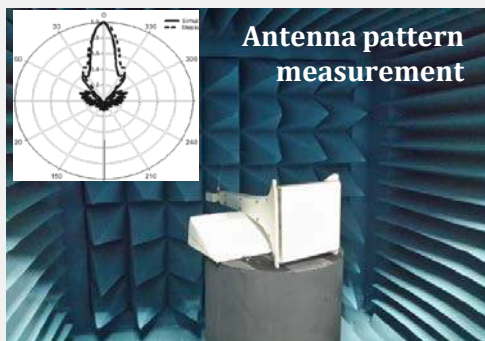
Associate Professor, Dept. of Engineering Design

<http://ed.iitm.ac.in/~akavitha/index.html>

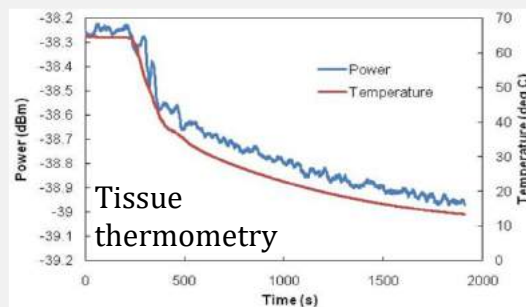


- Antennas, Filters, Microwave Circuits
- EM Medical Devices – Thermal therapy, Diagnostic
- EM Nondestructive Evaluation (NDE) – Microwave, Eddy Current Inspection

### Antenna, Filter Design

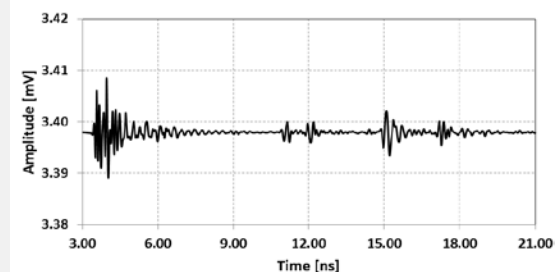


### EM Medical Devices

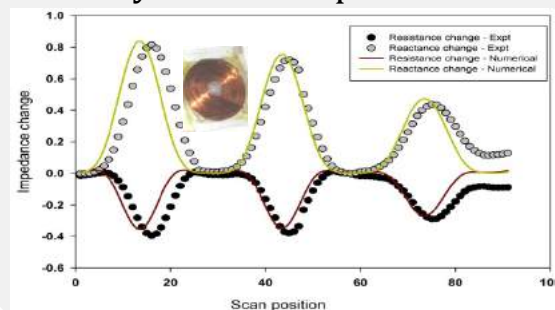


### EM NDE

#### Microwave remote inspection



#### Eddy current inspection



[Back to Top](#)





Dr. R. Krishna Kumar

PhD, IIT Madras

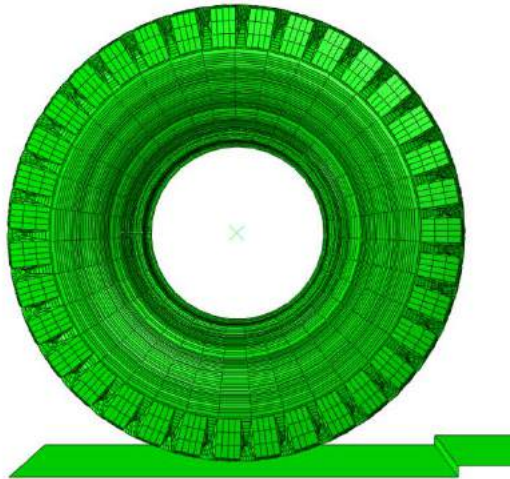
Professor, Dept. of Engineering Design

044-2257-4661; rkkumar@iitm.ac.in

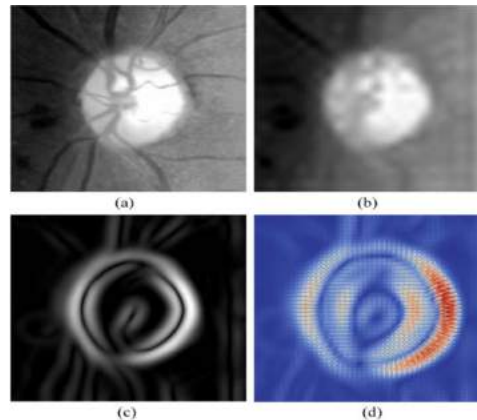
<http://www.iitm.ac.in/ED>



- Non-linear Finite Element / Tire mechanics and Biomechanics
- Biomedical Signal Processing/Cardiovascular
- Biomedical Image Processing/Diabetic Retinopathy, Cardiac imaging, image guided surgery



Tire Mechanics



Optic Disc Detection



Five lead wireless ECG

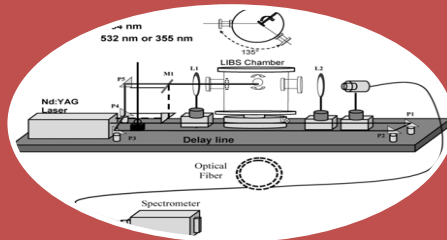




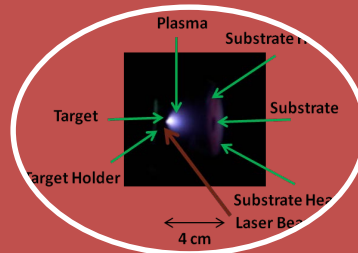
**Nilesh J. VASA**  
**Dr. Eng., Kyushu University, Japan**  
Professor, Dept. of Engineering Design  
+91-44-2257-4706; njvasa@iitm.ac.in  
<http://ed.iitm.ac.in/~vasa/>



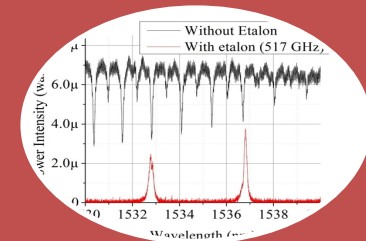
- Laser assisted sensing, Laser induced breakdown spectroscopy (LIBS) based sensing
- Laser assisted micro-manufacturing, annealing, texturing of thin films
- Optical coherent tomography technique for biomedical applications



LIBS for elemental analysis



Laser assisted  
micro-manufacturing



Laser assisted sensing

**Opto-Mechatronics Laboratory : Application of Lasers in Engineering**



# Dr. Palaniappan Ramu

## Ph.D, University of Florida, Gainesville, USA

Associate Professor, Dept. of Engineering Design

044-2257-4738; palamu@iitm.ac.in

<http://www.ed.iitm.ac.in/~palamu/>



- Treatment of uncertainties in engineering design
- Design space exploration and surrogate enabled optimization
- Engineering analytics and decision sciences

### Core area

- Uncertainty quantification, propagation and analysis
- Applied statistics

### Methods

- DoE
- Optimization
- Adaptive sampling
- Surrogates/ metamodels
- Model calibration
- Engineering analytics

### Application

- Aerospace DSS
- Design for reliability robustness, quality and sustainability
- Wind turbines
- Material characterization

**Probabilistic process and product design and development**



# Dr. M. Ramanathan

## PHD, Indian Institute of Science, India

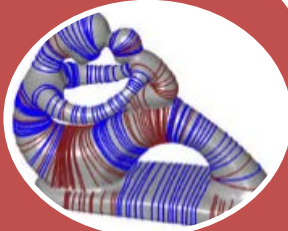
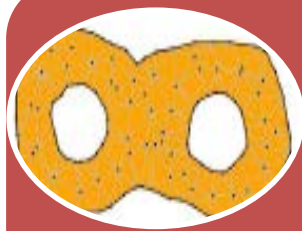
Associate Professor, Dept. of Engineering Design

044-2257-4734; [mraman@iitm.ac.in](mailto:mraman@iitm.ac.in)

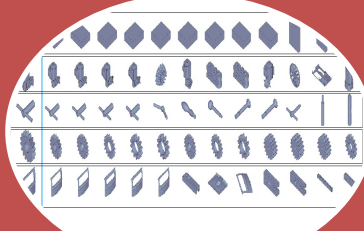
<http://ed.iitm.ac.in/~raman>



- Geometric and solid modeling /Analysis of Mesh Models and Point-sets.
- Image processing (including biomedical)/Primitive extraction from images
- Computational geometry in curved world/Shortest path, Voronoi diagram



Shape Reconstruction,  
Animation



Content-based  
Shape/Image retrieval,  
Image reconstruction



Path Planning / Mould  
separation/Protein  
structural analysis

**Geometric computing**



# Dr. Sandipan Bandyopadhyay

## PHD, Indian Institute of Science, Bangalore

Associate Professor, Dept. of Engineering Design

044-2257-4733; [sandipan@iitm.ac.in](mailto:sandipan@iitm.ac.in)

<http://www.ed.iitm.ac.in/~sandipan>



- Computational kinematics
- Mechanics, control, and design of parallel robots
- Design of mechanisms and products



Singular manifold of the  
general hexagonal Stewart  
platform manipulator



MaPaMan: a 3-DoF spatial  
parallel robot



An improved hand-driven  
tricycle with suspensions

**From equations to embodiment**



**Dr. G SARAVANA KUMAR**

**PhD, IIT Kanpur, India**

**Associate Professor, Dept. of Engineering Design**

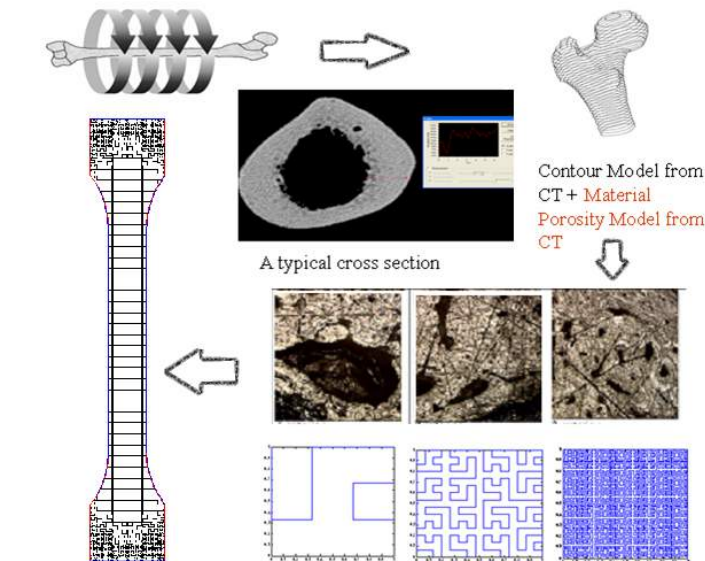
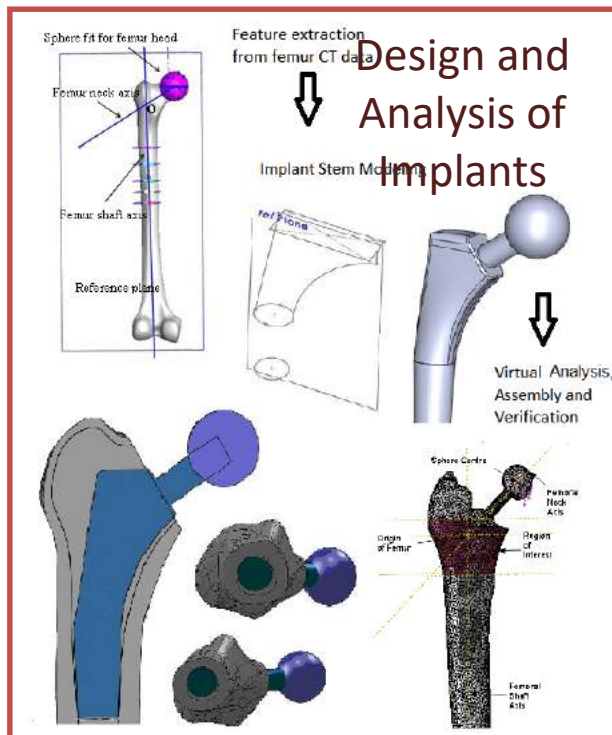
044-2257-4736; gsaravana@iitm.ac.in

<http://ed.iitm.ac.in/~gsaravana>

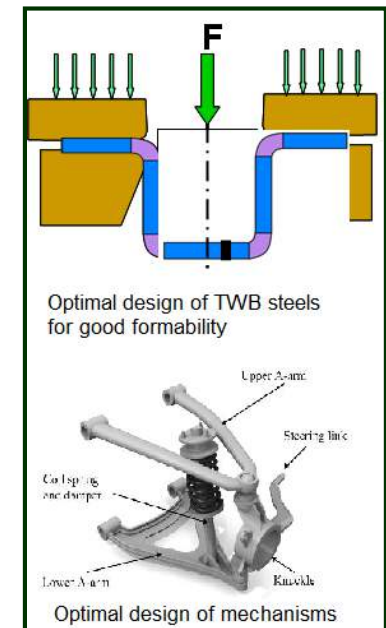


**Development of representational and computational tools for virtual and physical prototyping applied to arrive at solutions to design problems.**

- CAD/CAE/CAM
- Additive Manufacturing
- Engineering Optimization
- Nature Inspired Computing



**Composition / Porosity controlled Object  
CAD and Layered Manufacturing**



**Optimal Design**

[Back to Top](#)





Dr. C. S. Shankar Ram

PhD, Texas A&M University, USA

Professor, Department of Engineering Design

Phone: +91-44-22574705; E-mail: shankarram@iitm.ac.in

<http://ed.iitm.ac.in/~shankarram>

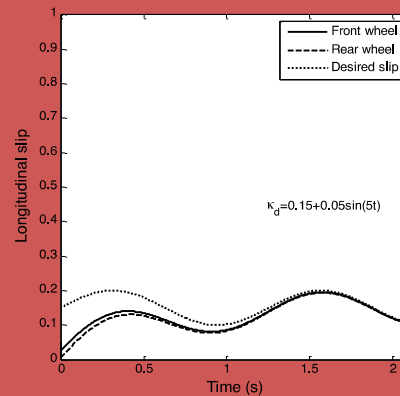


## Areas of Research

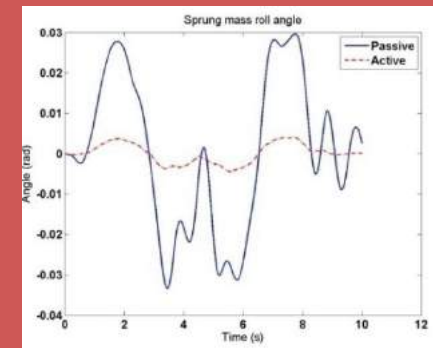
- Mathematical Modelling of Dynamic Systems, Control, Fault Diagnosis, Automotive Systems, Vehicle Dynamics, Transportation Systems.
- Brakes – Model based analysis, control and diagnosis of electro-pneumatic brakes for heavy commercial vehicles, antilock braking system, vehicle stability control, regenerative braking.
- Suspension – Active suspension for heavy commercial vehicles, rollover detection and prevention.



Brake Systems Lab



Slip Control



Roll Control



# Dr. SRIKANTH VEDANTAM

## SCD, Massachusetts Inst. of Technology, USA

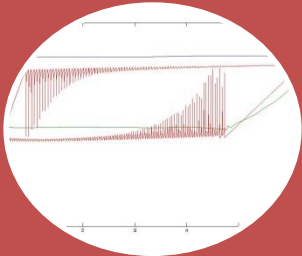
Professor, Dept. of Engineering Design

044-2257-4739; [srikanth@iitm.ac.in](mailto:srikanth@iitm.ac.in)

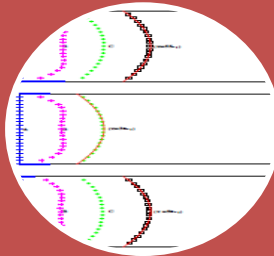
<http://ed.iitm.ac.in/~srikanth>



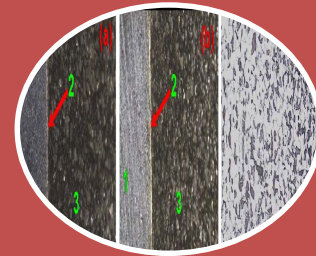
- Mechanics of Smart Materials and Functionally Graded materials
- Hydrodynamics of flow in microchannels
- Discrete computational mechanics



Shape memory reinforced  
composites for impact  
resistant structures



DNA separation and  
manipulation of biological  
cells in microchannels



Functionally graded  
materials for brake  
applications



# Dr. Tuhin Subhra Santra

Ph.D, National Tsing Hua University, Taiwan

Assistant Professor, Dept. of Engineering Design

044-2257-4747; tuhin@iitm.ac.in

<https://ed.iitm.ac.in/~tuhin/>



❑ Bio-Micro/Nano Electro Mechanical Systems (Bio-MEMS/NEMS)

❑ Biomedical Micro/Nano Devices

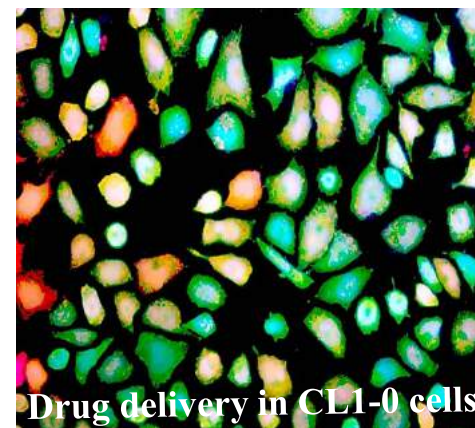
❑ Biofabrication

❑ Cell Chip/Lab on a Chip

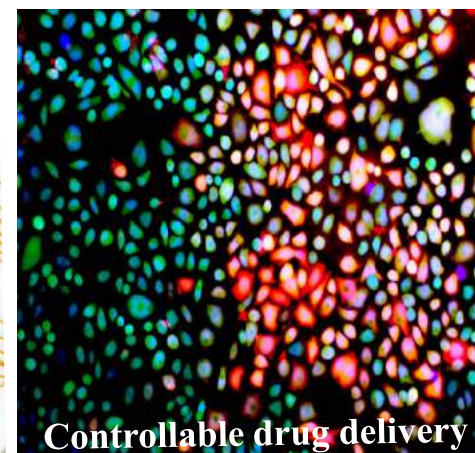
❑ Nanomedicine

❑ Bionanomaterials

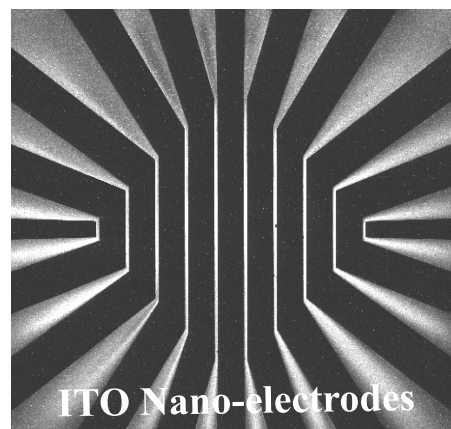
*"We are developing micro/nano fabricated chips for massively parallel high throughput single cell therapy and diagnostics using different physical mechanisms such as electrotherapy, laser therapy, mechanotherapy etc."*



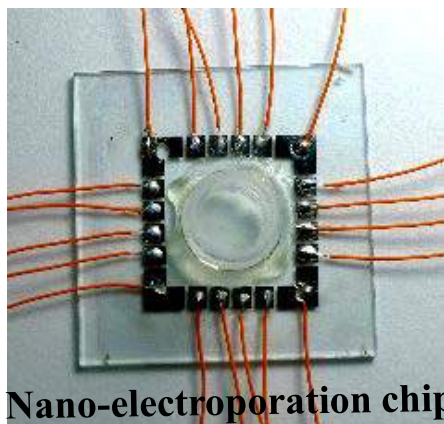
Drug delivery in CL1-0 cells



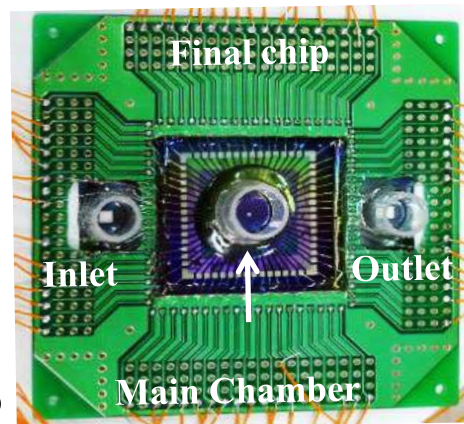
Controllable drug delivery



ITO Nano-electrodes



Nano-electroporation chip



Main Chamber

[Back to Top](#)





# Dr. Venkatesh Balasubramanian

## PhD, Louisiana Tech University, USA

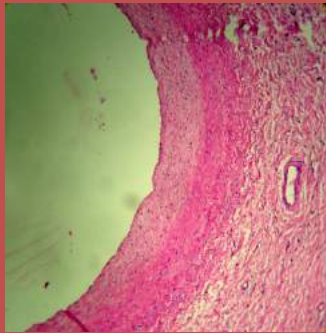
Professor, Dept. of Engineering Design

044-2257-4117; [chanakya@iitm.ac.in](mailto:chanakya@iitm.ac.in)

<http://www.ed.iitm.ac.in/~vb/>



- Medical Devices and Implants
- Human Factors and Ergonomics
- Innovation and Manufacturing Strategy



- Tissue Engineering
- Biomaterial Development
- Electro-mechanical Devices/ Ortho Devices



- Driver Fatigue
- Occupant Safety
- Occupational Biomechanics duct & Process Design



- RBG Risk Scaling
- RBG Innovation Ladder
- Sustainable Manufacturing
- Manufacturing Strategies



INDIVIDUAL FACULTY PROFILE

# DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCE



## LIST OF FACULTY

[Anindita Sahoo](#)

[Anup Kumar Bhandari](#)

[Avishek Parui \(Profile yet to be uploaded\)](#)

[Aysha Iqbal Viswamohan](#)

[Binitha V Thampi](#)

[Divya A](#)

[Dhanavel S.P](#)

[Hemachandran Karah \(Profile yet to be uploaded\)](#)

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[John Bosco Lourdusamy \(Profile yet to be uploaded\)](#)

[Jyothirmaya Tripathy \(Profile yet to be uploaded\)](#)

[Kalpana K](#)

[Malathy Duraisamy \(Profile yet to be uploaded\)](#)

[Mathangi Krishnamurthy](#)

[Merin Simi Raj](#)

[Milind Brahme](#)

[Muraleedharan V.R](#)

[Prema Rajagopalan \(Profile yet to be uploaded\)](#)

[Rajesh Kumar](#)

[Roland Wittje](#)

[Sabuj Kumar Mandal](#)

[Santhosh R](#)

[Santhosh Abraham](#)

[Santhosh Kumar Sahu \(Profile yet to be uploaded\)](#)

[Satya Sundar Sethy](#)

[Solomon Benjamin](#)

[Sonika Gupta \(Profile yet to be uploaded\)](#)

[Sreekumar Nellickappilly](#)

[Srilata K](#)

[Subash S](#)

[Sudarsan Padmanabhan](#)

[Sudhir Chella Rajan](#)

[Suresh Babu M](#)

[Swarnalatha Rangarajan](#)

[Tabraz S.S \(Profile yet to be uploaded\)](#)

[Umakant Dash](#)



# Anindita Sahoo

Assistant Professor, Department of Humanities & Social Sciences

+91 44 2257 4534, [anindita@iitm.ac.in](mailto:anindita@iitm.ac.in)/[sahoo.anindita@gmail.com](mailto:sahoo.anindita@gmail.com)

<https://hss.iitm.ac.in/team-members/anindita-sahoo/>



**A**

Theories of Natural Language,  
Cognition and Computation

Issues related to Faculty of Language  
Evolution of Language  
Comparative studies of Language

**B**

Linguistic Typology,  
Syntax-morphology Interface  
Variation Studies

Syntactic Typology of South Asian Languages  
Grammars of Indian English  
Diachronic studies of grammaticalization

Technique development.  
Nonlinear electrochemical Impedance  
Spectroscopy (NLEIS)

**C**

Pragmatics and Discourse Analysis  
Computational Sociolinguistics  
NLP

Effects of Social context on Language  
Data Mining and Content Analysis  
Language and Identity



**Dr. Anup Kumar Bhandari**

PhD (in Quantitative Economics), Indian Statistical Institute

Associate Professor, Dept. of Humanities and Social Sciences

044-2257-4531, [anup@iitm.ac.in](mailto:anup@iitm.ac.in)

<http://www.hss.iitm.ac.in/anup/index.html>



## **Major Areas of Research**

- Production Economics, with special emphasis on Productivity and Efficiency Analysis
- Applied Industrial Economics
- Issues related to Indian Banking and Indian Financial Markets



# Dr. Aysha Iqbal Viswamohan

Professor, Department of Humanities & Social Sciences

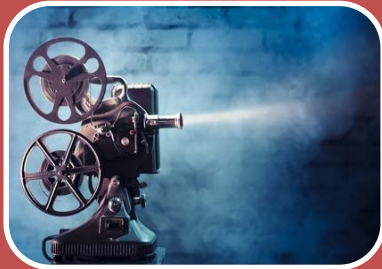
044-2257-4521; draysha@iitm.ac.in

<http://www.hss.iitm.ac.in/aysha/index.html>



## Major Areas of Research

- Film Studies
- Drama and Contemporary Fiction
- Popular Culture



Film Studies



Drama



Popular Culture





**Dr. BINITHA V THAMPI**

**PHD, Institute for Social and Economic Change,  
Bangalore, India**

**Associate Professor, Dept. of Humanities and Social Sciences**

044-2257-4528;binithathampi@iitm.ac.in

<http://www.iitm.ac.in>



- Gender and Development
- Decentralised Planning and Governance
- ICTs for Development

Gender critique of public  
policies and engendering  
of development

Analysis of governance  
reform initiatives and  
decentralized planning

Digital divide and the  
inclusion





# Dr. Dhanavel S P

Professor, Humanities and Social Sciences

044-2257 4522; dhanavelsp@iitm.ac.in

<http://www.hss.iitm.ac.in/dhanavel>

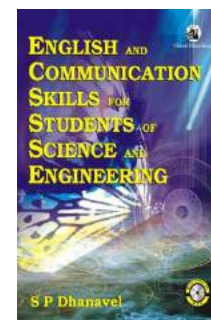
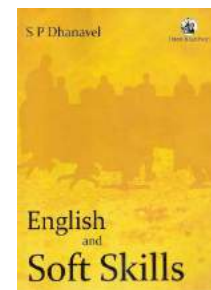
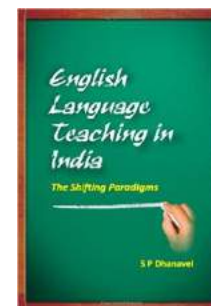


## Major Areas of Research

- Indian English Drama
- American Poetry
- English Language Teaching, Communication and Soft Skills

## Recent Books

- English Language Teaching in India: The Shifting Paradigms (New Delhi: Tata McGraw-Hill, 2012)
- English and Soft Skills (Hyderabad: Orient BlackSwan, 2010)
- English and Communication Skills for Students of Science and Engineering (Chennai: Orient BlackSwan, 2009)





Dr. Divya A

Assistant Professor

Department of HSS, IITM

044-2257 4542 ; divya@iitm.ac.in

## Lecture 3D: Realism, Gender in Tagore's Kabuliwala

### Tagore on Realism

- ❖ "I am surprised when you say that my short stories are lyric in appeal...I'd like to emphasise that there was never any want of realism in them. I've written what I have seen, deeply felt and directly experienced."
- ❖ "If you think it over you'll see that the real picture of Bengali families had its artistic and authentic representations in my short stories" (See *Prabasi*, May 1941)



# Dr. Joe Thomas Karackattu

Assistant Professor, Humanities and Social Sciences

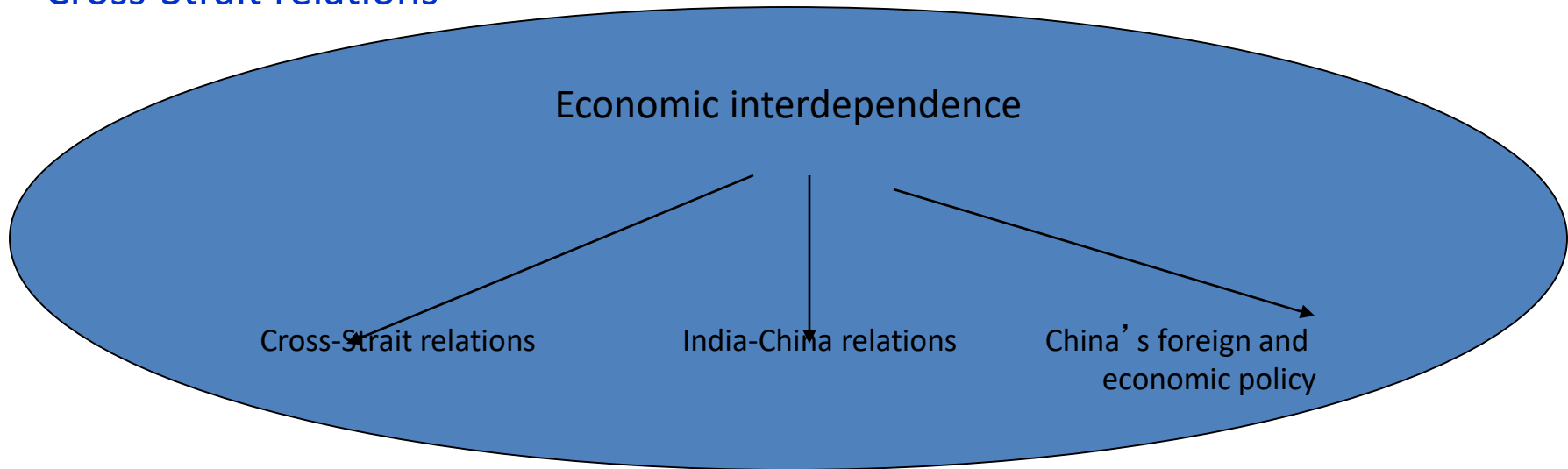
044-2257 4511 ; [joe@iitm.ac.in](mailto:joe@iitm.ac.in)

<http://www.hss.iitm.ac.in/joethomas/index.html>



## Major Areas of Research

- Economic interdependence and conflict
- India-China relations
- Cross-Strait relations



How conflict stands to be deterred, informed, or transformed by the value of economic linkages at the inter-state level



Dr. K. Kalpana

PHD, Madras Institute of Development Studies

Assistant Professor, Dept. of HSS

044-2257-4520; kkalpana@iitm.ac.in

<http://www.iitm.ac.in/component/faculty/75/kkalpana/>



- Gender and Development / Women's Studies
- Shifting Paradigms of State-Civil Society Relationships

Understanding how the socio-political dynamics of gender, class and caste mediate and shape Indian women's experience of development in post-Independence India

Critical analysis of the shifting relationships between the Indian state and civil society actors in the delivery of public and social services



Dr. Mathangi Krishnamurthy

Assistant Professor, Dept. of Humanities and Social Sciences

044-2257-4530; mathangi@iitm.ac.in

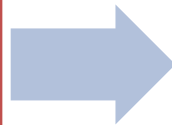
<http://www.hss.iitm.ac.in/mathangi/index.html>



## Major Areas of Research

- The anthropology of globalization
- Labor, body, and gender
- The politics of the Indian middle-class

The relationship between globalization, the new middle-classes, forms of labor, and production of body, kin, and identity



1-800 Worlds:

An ongoing book project, this investigates the formation of call centers as both precursors and symptoms of the new Indian middle-classes



The politics of medical outsourcing: This project investigates new forms of labor as practised in the gestational surrogacy industry and will solicit funding from the Wellcome Trust, UK.





# Dr. Merin Simi Raj

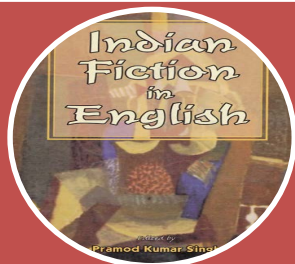
Assistant Professor, Dept. of Humanities and Social Sciences

merinsimiraj@gmail.com

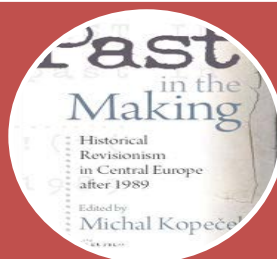


## Major Areas of Research

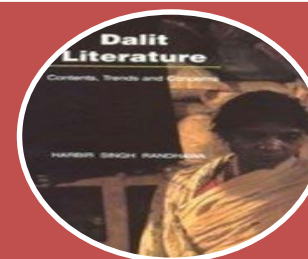
- Indian English fiction – historicizing texts and textualizing history; nation-writing; secularism and Indianness debate; visibility from marginalized locations – gender, caste and region
- Literary Historiography Studies – the writing of literary histories in India; questioning the foundations and frameworks; Nationalism and the politics of inclusion/exclusion
- Caste studies and Dalit writing – caste and secular nationalist imaginings; discourse of denial and castelessness; construction of new knowledge subjects



Opening up Indian English fiction as a ground for insurrections, possibilities and destabilizations



How the recovery/inclusion of certain texts/traditions/events change the 'story' of a particular literature/genre/nation



How other frames of references affect the dominant meaning making processes

← Examining the conditions/terms of production and reception of knowledge and its institutionalization →



**Dr. Milind Brahme**

**PhD (JNU, India)**

**Associate Professor, Dept. of Humanities and Social Sciences**

044-2257-4508; [brahme@iitm.ac.in](mailto:brahme@iitm.ac.in)

<http://www.hss.iitm.ac.in/milind/index.html>



- Research Area – Modern German and Comparative Literature
- Research Area – Education – School and Higher Education in India
- Teaching Area – Literary Theory, Literary Criticism, German Language and Literature

### Areas of Application of Research

#### **German Language and Literature:**

•My research in this area does not have any direct application. Indirectly it informs my teaching as well as research guidance in English and German Literary Studies.

#### **Education:**

•Research Guidance

•Research based Consultancy in the form of Monitoring the Sarva Shiksha Abhiyan in Tamil Nadu for the MHRD since 2008

•Evaluation of Pedagogical Interventions and Innovations in School Education – for the Tamil Nadu Government as well as private non-profit institutions



# Dr. VR Muraleedharan

## Ph.D (IIT Madras)

Professor, Dept. of HSS

044-22574506, [vrm@iitm.ac.in](mailto:vrm@iitm.ac.in)

<http://www.hss.iitm.ac.in/muraleedharan/index.html>



- Healthcare Economics (Focus on Financing mechanisms and HR policies); Dr. UmakantDash is my research partner. Collaborative research project with 10 Institutions from 7 countries, supported by DFID, UK; <http://resyst.lshtm.ac.uk>
- History of Healthcare in South India (Focus on Institutional history, role of technology in health care and Patient Autonomy); Dr John Lourdusamy and Dr N Sreekumar are co-researchers.
- Healthcare Technology Assessment (Focus on methodologies for economic evaluation of healthcare technologies.) In collaboration with NHSRC, Delhi.

As a part of an International Consortium of 10 Research Institutions, our focus of research is on the design and implementation of innovative financing mechanisms and human resources policies that will help build resilience and responsiveness of health system to promote health and health equity . This study is funded by DFID UK up to 2016.

This project is funded by the Wellcome Trust UK for three years up to 2015, coordinated by Dr John Lourdusamy and Dr Sreekumar. I focus on how introduction of various technologies changed the public perception of medical profession in early 20<sup>th</sup> century. Dr John and Dr Sreekumar are looking at the history of medical institutions in Madras city, and concept of patient autonomy as practiced by indigenous medical practitioners, respectively.

During the next five years, I intend to work on methodologies for undertaking economic evaluation of medical technologies in poor resource settings, such as in India, where access to quality care remains the most critical issue.



# Dr. Rajesh Kumar

PhD, University of Illinois at Urbana-Champaign, USA

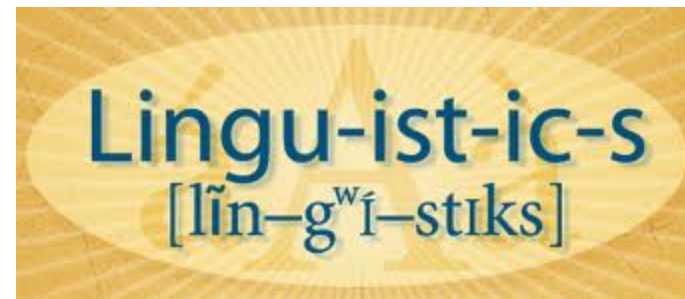
Associate Professor, Department of Humanities and Social Sciences

044-2257-4537; [rajesh@iitm.ac.in](mailto:rajesh@iitm.ac.in)

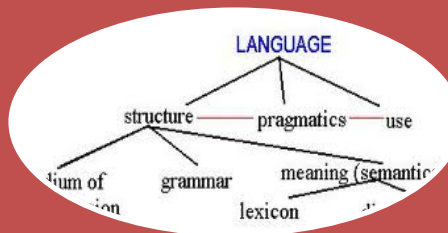
<http://www.hss.iitm.ac.in/rajesh/index.html>



- Language in Education
- Structure of South Asian Languages
- Sociolinguistics



Organization of language at the levels of sounds, words, and sentences.



Linguistic competence and performance, relationship between language and society, and relationship between language and human mind.



Applications of the fundamental ideas of language learning/acquisition for teaching in general and teaching of second/foreign language in particular.

**Understanding nature and structure of natural language and its applications**



# Roland Wittje

PhD, University of Illinois at Urbana-Champaign, USA

Associate Professor, Department of Humanities and Social Sciences

044-2257-4540; [roland@iitm.ac.in](mailto:roland@iitm.ac.in)

<http://www.hss.iitm.ac.in/index.php/faculty/institute-faculty?id=60>

## Research Interests:

- History of the physical sciences and engineering of the late 19th and 20th century
- Global history of science and technology
- History of scientific collections, research technology and scientific practice
- History of science education and technical training
- History of acoustics





**Dr. Sabuj Kumar Mandal**  
Assistant Professor, Humanities and Social Sciences

044-2257-4532; [sabuj@iitm.ac.in](mailto:sabuj@iitm.ac.in)  
<http://www.hss.iitm.ac.in/sabuj/index.html>



## Major Areas of Research

- Energy and Environmental Economics
- Efficiency and Productivity Analysis( frontier approach)
- Industrial Economics & Applied Econometrics
- Behavioral Economics.



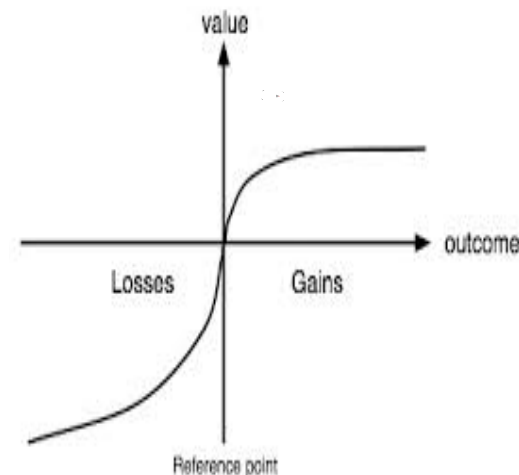
**Industrial Energy  
Efficiency**



**Global warming and  
climate change**

**P2P HELPS STOP GLOBAL WARMING**

Instead of driving to get CDs, buying pre-packaged software from megacorporations and wasting energy, you can help fight Global Warming by using P2P. Help save resources, fight pollution and save the environment. – It's what Jesus would do.





Dr. R.Santhosh  
PHD, ISEC Bangalore, India  
Asst. Professor, Dept. of HSS

044-2257-4517; rsantho@iitm.ac.in  
[www.hss.iitm.ac.in/santhosh/index.html](http://www.hss.iitm.ac.in/santhosh/index.html)



- Research Area: Sociology of Religion, Islam
- Research Area: Development Studies and globalization
- Research Area: Social Movements and state

changing articulation of religion  
in the contemporary world.

role of Islamic activism and  
charity in the fields of social  
welfare and public health in  
Kerala.

New Social movements and  
identity question



# Dr. Santhosh Abraham

Assistant Professor, Humanities and Social Sciences

044-2257-4536; [abraham@iitm.ac.in](mailto:abraham@iitm.ac.in)

<http://www.hss.iitm.ac.in/abraham/index.html>



## Major Areas of Research

- Colonial Courts, Legal Pluralism, Customary Laws, Conflicts
- Mental Asylums and Legal Norms in Colonial South India
- Territorial Logics of Malabar and South Canara: History and Land in the Social Construction of Law



Colonial Courts, Native  
Laws, Conflicts



Colonialism, Psychiatry,  
Mental Asylums



History and Land in the  
Social Construction of Law

Colonialism, Courts, Law, Land, Medical Institutions



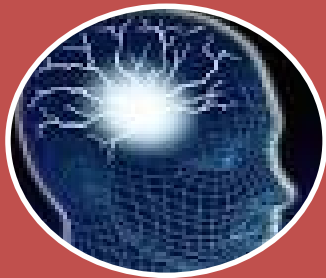
# Dr. Satya Sundar Sethy

PhD, Central University of Hyderabad, India  
Associate Professor, Dept. of Humanities & Social Sciences

044-2257-4509; [satyasundar@iitm.ac.in](mailto:satyasundar@iitm.ac.in)  
<http://www.hss.iitm.ac.in/satya/index.html>



- Research Area: Philosophy of Language, Analytical Philosophy
- Research Area: Contemporary Western Philosophy
- Research Area: Information and Communication Technologies (ICTs) in Education



Semantic and Mental  
Representations



Meaning, Truth, Belief  
System, and Knowledge



Assessment and Evaluation,  
Quality Assurance, Pedagogy  
and Andragogy of Learning,  
Instructional Design





# Dr. Solomon Benjamin

Associate Professor, Humanities and Social Sciences

Ph.D. Massachusetts Institute of Technology

044-2257-4538; solly.benj@iitm.ac.in



## Major Research Areas

- **Trans-National Urbans: Indian and Chinese Urbanism as a 'South' Theory:** Co-producing Indian and Chinese Urbanisms: With researchers at the Hong Kong Baptist University, Chinese University of HK, CRIT Mumbai, this networks works on the idea of 'Co-produced Urbanism to re-think the urban not as bounded but inter-connected ideas and practices. Preliminary funding from the Indian Council of Social Science Research.
- **Logics of Non-Metro Urbanization:** SUBURBIN (Subaltern Urbanisation in India) funded by the 'ANR' French National Research Agency <http://suburbin.hypotheses.org/701> With more than 30 collaborators in India and France, coordinated with the CHS Delhi, CPR Delhi, IFP Pondicherry, the project analyses the logics of small town large village urban agglomerations.
- **Spatializing Peri-Urban Claims: Land, Politics, and Economy:** Research network focusing on metro-peripheries as part of *Global Suburbanisms: Governance, Land, and Infrastructure in 21st Century*: With fifteen 'co-applicants' more than 40 collaborators in a long term international research collaborative funded under the Major Collaborative Research Initiatives (MCRI), Social Science and Humanities Research Council (SSHRC), Canada) [http://www.yorku.ca/city/?page\\_id=222](http://www.yorku.ca/city/?page_id=222)



'Repair' or 'Reconstitution' in Indian China Bazaars: An issue of conceptual and empirical significance



'Chieftain' House in South Canara and it's Chinese Vase: Mediations via 'customary' claims underpin non-metro urbanisation, with trans-national trade links







# Dr. SREEKUMAR NELLICKAPPILLY

## PHD, Hyderabad Central University

Professor, Dept. of HSS

044-22574514, [srkumar@iitm.ac.in](mailto:srkumar@iitm.ac.in)

<http://www.hss.iitm.ac.in/sreekumar/index.html>



- Bioethics and the History of Healthcare in South India (Focus on Patient Autonomy, Institutional history and the role of technology in health care); Dr John Lourdusamy and Prof. V.r.Muraleedharan are co-researchers.
- Traditional/Indegenous Medicine (Focus on Scientific and Ethicsal aspects) supported by INSA, New Delhi.
- Philosophical, phenomenological, scientific and hermeneutical dimensions of human reality and human wellbeing.

### Philosophical, Phenomenological and Scientific Conceptions of Human Wellbeing

This project is funded by the Wellcome Trust UK for three years upto 2015, coordinated by Dr John Lourdusamy and Prof. V.r.Muraleedharan. I focus on the problem of Patient Autonomy and Wellbeing with

This project is funded by the Indian National Science Academy, New Delhi and it tries to understand the history, ethical outlook and cultural aspects related to the traditional Ayurveda practitioners of Kerala who are known as Parambarya Vaidyas.

The phenomenological and philosophical conceptions of human being. This is a broad area of my research where I take insights from both the western and Indian philosophical traditions.



Dr. K.Srilata

Ph.D, Hyderabad Central University

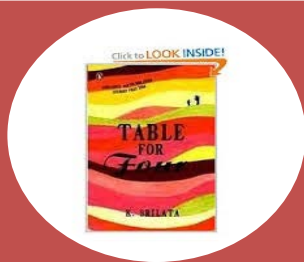
Professor, Dept. of Humanities and Social Sciences

044-22574515; sree@iitm.ac.in

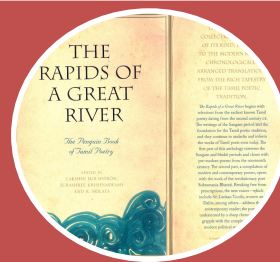
<http://www.hss.iitm.ac.in/srilata/>



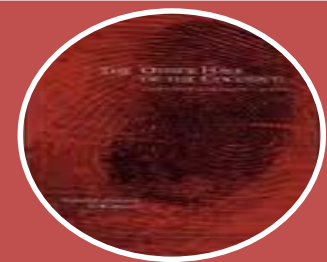
- Theories of Creativity and Creative Writing Research
- Indian Literatures in Translation
- Children's Literature; Women's Writing.



Writing



Literary  
Translation



Reading Literary  
Texts and Contexts

**The focus of my work is the literary text and its social context.**



# Subash S

PhD, IIT Bombay

Associate Professor , Department of Humanities and Social Sciences

044-2257-4507; [subash@iitm.ac.in](mailto:subash@iitm.ac.in)

<http://www.hss.iitm.ac.in/subash/index.html>



## Major Areas of Research

- Foreign Direct Investment
- Economics of Innovation and Technological Change
- International Trade



# Dr. Sudarsan Padmanabhan

## Ph.D (Pondicherry Univ & Univ of South Florida)

### Associate Professor, Dept. of HSS

044-22574526, [sudarsanp@iitm.ac.in](mailto:sudarsanp@iitm.ac.in)

<http://www.hss.iitm.ac.in/sudarsan/index.html>



- Social and Political Philosophy (Focus on Social, Political and Cultural Theories and Institutions): Dr. Jyotirmaya Tripathy is my research partner. India EU Study Centre Project (IESCP) – 2010-2011 – [www.iescp.net](http://www.iescp.net) - Result of India – EU Joint Action Plan – Strong emphasis on EU studies, teaching, research and student exchange
- Erasmus Mundus Consortium (IBIES) with Aarhus University, Denmark - Collaborative teaching, student exchange and research partnerships with 19 national and international universities funded by the European Union. ([www.erasmus.iescp.net](http://www.erasmus.iescp.net)) - 2013-2016
- Erasmus Mundus Asia Lot – MAE – Erasmus Mundus Consortium with Aarhus University (<http://www.mae-erasmus.iescp.net/>) - Proposal stage

My area of current research is the construction of Indian social imaginary. I am interested in the pre-colonial, colonial and post-colonial social, political and economic institutions that influenced the formation of Indian nation and state. An attempt to create an Indian social imaginary is simultaneously an endeavour to create a moral order. The Constitution of India best exemplifies an attempt to institutionalize India's post-colonial, non-hierarchical, and democratic moral order.

The India EU Study Centre Programme funded by the EU was envisioned by the EU-India Joint Declaration to increase mutual cooperation in Higher Education. The research group at IIT Madras was called the Centre for Comparative EU Studies (CCEUS). The broad areas covered by the Centre were philosophy, political sciences, literature, culture studies, and international relations. More specifically, social and political theory, postcolonial, poststructural and postmodern cultural debates, contemporary debates in international relations, especially, problematizing nation-state and cosmopolitanism.

The EU Study Centre has conducted several international workshops, seminars and conferences with its European and Indian partners. The outcome of this partnership is two edited volumes published by Routledge, India. ***The Democratic Predicament: Cultural Diversity in Europe and India*** (2013) is edited by Dr. Jyotirmaya Tripathy and Dr. Sudarsan Padmanabhan and the second volume titled politics in the ***Global Age: Critical Reflections on Sovereignty, Citizenship, Territory and Nationalism*** edited by Dr. Sonika Gupta and Dr. Sudarsan Padmanabhan by Routledge Publishers is forthcoming.





Dr. Sudhir Chella Rajan

UCLA, University of California, Los Angeles

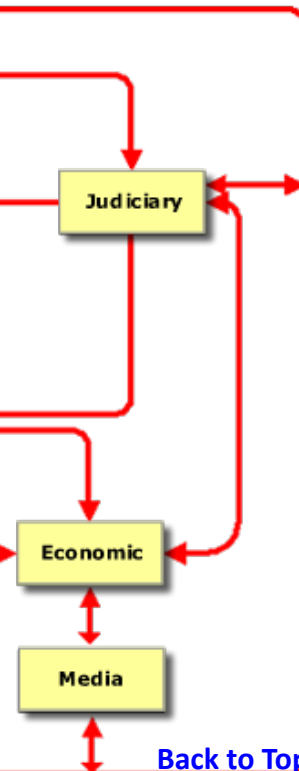
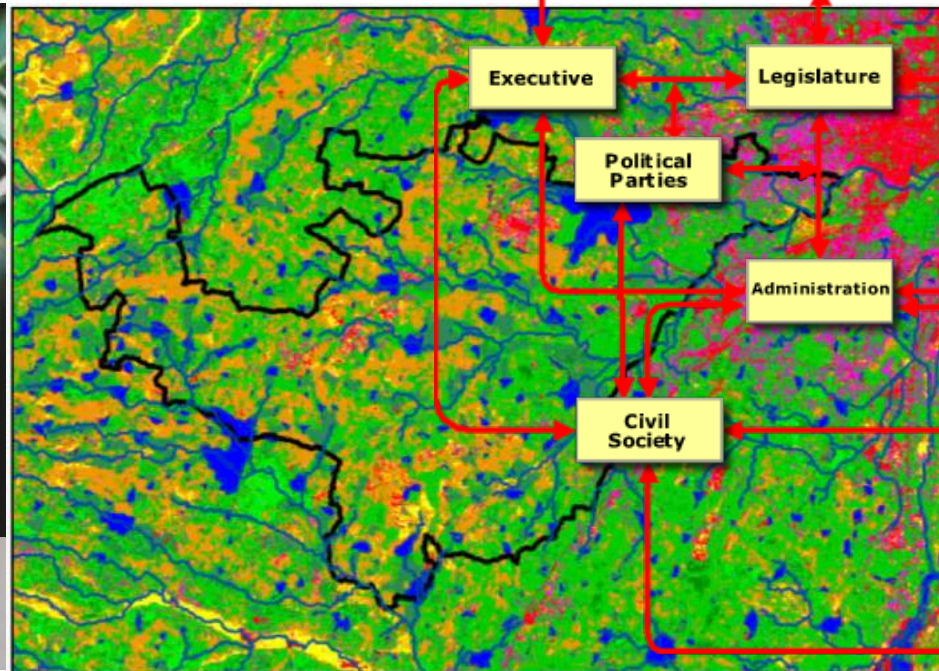
Professor, Dept. of Humanities and Social Sciences

044-2257-4525; [scrajan@iitm.ac.in](mailto:scrajan@iitm.ac.in)

<https://hss.iitm.ac.in/team-members/sudhir-chella-rajan/>



- Political theory and the environment: automobility; climate change; resource curse; transport and urban policy
- Periurban initiative: armatures and enclaves; bypasses and youth; community gardening; repair cultures
- Corruption studies: big histories; grand corruption; social theories of elite networks and emergence



[Back to Top](#)





Dr. M Suresh Babu

PhD (JNU, New Delhi)

Professor, Dept. of HSS

044-2257-4527; sureshbabum@iitm.ac.in

<http://www.hss.iitm.ac.in/sureshbabu/index.html>



## Major Areas of Research

- Industrial Economics
- Trade and Development
- Education and Human Capital



My research has been on Competition, Entry Barriers and Productivity Growth in Indian Manufacturing Industries



I am currently interested in the issues related to unorganized manufacturing sector in India, especially innovations and growth



I have been associated with the monitoring of Sarva Siksha Abhayan in Tamil Nadu and the implementation of ICT in schools

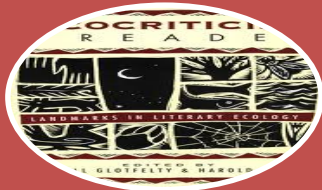
Industrial Performance/Applied Macroeconomics/Innovations and Human Capital



**Dr. Swarnalatha Rangarajan**  
**PHD, University of Madras, India**  
Professor, Dept. of Humanities and Social Sciences  
044-2257-4519, [swarna@iitm.ac.in](mailto:swarna@iitm.ac.in)  
<http://www.hss.iitm.ac.in/swarnalatha/index.html>



- Ecocriticism
- American Literature
- Early Modern English Literature



Representation of environmental  
debates in cultural spaces-  
ecofeminism, econarratives from the  
Global South,  
bioregionalism, ecophilosophy  
place studies



The diverse genres of 18<sup>th</sup>, 19<sup>th</sup> and  
20<sup>th</sup> American Literature- with a  
special focus on the writings of  
Thomas Wolfe



Shakespearean drama – the  
greening of Shakespeare studies



Dr. Umakant Dash

Ph.D (IIT Kanpur)

Professor, Dept. of HSS

044-22574516, [dash@iitm.ac.in](mailto:dash@iitm.ac.in)

<http://www.hss.iitm.ac.in/umakant/index.html>



- Healthcare Economics (Equity, Efficiency and Governance)
- Efficiency Analysis (Data Envelopment Analysis)
- Financial Economics (Fixed Income Securities, Derivatives Market)



Part of an International Consortium of 10 Research Institutions, **RESYST**, the focus is on generating evidences which would enhance the resilience and responsiveness of health systems in promoting health and health equity. This project is funded by the Department for International Development, UK. <http://resyst.lshtm.ac.uk>

Efficiency Analysis of Sectors: the Banking Sector and Health Systems



**Healthcare Purchasing Arrangements:** intend to work on governance issues pertaining to purchasing of health care services in India, where access to basic care remains one of the challenge in achieving Universal Health Care.

**Healthcare Economics/Efficiency Analysis/Derivative Market**



INDIVIDUAL FACULTY PROFILE

# DEPARTMENT OF MANAGEMENT STUDIES

# LIST OF FACULTY

[Amit R.K](#)

[Arshinder Kaur](#)

[Arun Kumar G \(Profile yet to be uploaded\)](#)

[Ganesh L.S \(Profile yet to be uploaded\)](#)

[Kamalanabhan T.J](#)

[Krishna Prasanna](#)

[Lata Dyaram](#)

[Madhumathi Rajendran](#)

[Nandan Sudarsanam](#)

[Prakash Sai L](#)

[Rahul R Marathe](#)

[Rajendran C \(Profile yet to be uploaded\)](#)

[Richa Agrawal](#)

[Rupashree Baral](#)

[Saji K Mathew \(Profile yet to be uploaded\)](#)

[Srinivasan G](#)

[Sundarraaj R.P](#)

[Thenmozhi M](#)

[Thillai Rajan A](#)

[Upendra Kumar Maurya](#)

[Usha Mohan](#)

[Vaibhav Chawla](#)

[Varisha Rehman](#)

[Vijayalakshmi V](#)





# Dr. R K Amit

## Ph.D., IISc Bangalore, India

Associate Professor, Dept. of Management Studies

044-2257-4575; rkamit@iitm.ac.in

<http://www.doms.iitm.ac.in/amit.htm>



- Game Theory
- Decision Theory
- Operations Research



Relational Contracts  
in Supply Chains



Inventory Games



Combinatorial  
Auctions



**Dr. Arshinder Kaur**  
**PHD, IIT Delhi, INDIA**

**Associate Professor, Dept. of Management Studies**

044-2257-4553; [arshinder@iitm.ac.in](mailto:arshinder@iitm.ac.in)

<http://www.iitm.ac.in/arshinder>



- Supply Chain (SC) Management/ SC Coordination, SC contracts, Closed-loop SC
- Inventory Management/ Newsboy model and Operations Research Applications
- Strategic Sourcing/Evaluation and selection of suppliers



**Automobile and  
auto components**



**Castings**



**Agro food  
products**

**Operations and Supply Chain Management**



**Dr. TJ Kamalanabhan**  
**Ph.D, University of Madras, India**  
**Professor, Dept. of Management Studies**

044-2257-4556; tj@iitm.ac.in



**Specialization:** Human Resource Management and Organizational Behavior

**Courses:** Talent Management, Performance Management, Training & Development and Compensation Management

**Current research:** Stress and Burnout, Employee Turnover, Performance Dimensions in Hospitals , Corporate Communication

- **DAAD Fellowship**
- Publications in National & International Journals
- Multiple Workshops
- **SIDBI Corpus Fund**

Entrepreneurship



- KNU University, Daegu, South Korea
- Multimedia University, Malaysia
- University College of Tech & Mgmt, Malaysia
- MUST University, Iran

Visiting Faculty



- **Erasmus Mundus Fellowship**
- Diversity Management
- Organizational Change
- **Discipline Lead**

Organization Behavior



- **Fulbright Fellowship**
- Business Consulting
- Cross Cultural research and development
- **HR Lab at IIT Madras**

Corporate HR





Dr. Krishna Prasanna  
PHD, University of Madras, India  
Professor, Dept. of Management Studies  
044-2257-4571; [pkp@iitm.ac.in](mailto:pkp@iitm.ac.in)  
<http://www.doms.iitm.ac.in/pkp.html>



- Fixed Income Markets
- Financial Risk Management
- Corporate Governance



Fixed Income  
Markets



Financial Risk  
Governance models



Liquidity Risk in  
Financial Markets





# Lata Dyaram

Ph.D (Indian Institute of Technology Madras)

044-2257-4567; lata.dyaram@iitm.ac.in

Associate Professor

**Department of Management Studies**



## Major Areas of Research

- Organizational Behavior, Leadership and Organization Development (L&OD), Human Resource Management
- Cognition, spontaneous mental states and goal directed behavior across contexts
- Behaviorism combining elements of philosophy, methodology, and psychological theory.



Perception, reasoning,  
sense making, learning



Emotions intertwined  
with personality,  
dispositions & motivation



Biological Drives, Learned  
motives, Needs, goals

Spectrum of Cognition, Emotion and motivational processes to study human behavior

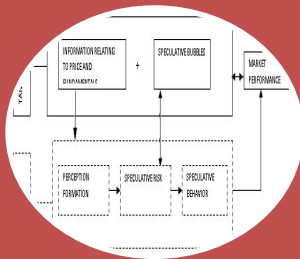




Dr. Madhumathi Rajendran  
PHD, Madras University, India  
Professor, Dept. of Management Studies  
044-2257-4565; rmm@iitm.ac.in  
[http://www.iitm.ac.in/....](http://www.iitm.ac.in/)



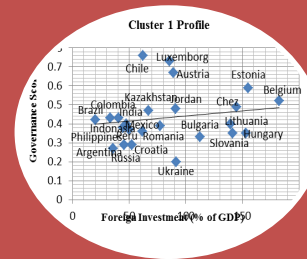
- Capital Markets
- Corporate Governance
- International Finance



Valuation of  
Financial Assets



Governance and  
Firm Performance



Evaluation of  
Financial Risk

Corporate Finance



Dr. Nandan Sudarsanam

PhD, Massachusetts Institute of Technology, USA

Assistant Professor, Department of Management Studies

044-2257-4580; nandan@iitm.ac.in



Advancement of Algorithmic techniques for solving problems and achieving objectives

### Core Methodologies Advanced

- Experimentation
- Data Mining/  
Machine Learning
- Decision-making  
under uncertainty
- Applied Statistics

### Research Approach Deployed

- Simulation of Meta Models

$$y(x_1, x_2, \dots, x_n) = \beta_0 + \sum_{i=1} \beta_i x_i + \sum_{i=1} \sum_{j>i} \beta_{ij} x_i x_j + \varepsilon$$

$$x_i \sim NID(0, \sigma_n^2) \quad i \in 1 \dots m$$

$$x_i \in \{+1, -1\} \quad i \in m+1 \dots n$$

$$\varepsilon \sim NID(0, \sigma_\varepsilon^2)$$

$$\Pr(\delta_i = 1) = p$$

$$\Pr(\delta_{ij} = 1 | \delta_i, \delta_j) = \begin{cases} p_{00} & \text{if } \delta_i + \delta_j = 0 \\ p_{01} & \text{if } \delta_i + \delta_j = 1 \\ p_{11} & \text{if } \delta_i + \delta_j = 2 \end{cases}$$

$$f(\beta_i | \delta_i) = \begin{cases} N(0, 1) & \text{if } \delta_i = 0 \\ N(0, c^2) & \text{if } \delta_i = 1 \end{cases}$$

$$f(\beta_{ij} | \delta_{ij}) = \frac{1}{s_1} \begin{cases} N(0, 1) & \text{if } \delta_{ij} = 0 \\ N(0, c^2) & \text{if } \delta_{ij} = 1 \end{cases}$$

### Domains of Application

- Engineering Systems
- Demographic and  
Census Data
- Financial Data
- Manufacturing and  
Product Design



**Dr. L. Prakash Sai**  
**PhD, IIT Madras, INDIA**  
Professor, Dept. of Management Studies  
[+91-44-2257-4568](tel:+91-44-2257-4568); [lps@iitm.ac.in](mailto:lps@iitm.ac.in)



- Strategy and Policy Studies
- Technology Foresight and Innovation
- Competitiveness and Business Excellence



Manufacturing



Information  
Technology



Education



Healthcare





Dr. Rahul R Marathe  
PHD, Iowa State University, USA  
Associate Professor, Dept. of Management Studies  
044-2257-4579; [rrmarathe@iitm.ac.in](mailto:rrmarathe@iitm.ac.in)  
<http://www.doms.iitm.ac.in/rahul.htm>



- Mathematical and statistical modeling
- Stochastic processes
- Optimization

Manufacturing

Analytics

Uncertainty  
modeling



# Dr. Richa Agrawal

## Ph D, IIT Bombay, India

Associate Professor of Marketing, Dept. of Management Studies

044-2257-4564; [richa@iitm.ac.in](mailto:richa@iitm.ac.in)

<http://www.doms.iitm.ac.in/richaagrawal>



- Relationship Marketing - Relational Behaviour, Communities & Networks
- Scale Development
- Contemporary Marketing Areas: Green marketing, Luxury marketing, etc.



Customer Insights



Marketing Measures



Relationships, Communities  
and Behaviors





# Dr. Rupashree Baral

## PhD, IIT Bombay, India

Associate Professor, Dept. of Management Studies

044-2257-4561; rupashree@iitm.ac.in

<http://www.iitm.ac.in/component/faculty/76/rupashree/>



- Research Area 1: Work-Family Dynamics
- Research Area 2: Diversity/Generational Differences at the Workplace
- Research Area 3: Technology and Human Interface: Problems and Prospects



Work-Family Dynamics



Diversity/Generational  
Differences at the  
Workplace



Technology and Human  
Interface: Problems and  
Prospects



# G Srinivasan

## PHD, IIT Madras

Professor, Dept. of Management Science

044-2257-4560; [gsrini@iitm.ac.in](mailto:gsrini@iitm.ac.in)

<http://www.doms.iitm.ac.in>



- Cellular Manufacturing
- Supply Chain Modeling
- Sequencing and Scheduling.

Operations Research  
Applications

Manufacturing  
Systems Management

Supply Chain  
Management



# Dr. R. P. Sundarraj

Professor, Management Studies

PhD, University of Tennessee at Knoxville

044-2257-4558; rpsundarraj@iitm.ac.in

<http://www.doms.iitm.ac.in/domsnew/index.php/sundarraj-rp>

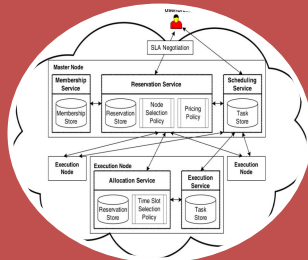


## Major Areas of Research

- Electronic negotiation and applications
- Analytics
- Innovation management

## Prior experience

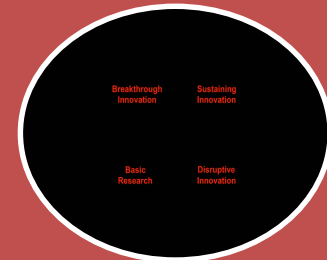
- Qatar University, Doha
- University of Waterloo, Canada
- Clark University, USA



Cloud computing  
negotiation, pricing,  
services



Analytics



Technology innovation  
in firms

← Applying Operations research and behavioral models to technology design and adoption →



# Dr. Thenmozhi M

## Ph.D, University of Madras, India

Professor, Dept. of Management Studies

044-2257-4562; [mtm@iitm.ac.in](mailto:mtm@iitm.ac.in)

<http://www.doms.iitm.ac.in/thenmozhi.htm>, <http://ssrn.com/author=567794>



**Specialization:** Corporate Finance and Strategy, Corporate Valuation, Financial Markets, Computational Finance, Forecasting and Time Series Modeling, Stock and Commodity Derivatives.

**Courses:** Financial accounting, Cost Management, Financial Management, Financial Institutions and Markets, Computational Finance, Fixed Income Securities :Trading and Strategy, Investment Management, Empirical Research in Finance, Options and Futures.

**Current research:** Cash holdings and Governance, CBHI scheme Performance, Intraday Price discovery and Volatility Spillover, India VIX and Risk Management, Liquidity in Currency Options, Crude Oil Pricing.

Fulbright-Nehru  
Visiting Lecturer  
Fellowship 2010-11

European Union Erasmus  
Mundus  
Scholarship 2009-10

Australian Government  
Endeavour Executive  
Award, 2007

Series	Augmented Dickey Fuller Test	Phillips Perron Test
	Statistics	Statistics
Panel A: IGP CAGR Ratio		
Return	-28.241	-28.019
Volume	-35.747	-35.251
Volatility	6.5072	-7.8387
Panel B: IGP CAGR		
Return	-35.723	-35.099
Volume	-31.002	-30.481
Volatility	-3.1289**	-3.1029**

### Corporate Finance and Strategy

Impact of diversification Strategy on Firm Performance: Entropy Approach

- Cross-border Mergers and Acquisitions involving emerging markets

	Supply	Forecasting
20	26.310	26.885
21	26.589	26.859
22	26.768	27.043
24	26.880	27.158
25	26.811	27.105
New York session		
	26.347	26.619
	26.665	26.933

### Financial markets

- Effect of macroeconomic variables on Bond market volatility in BRIC Countries
- Volatility Spillover in Bullion and Energy futures and Spot Markets



### Financial Modeling

Forecasting Stock Index Returns using ARIMA-SVM, ARIMA-ANN, and ARIMA-Random Forest Hybrid Models.

Multi-objective and Multi-strategy Optimization Stock Trading Model using Support Vector Machines and Ant Colony optimization



# Dr. Thillai Rajan A.

Fellow (Ph.D.), Indian Institute of Management Bangalore, India

Professor, Dept. of. Management Studies

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<http://www.iitm.ac.in/thillai.htm>



## Private Equity and Venture Capital

- Annual India venture capital and private equity report series
- Value addition by venture investors
- Non-financial risk management by private equity investors



## Infrastructure Finance

- Private equity in infrastructure
- Project finance in high risk environments
- Impact of PPP on costs and overruns
- Impact on PPP on project outcomes viz., access, cost, price, quality, and efficiency



## Corporate Finance

- Real options
- Corporate social responsibility
- Sources of SME funding and impact of performance





# Dr. Upendra Kumar Maurya

Fellow (Ph.D), XIMB ,Xavier University, Bhubaneswar  
Assistant Professor, Dept. of Management Studies

044-2257-4578; upendra@iitm.ac.in

<https://doms.iitm.ac.in/index.php/upendra>



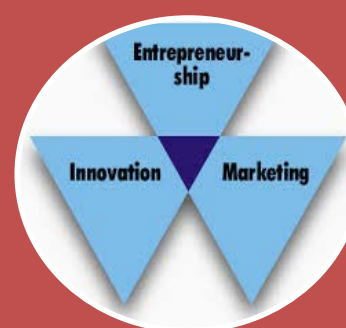
- Business to Business Marketing
- Tourism Marketing
- Entrepreneurship and Marketing Interface
- Brand and Identity issues in Organizations



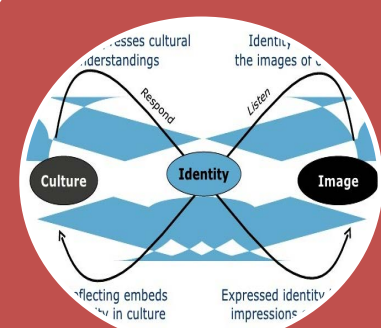
Business to Business Marketing



Tourism Marketing



Entrepreneurship and Marketing Interface



Brand and Identity issues in Organizations

**BROAD DESCRIPTION OF THE BANDWIDTH/AREA OF RESEARCH**



**Dr. Usha Mohan**  
**PHD, Indian Statistical Institute, INDIA**  
Associate Professor, Dept. of Management Science  
044-2257-4576; [ushamohan@iitm.ac.in](mailto:ushamohan@iitm.ac.in)  
<http://www.doms.iitm.ac.in/usha.html>



- Quantitative Models in Supply Chain Management.
- Socially Relevant Applications of Operations Research
- Combinatorial Optimization.

Order Management in  
MTO environments and  
Design of Sales force  
Incentives

Design of Food Supply  
Chains to improve Food  
security and Scheduling  
patients in Health Care  
Delivery Systems

Pick up and Delivery  
Vehicle Routing  
Problems



**Dr. Vaibhav Chawla**  
**FPM (PhD), IIM Kozhikode, India**  
Assistant Professor, Dept. of Management Studies  
044-2257-4585; vaibhavchawla@iitm.ac.in



- Role of positive psychology constructs (such as spirituality, mindfulness, delayed gratification etc.) and social media in salesperson performance
- Exploring mechanisms to address customer complaints over social media
- Understanding customer psychology during product return in e-commerce context





# Dr. Varisha Rehman

## PhD, IIT – Allahabad, India

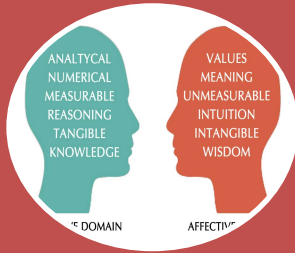
Assistant Professor, Dept. of Management Studies

044-2257-4572; [varisha@iitm.ac.in](mailto:varisha@iitm.ac.in)

<http://www.doms.iitm.ac.in/domsnew/index.php/varisha-rehman>



- Advertising ( traditional and new media advertising)
- Consumer Behavior
- Entertainment Marketing



Cognitive , affective and  
evaluation aspects of  
advertising



Consumer Behavior



Entertainment  
Marketing

Research Spectrum



Dr. V. Vijayalakshmi

PhD, Indian Institute of Technology Madras, India

Assistant Professor, Dept. of Management Studies

044-2257-4566; [viji@iitm.ac.in](mailto:viji@iitm.ac.in)

<https://doms.iitm.ac.in/index.php/vijayalakshmi-v>



- **Positive Organizational Behavior:** Generating Positivity in the Workplace, Happiness and Work, Workplace Emotions, Finding Meaning in Work, Strength-Based Approach to Work, Discovering Calling, Integral Leadership Development, Unlearning
- **Cross-Cultural Management:** Cultural Competence and Global Dexterity
- **Teaching, Learning and Education:** Holistic Education, Contemporary Teaching and Learning Beliefs and Practices, Creativity in Teaching-Learning



NURTURING THE INNER YOU:  
FOR INDIVIDUAL, GROUP,  
ORGANIZATIONAL  
TRANSFORMATION



INNOVATION IN TEACHING-  
LEARNING PRACTICES,  
INTEGRAL EDUCATION



CROSS-CULTURAL  
MANAGEMENT

← **ORGANIZATIONAL BEHAVIOR AND HUMAN RESOURCE DEVELOPMENT** →





INDIVIDUAL FACULTY PROFILE

# DEPARTMENT OF MATHEMATICS

## LIST OF FACULTY

[Anoop T V \(Profile yet to be uploaded\)](#)

[Aprameyan P \(Profile yet to be uploaded\)](#)

[Arijit Dey](#)

[Arindama Singh](#)

[Arya Kumar Bedabrata Chand \(Profile yet to be uploaded\)](#)

[Balaji R \(Profile yet to be uploaded\)](#)

[Chidella Srinivasa Rao](#)

[Dipramit Majumdar \(Profile yet to be uploaded\)](#)

[Jayanthan A.V](#)

[Kalpana Mahalingam](#)

[Kunal Krishna Mukhopadhyay](#)

[Narayanan N \(Profile yet to be uploaded\)](#)

[Neelesh S Upadhye](#)

[Ponnusamy S \(Profile yet to be uploaded\)](#)

[Priyanka Shukla](#)

[Radha R](#)

[Rama R](#)

[Ramesh Kasilingam \(Profile yet to be uploaded\)](#)

[Santanu Sarkar](#)

[Sanyasiraju Y.V.S.S](#)

[Sarang S Sane](#)

[Satyajit Roy](#)

[Shaiju A.J](#)

[Shruti Dubey](#)

[Sivakumar K.C \(Profile yet to be uploaded\)](#)

[Sivaram Ambikasaran](#)

[Soumen Sarkar \(Profile yet to be uploaded\)](#)

[Sounaka Mishra](#)

[Srinivasa Rao Manam](#)

[Sriram B](#)

[Suhas Jaykumar Pandit \(Profile yet to be uploaded\)](#)

[Sumesh K](#)

[Sundar S \(Profile yet to be uploaded\)](#)

[Thamban Nair M](#)

[Uma V \(Profile yet to be uploaded\)](#)

[Venkata Balaji T.E](#)

[Vetrivel V \(Profile yet to be uploaded\)](#)



# Arijit Dey

## Associate Professor, Mathematics

044-2257-4635; [arjit@iitm.ac.in](mailto:arjit@iitm.ac.in)



B.Sc: Presidency University, Kolkata

M.Sc/Ph.D: IMSc (Under V. Balaji and D.S. Nagaraj).

Post. Doctoral stay: CMI, TIFR (Mumbai), MPI (Bonn)

•My broad subject of research is algebraic geometry in particular I am interested in following topics:

- Vector Bundles and Decorated sheaves over algebraic varieties, Principal Bundles over algebraic varieties.
- Toric Geometry (Bundle theoretic questions).



Dr. Arindama Singh  
PHD, IIT Kanpur, India  
Professor, Dept. of Mathematics

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[http://mat.iitm.ac.in/home/asingh/public\\_html/index.html](http://mat.iitm.ac.in/home/asingh/public_html/index.html)



- .Numerical Analysis
- .Knowledge Compilation
- .Image Processing

---

#### APPLICATION 1

Numerical solution of singularly perturbed two-point boundary-value problems and of elliptic PDEs, use of regularization methods.

#### APPLICATION 2

A propositional knowledge base is converted to a set of its prime implicants or prime implicates so that conclusions can be drawn from the knowledge base comparatively easily.

#### APPLICATION 3

PDEs are used to deblur and denoise images using regularization methods. Improvisation on the Perrona-Mallick type of PDE-based image processing is the main trick used here.

---



# Dr. Chidella Srinivasa Rao

## PHD, IISc Bangalore, India

Professor, Dept. of Mathematics

044-2257-4623; [chsrao@iitm.ac.in](mailto:chsrao@iitm.ac.in)

[http://mat.iitm.ac.in/home/chsrao/public\\_html](http://mat.iitm.ac.in/home/chsrao/public_html)



- Nonlinear Ordinary Differential Equations
- Nonlinear Partial Differential Equations
- Generalized Burgers Equations

Existence and  
Uniqueness of solutions  
of nonlinear  
Ordinary differential  
equations

Approximate /large time  
asymptotic solutions to  
generalized Burgers  
equations

These partial differential  
equations appear in  
nonlinear acoustics





# Dr. A. V. Jayanthan

## PHD, I.I.T. Bombay, India

Associate Professor, Dept. of Mathematics

044-2257-4625; [jayanav@iitm.ac.in](mailto:jayanav@iitm.ac.in)

[http://mat.iitm.ac.in/home/jayan/public\\_html/index.html](http://mat.iitm.ac.in/home/jayan/public_html/index.html)



- Hilbert coefficients and homological properties of Blowup algebras
- Betti numbers of affine and projective monomial curves
- Buchsbaum-Rim function, polynomial and their coefficients.

**Blowup algebras arise from the process of blowing up of an algebraic variety. This is an important process in the resolution of singularities. I study homological properties, such as Cohen-Macaulayness, Gorensteinness using a certain numerical function known as Hilbert function and its coefficients.**

**Buchsbaum-Rim function is a generalization of Hilbert function. Though the Hilbert function and its coefficients are very well studied, the Buchsbaum-Rim function and its coefficients are not very well studied. I study these coefficients and its relation with homological properties of a given module.**

**Betti number of a module indicates its computational complexity. It is an important invariant in many applied areas. I study certain classes of affine and projective curves and their Betti numbers.**



Dr. Kalpana Mahalingam

Associate Professor, Mathematics

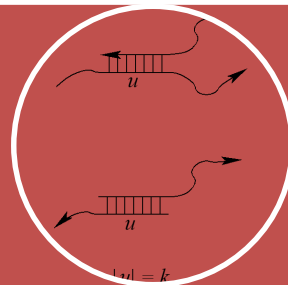
044-2257-4630; kmahalingam@iitm.ac.in  
[http://mat.iitm.ac.in/home/kalpana/public\\_html/](http://mat.iitm.ac.in/home/kalpana/public_html/)



## Major Areas of Research

- Theory of Codes
- Theory of Biomolecular Computing
- Combinatorics of words

Study of codes relative to a set of meaningful messages



Study of structures and operations on biomolecules using formal language theory

Study of words using matrices



# Kunal Krishna Mukhopadhyay

Associate Professor, Mathematics

044-2257-4640; kunal@iitm.ac.in



## Research Interests:

- $C^*$  and von Neumann Algebras
- Ergodic Theory, Free Probability
- Quantum Groups, Quantum Information
- Recently interested in Random Matrices



# Dr. Neelesh S Upadhye

## Ph.D.: IIT Bombay

Associate Professor, Dept. of Mathematics

044-2257-4625; [neelesh@iitm.ac.in](mailto:neelesh@iitm.ac.in)

<http://mat.iitm.ac.in/neelesh>



1. Probabilistic Approximations, Estimation Methods
2. Financial Time Series Modelling
3. Data Science: R programming, Statistical Learning
4. Subordinated Stochastic Processes, Modelling and Simulation



# Dr. Priyanka Shukla

PhD, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore

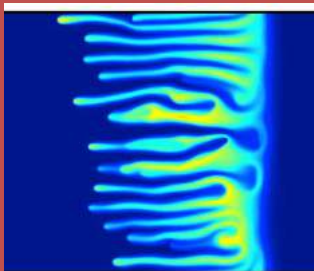
Assistant Professor, Department of Mathematics

044 2257 4609; priyanka@iitm.ac.in

<https://home.iitm.ac.in/priyanka/>

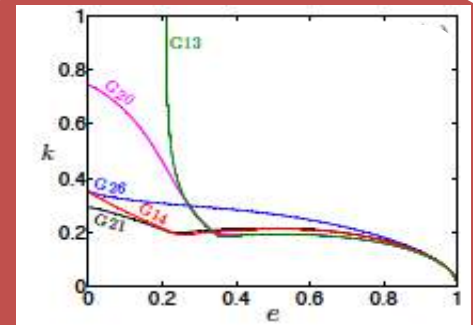
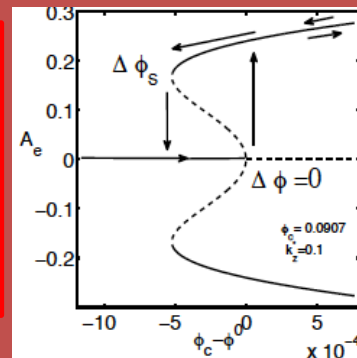
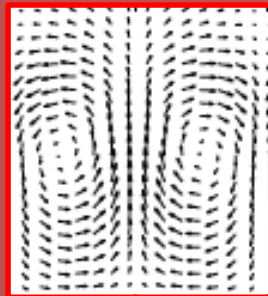


- Granular flows
- Hydrodynamic stability
- Mode interactions in fluid flows
- Kinetic theory



Chemically driven  
fingering instability:  
theory and simulations

Granular convection,  
shearbanding, etc.  
Landau equation, mode  
interactions and resonance



Higher order moment  
theories for rarified and  
granular gases



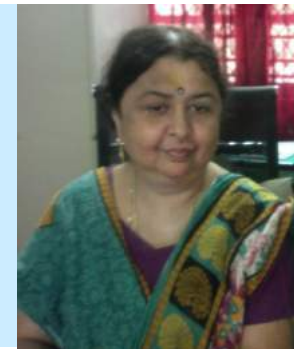


Dr. R. Radha

Ph.D. Institute of Mathematical Sciences, Chennai

Professor, Department of Mathematics

91-44-22574620; radharam@iitm.ac.in

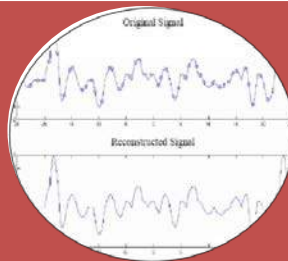


## Major Areas of Research

- Harmonic Analysis on Euclidean spaces, LCA groups, Compact groups and Heisenberg group
- Frame theory ,Wavelet Analysis and Invertibility of Operators
- Theory of Multipliers, Segal algebras and Bergman-Fock spaces



Hardy's inequalities for Hermite , special Hermite and Laguerre expansions



Sampling and reconstruction in shift invariant spaces



Wavelet applications to signal and image processing

Applying wavelets to Voice system and Identification of microcalcification clusters

[Back to Top](#)



# Dr. Rama R

Professor, Mathematics

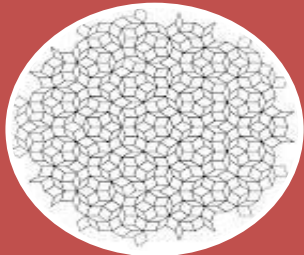
044-2257-4616; ramar@iitm.ac.in

[http://mat.iitm.ac.in/home/ramar/public\\_html/index.html](http://mat.iitm.ac.in/home/ramar/public_html/index.html)

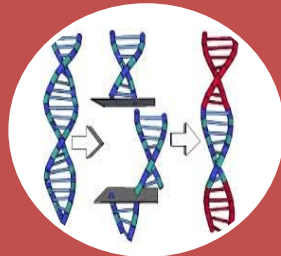


## Major Areas of Research

- Formal Languages and Automata Theory
- Molecular Computing
- Image Cryptography



Using abstract computing models for digital picture generation



Abstracting splicing operation for the generation of structured strings

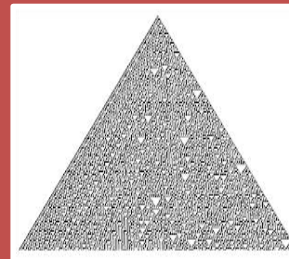


Image Cryptosystem using Cellular automata. (For pixel randomness)



Image Cryptosystem using Wavelet transformations and CRT. (For image compression)



# Dr. Santanu Sarkar

## Ph.D, Indian Statistical Institute

Associate Professor, Dept. of Mathematics

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- Cryptology
- Computational Number Theory
- Coding Theory





Dr. Y V S S Sanyasiraju

PHD, IIT Madras, India

Professor, Dept. of Mathematics

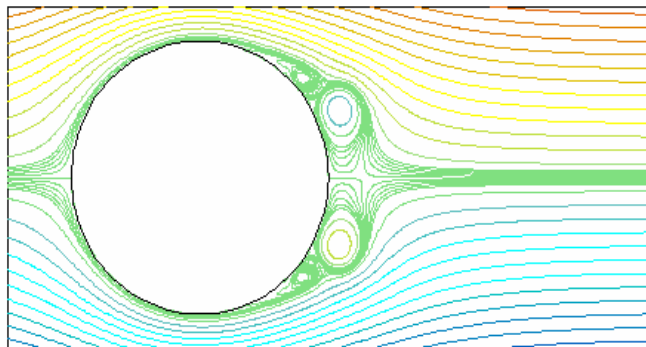
044-2257-4621; sryedida@iitm.ac.in

[http://www.iitm.ac.in/home/sryedida/public\\_html/index.html](http://www.iitm.ac.in/home/sryedida/public_html/index.html)

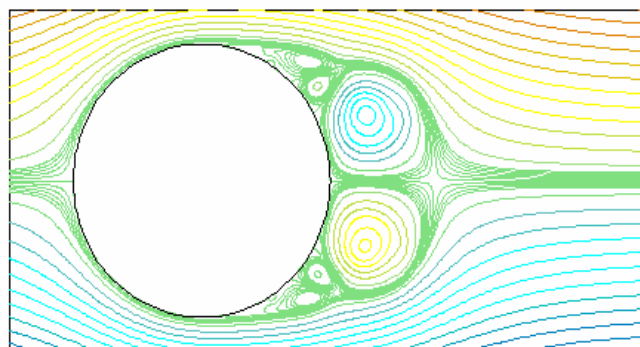


- Development of RBF based grid free schemes
- Higher order compact schemes
- Finite difference and finite volume schemes for incompressible flows

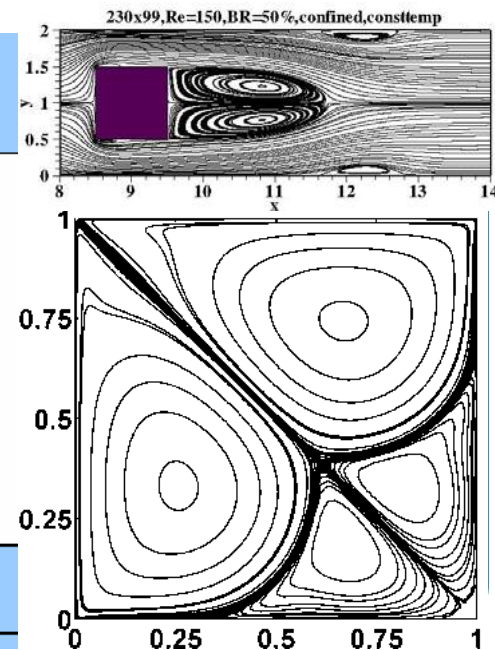
Capturing  $\beta$  and  $\alpha$  phenomena for unsteady, viscous, incompressible flow past a circular cylinder using Higher Order Semi Compact scheme at Reynolds number  $Re = 5000$



$\beta$  phenomenon at  $t = 1.5$



$\alpha$  phenomenon at  $t = 2.5$





# Sarang S.Sane

Assistant Professor, Mathematics

044-2257-4604; [sarang@iitm.ac.in](mailto:sarang@iitm.ac.in)

<https://home.iitm.ac.in/sarang/>



## Broad research interests

- My current research interests are broadly centred around commutative algebra, K-theory, geometry and topology. But I like to study anything that I find beautiful.

## Some more details

One of the themes I work on is doing obstruction theory in algebra with intuition from topology.

The main question I study in this regard is to analyze the structure of various obstruction theories (e.g. Euler class groups, Chow groups, Chow-Witt groups, etc.) with the aim of studying the splitting properties of projective modules/vector bundles.

Another theme which I am currently pursuing is the study of triangulated categories. More specifically, studying special derived subcategories of the derived category of modules/sheaves for a ring/scheme.

Invariants associated to these, such as K-theory or Witt theory are also of considerable interest to me and are part of both mentioned themes.





# Dr. Satyajit Roy

## PHD, I. I. Sc. Bangalore, India

Professor, Dept. of Mathematics

044-2257-4617; [sjroy@iitm.ac.in](mailto:sjroy@iitm.ac.in)

<http://www.iitm.ac.in/sjroy.html>

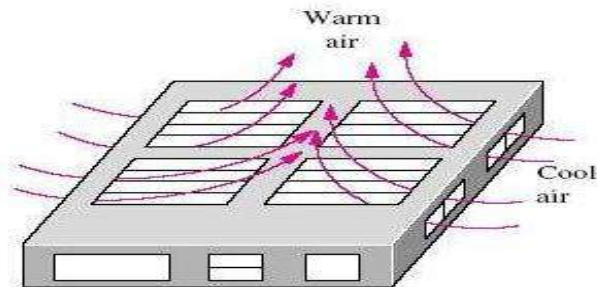


- Boundary Layer Theory

- Convective Heat and Mass Transfer

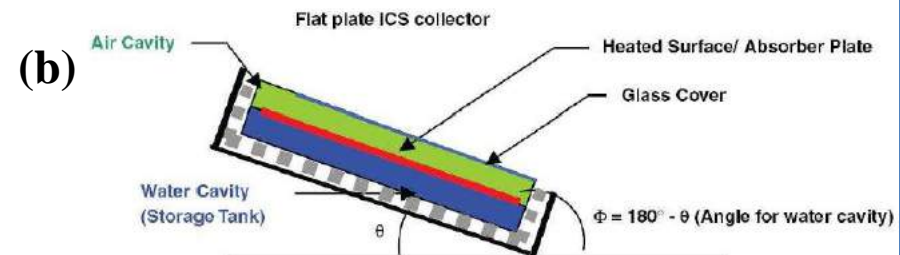
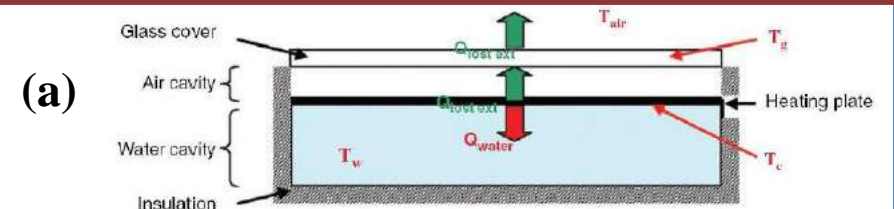
- Computational Fluid Dynamics

### Cooling of Electronic Devices



Natural convection phenomena within enclosures for cooling of electronic components

### Integrated Collector Storage Solar Water Heater



Natural convection phenomena within solar water heater



**Dr. A. J. SHAIJU**  
**PHD, INDIAN INSTITUTE OF SCIENCE INDIA**  
Associate Professor, Dept. of MATHEMATICS  
044-2257-4638; [ajshaiju@iitm.ac.in](mailto:ajshaiju@iitm.ac.in)  
<http://www.iitm.ac.in/....>



- Research Area/Focus 1 SYSTEMS AND CONTROL THEORY
- Research Area/Focus 2 GAME THEORY
- Research Area/Focus 3

**Study of various classes of Non-linear control systems that admit solutions in closed form.**



## Dr. Shruti Dubey

PhD, Indian Institute of Technology Kanpur

Associate Professor, Deptt of Mathematics

044-2257-4639; [sdubey@iitm.ac.in](mailto:sdubey@iitm.ac.in)

<http://www.mat.iitm.ac.in/home/sdubey/public.html/index.html>



### Major Areas of Research

- Nonlinear Analysis of Fractional Functional Differential Equations.
- Mathematical Study of Ferromagnetic Systems.

# Safyan

Stable Accurate Fast Robust Algorithms & Numerics group

Convenor: Sivaram Ambikasaran

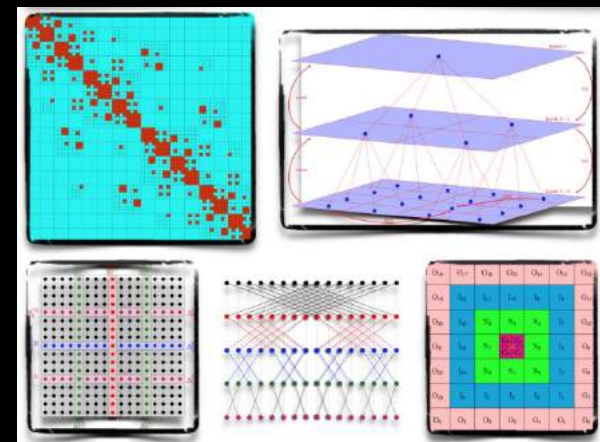
<http://sivaramambikasaran.com/>

[sivaambi@alumni.stanford.edu](mailto:sivaambi@alumni.stanford.edu)



## Theoretical & Computational Aspects of

- Numerical linear Algebra
- Approximation Theory
- Fast Stable Algorithms
- PDE's & Integral Equations



## Applications include

Acoustic & Electromagnetic scattering  
Finite Element & integral equation solvers  
Data driven physical modelling  
High dimensional statistics

[Back to Top](#)



**Dr. Sounaka Mishra, PhD**  
**Indian Statistical Institute Kolkata**  
**Associate Professor, Dept. of Maths.**

044-2257-4627; [sounak@iitm.ac.in](mailto:sounak@iitm.ac.in)  
<http://www.iitm.ac.in/...>



- Combinatorial Optimization
- Design of Approximation Algorithms for Hard Optimization Problems
- Graph Theory

**Complexity of Minimum  
Dominating Set and its  
variations**

**Approximation  
algorithms for  
node/edge deletion  
problems**





**Dr. Srinivasa Rao Manam**

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<http://www.iitm.ac.in/info/fac/manam>



## Major Areas of Research

- Integral Equation Methods in water wave Scattering
- Wave-Bottom and Wave-Structure Interactions



Dr. B. Sriram  
Ph.D., University of Florida, USA.

Assistant Professor, Dept. of Mathematics

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<https://math.iitm.ac.in/bsriram>



- Functional Analysis
- Operator Theory

Positive maps

Non-  
Commutative  
Sets / Functions.

Interpolation



**Dr. Sumesh. K**

**Ph.D. Indian Statistical Institute Bangalore Centre, India**

**Assistant Professor, Dept. of Mathematics**

**Email:** [sumeshkpl@iitm.ac.in](mailto:sumeshkpl@iitm.ac.in); **Phone:** 044-2257-4642;

**Webpage:** <https://home.iitm.ac.in/sumeshkpl/>



## Research Interests

- Operator algebras
- Operator spaces
- Quantum information
- Quantum probability

My research interests are mainly in the theory of operator algebras, specially focusing on the theory of completely positive maps, completely bounded maps, quantum dynamical semi-groups,  $E_0$ -semigroups, product systems, dilations, representations of  $C^*$ -algebras and Hilbert  $C^*$ -modules. I also have research interests in the theory of quantum probability and the mathematical aspects of quantum information theory.



# Dr. M. Thamban Nair

## PhD – IIT Bombay, India

Professor, Dept. of Mathematics

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[http://mat.iitm.ac.in/home/mtnair/public\\_html/index.html](http://mat.iitm.ac.in/home/mtnair/public_html/index.html)



- Applicable Functional Analysis
- Operator Equations
- Inverse and Ill-Posed Problems.

Problems in Applications take the form of operator equations. So, in the abstract frame work ,one has to investigate approximate solutions of operator equations.

Such investigations are useful in obtaining numerical approximations for the solution of differential and integral equations.

Most of the inverse problems in applications are ill-posed. For stable approximate solutions for such problems, they have to be regularized using appropriate tools from Functional Analysis and Operator Theory.



# Dr. Venkata Balaji T. E.

## PhD, CMI, Siruseri, Chennai, India

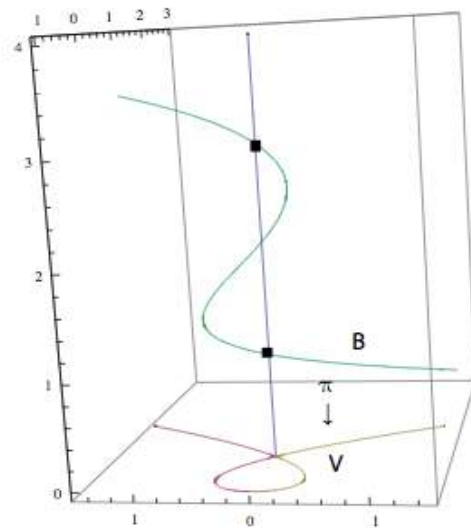
### Asst. Prof., Dept. of Mathematics

044-2257-4628; tevbal@iitm.ac.in

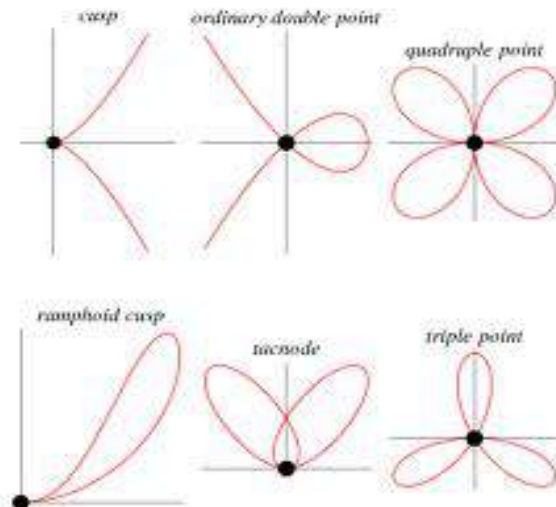
<http://www.iitm.ac.in/component/faculty/77/tevbal/>



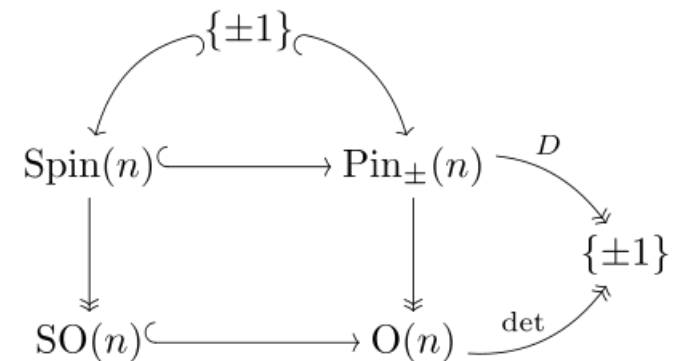
- Algebraic Geometry and Commutative Algebra
- Moduli and Classification of Vector Bundles, Quadratic Modules, Clifford Algebras
- Arbitrary Base Scheme Constructions and Specialisation Problems
- Orthogonal and Spin Groups



Desingularisations



Singularities



Clifford Algebras

For Moduli / Parameter Spaces of Degenerate Forms and Algebras





INDIVIDUAL FACULTY PROFILE

# DEPARTMENT OF MECHANICAL ENGINEERING

# LIST OF FACULTY

[Abhijit Sarkar](#)

[Amitava Ghosh](#)

[Anand T. N. C](#)

[Anand K](#)

[Anil Kumar Meena](#)

[Arunachalam N](#)

[Arunn Narasimhan](#)

[Arvind Pattamatta](#)

[Ashis Kumar Sen](#)

[Babu V](#)

[Balaji C](#)

[Balaji Srinivasan \(Profile yet to be uploaded\)](#)

[Chandramouli P](#)

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[Krishnan Balasubramaniam](#)

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[Manivannan P.V](#)

[Manoj Pandey](#)

[Mayank Mittal](#)

[Narasimhan Swaminathan](#)

[Pallab Sinha Mahapatra \(Profile yet to be uploaded\)](#)

[Parag Ravindran](#)

[Piyush Shakya](#)

[Prabhu Rajagopal](#)

[Prakash Maiya M](#)

[Prasad B.V.S.S.S](#)

[Raghavan V](#)

[Raghu Prakash V](#)

[Raju Sethuraman](#)

[Ramesh A \(Profile yet to be uploaded\)](#)

[Ramesh Babu N](#)

[Ramkumar P](#)

[Ratna Kumar Annabattula](#)

[Ravikiran Sangras \(Profile yet to be uploaded\)](#)

[Samuel G.L](#)

[Sarit Kumar Das \(Profile yet to be uploaded\)](#)

[Sateesh Gedupudi](#)

[Sathyan Subbiah](#)

[Seshadri Sekhar A](#)

[Shaligram Tiwari \(Profile yet to be uploaded\)](#)

[Shamit Bakshi](#)

[Shankar Krishnapillai](#)

[Shyama Prasad Das](#)

[Sivasrinivasu Devadula \(Profile yet to be uploaded\)](#)

[Somashekhar S Hiremath](#)

[Soundarapandian S](#)

[Sourav Rakshit](#)

[Srikrishna Sahu](#)

[Srinivas Reddy K](#)

[Srinivasan K](#)

[Sujatha Chandramohan](#)

[Sujatha Srinivasan](#)

[Sundararajan Natarajan](#)

[Sundararajan T \(Profile yet to be uploaded\)](#)

[Sushanta Kumar Panigrahi](#)

[Varunkumar S](#)

[Venkatarathnam G](#)

[Vishal V.R Nandigana](#)

[Viswanath K \(Profile yet to be uploaded\)](#)



**Dr. Abhijit Sarkar**  
**PHD, IISc Bangalore, India**  
**Associate Professor, Dept. of Mechanical Engg.**  
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<http://www.iitm.ac.in/component/faculty/78/asarkar/>



- Acoustics
- Vibration
- Wave Propagation

Dispersion characteristics  
of structural acoustic  
waveguides



Application areas: Noise Control in  
Ducts and Mufflers

### Vibration of Shells



Application areas: Dynamics  
of sheet metal components

### Applications of Mathematics to Problems in Mechanics

- Asymptotic Methods
- Computational methods
- Continuum Mechanics
- Fluid-Structure Interaction
- Signal Processing algorithms  
for condition monitoring,  
music, etc.



# Dr. Amitava Ghosh

(PhD, IIT Kharagpur, India)

Associate Professor, Dept. of Mechanical Engineering

044-2257-4724; amitava\_g@iitm.ac.in

<http://www.iitm.ac.in/....>



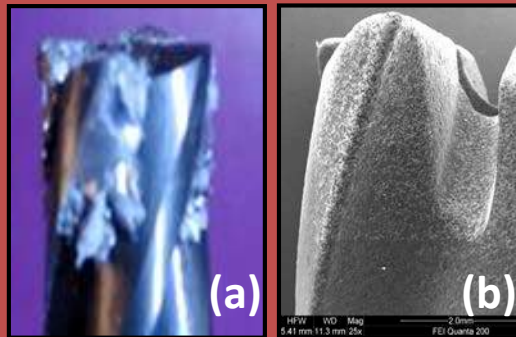
## Current research activities:

- High speed machining / *Focus: nano-MQL and Cryogenic application*
- Cutting tools with soft and hard tribo-coating / *Focus: machining of Al-alloys*
- Development of single layer (SL) abrasive tool / *Focus: SL diamond dressing tool*



MQL

(minimum quantity lubrication)



End mill (after Al-machining)

(a) uncoated (b) graphite-x coated



brazed cBN

(from a single layer abrasive tool)

High speed machining, grinding-Development of cutting tools-Sustainable solutions





# Dr. Anand T. N. C. PHD, IISc, India

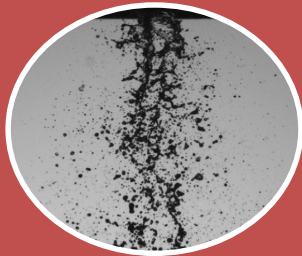
Associate Professor, Dept. of Mechanical Engg.

044-2257-4715; [anand@iitm.ac.in](mailto:anand@iitm.ac.in)

<http://www.mech.iitm.ac.in/anand>



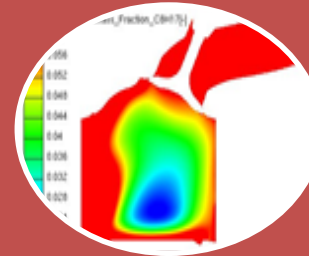
- Laser-based diagnostics for spray characterization and combustion
- Fuelling systems for engines
- CFD for I.C. Engines



Characterization of ethanol spray  
from a port fuel injector



Ultrasonic atomization for  
gasoline engines:  
Low droplet sizes at even  
atmospheric pressure



CFD predictions of fuel-air mixing  
in a PFI engine

**Experimental and computational studies on sprays and combustion**



**Dr. K. Anand**

PhD, IIT Madras, India

Assistant Professor, Mechanical Engineering

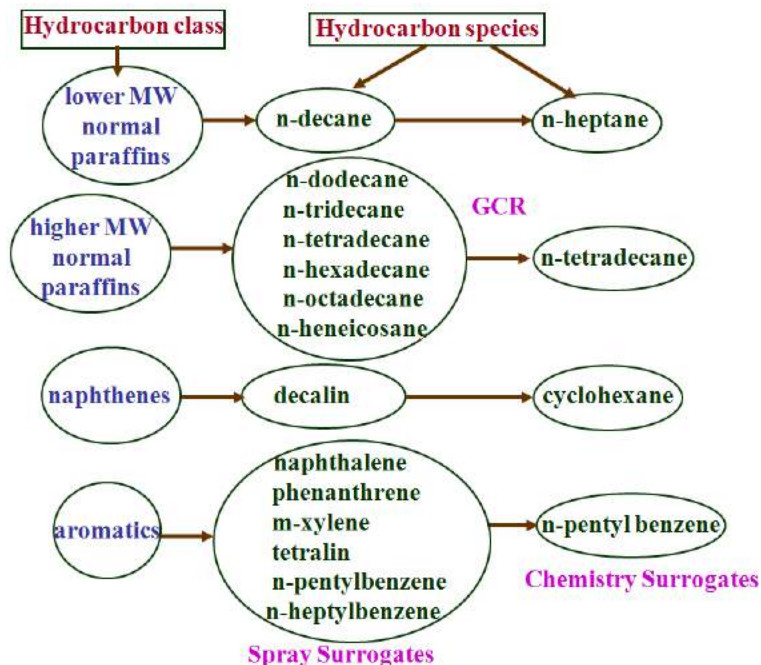
044-2257-4720; anand\_k@iitm.ac.in



## Major Areas of Research

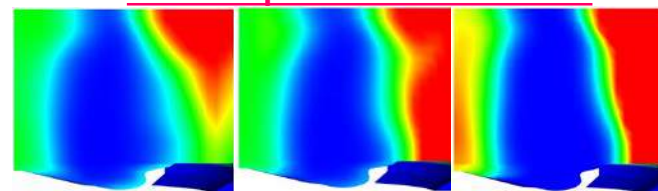
- Experimental and Numerical Investigations on Low Temperature Combustion
- Automotive Fuel Surrogate Modelling
- Developing High Efficiency, Clean Combustion Engines through Fuel Modifications

### Diesel Fuel Surrogate Model Representation

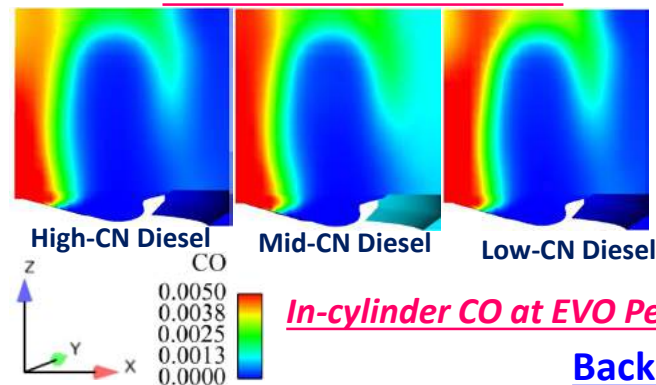


### Fuel and Combustion Mode Effects

#### Low Temperature Combustion



#### Conventional Combustion



[Back to Top](#)



# Dr. Anil Kumar Meena

PhD, Arts et Métiers ParisTech, Paris, France

Assistant Professor

Department of Mechanical Engineering

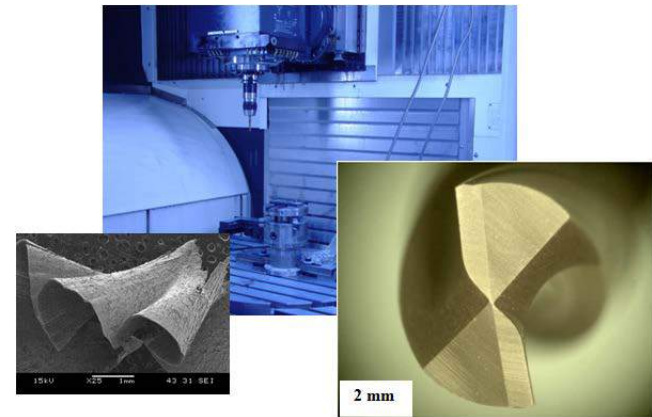
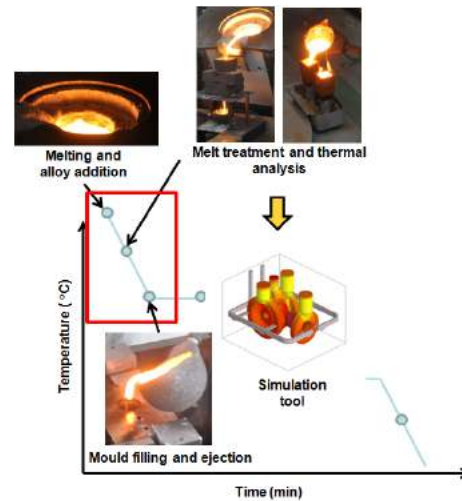
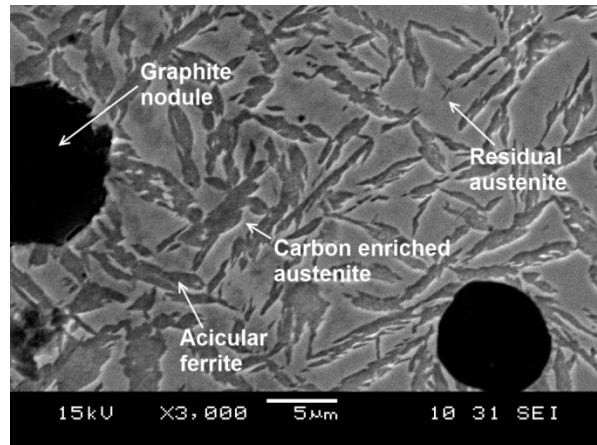
IIT Madras, Chennai-600036

+91-44-2257-4726; anilm@iitm.ac.in



## Research interests:

- Casting, Heat Treatment, Microstructure and properties of ADI
- Dry and near dry machining
- High speed machining
- Sustainable manufacturing
- Light-weight alloys for automotive applications



Microstructure & Material properties

Process route optimization

Dry and MQL machining



**Dr. N.Arunachalam**

Assistant Professor, Mechanical Engineering

044-2257-4722; chalam@iitm.ac.in

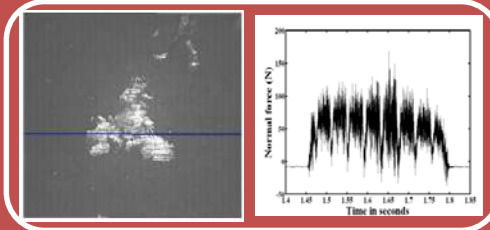


## Major Areas of Research

Prognostics and health management of industrial systems

Grinding Process modeling and control for advanced materials

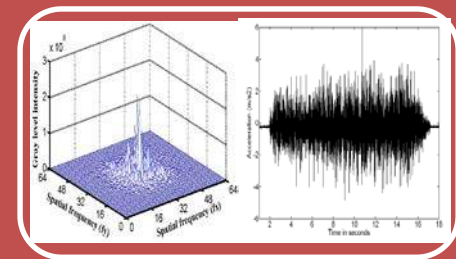
Machine vision and its applications



Multi sensor fusion for data and model based diagnosis and prognostics



Machine vision for process monitoring and control



Grinding Process modeling for MMC and CMC'S

**Applying advanced sensors and models for condition based maintenance of mechanical systems**

[Back to Top](#)





# Dr. Arunn Narasimhan

## PHD, Southern Methodist University, USA

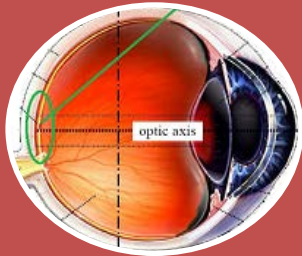
Professor, Dept. of ME

044-2257-4696; [arunn@iitm.ac.in](mailto:arunn@iitm.ac.in)

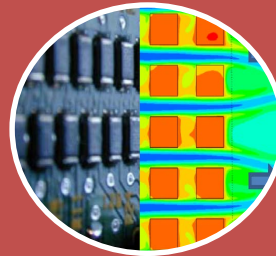
<http://www.iitm.ac.in/component/faculty/78/arunn/>



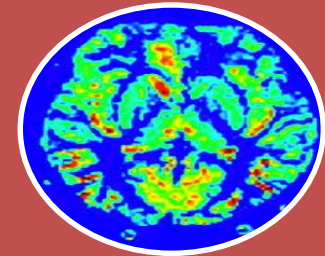
- Heat and Fluid Flow in Porous Media (sand, metal foam, electronics, bio-tissue)
- Heat and Fluid Flow in Biological Systems (Bio-heat and Bio-fluids)
- Phase Change and Convection Heat Transfer (passive cooling / thermal storage)



Retinal Laser Surgery / Retinal  
Drug Delivery (Bio-heat-flow  
Models)



Electronics Cooling as Bi-  
disperse Porous Media / Porous  
Medium Combustion / Heat  
Transfer Enhancement



Brain Stroke Cooling /  
Cryosurgery (Bio-heat-porous –  
medium Models)





# Dr. Arvind Pattamatta

Associate Professor, Mechanical Engineering

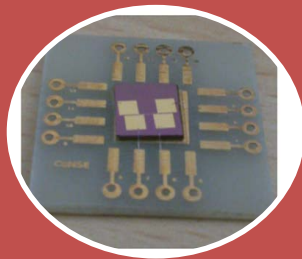
044-2257-4654; arvindp@iitm.ac.in

<http://mech.iitm.ac.in/Faculty/ap/home.php>

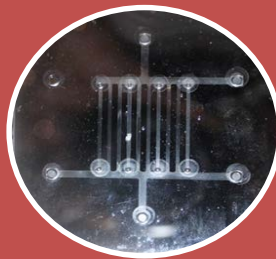


## Major Areas of Research

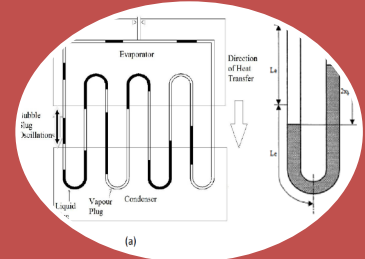
- Micro and Nano scale Heat transfer with applications in micro electronic cooling
- Two Phase flows during flow boiling in microchannels
- Computational Fluid Dynamics and Mesoscopic Numerical Methods.



Level 1: Materials  
(conduction in  
nanostructures)



Level 2: Heat Dissipation  
from Device to Heat Sink



Level 3: Heat Removal  
from Heat Sink to  
Ambient

Applying Mesoscale Numerical methods for heat transfer prediction and validation with experimental techniques



# Dr. Ashis Kumar Sen

Associate Professor, Mechanical Engineering

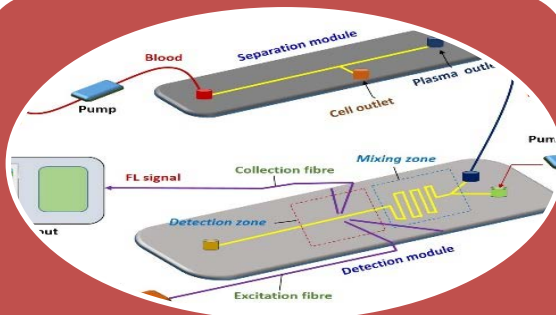
044-2257-4716; ashis@iitm.ac.in

<http://www.ashislab.in/>

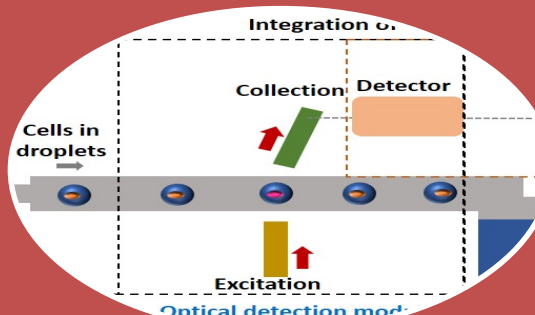


## Major Areas of Research

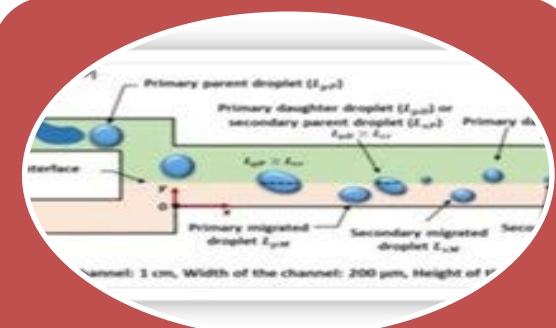
- Microfluidics Technology.
- Healthcare and Lab on Chip diagnostics.
- Interfacial phenomena in microfluidics.



Optofluidic platform for detection of gases in liquids



Detection and isolation of target cells in single-cell format



Droplets, interfaces, wetting

Applying microfluidics technology for healthcare and lab on chip diagnostics

[Back to Top](#)



Dr. V. BABU

PhD, The Ohio State University, USA

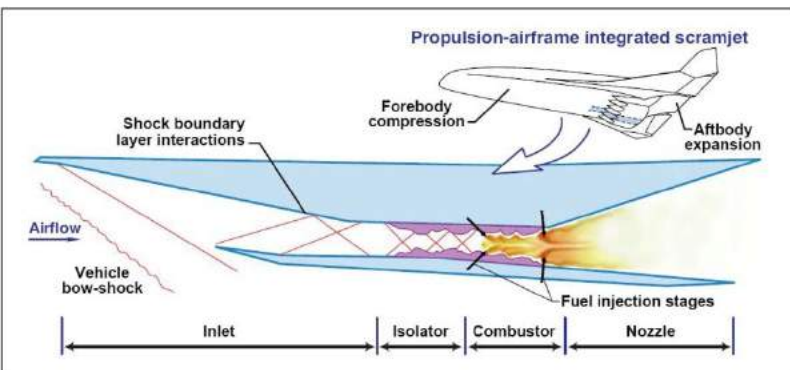
Professor, Dept. of Mechanical Engineering

044-2257-4688; vbabu@iitm.ac.in

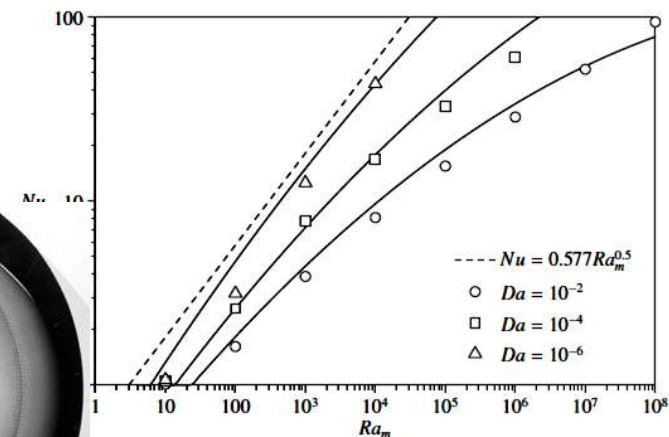
<http://www.iitm.ac.in/>



- High Speed Propulsion/Supersonic intakes; Supersonic combustion
- Computational Aero-acoustics/Prediction and mitigation
- Lattice Boltzmann method/Simulations of flow and heat transfer; HPC



Source: <http://www.nasa.gov/>





# Dr. C.Balaji

## Ph.D, IIT Madras

Professor, Dept. of Mechanical Engineering

044-2257-4689; [balaji@iitm.ac.in](mailto:balaji@iitm.ac.in)

<http://mech.iitm.ac.in/Faculty/CB/home.php>



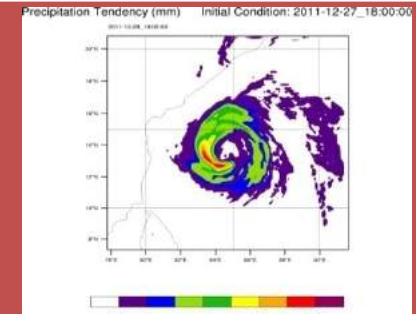
- Optimization in heat transfer
- Inverse heat transfer
- Satellite meteorology, numerical weather prediction and data assimilation



Temperature field with thermochromic liquid crystals



Thermal optimization of phase change material based heat sinks



Prediction of 24hr accumulated rainfall for cyclone Thane

**Heat transfer, optimization and atmospheric sciences**



**Dr. Chandramouli P.**  
**Ph. D., The Ohio State University, USA**  
**Professor, Department of Mechanical Engineering**

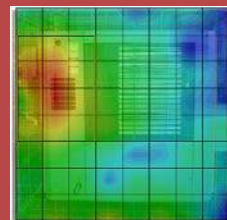
+91 44 22574690; mouli@iitm.ac.in  
<https://sites.google.com/site/iitmmouli/>



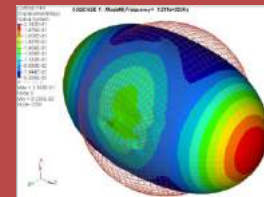
- Nonlinear Dynamics
- Noise and Vibration Control
- Fluid-Structure-Acoustic Interactions



Efficient computation of  
large order nonlinear  
dynamical systems  
Windmilling in aero-  
engines



Hybrid techniques for  
noise control  
Double porous linings &  
embedded resonators



Breathing waves in  
submerged fluid filled  
tubes  
Flow acoustics of fluid  
filled shells

COMPUTATIONAL AND EXPERIMENTAL METHODS FOR NVH

[Back to Top](#)





**Dr. DHIMAN CHATTERJEE**  
**Ph.D., INDIAN INSTITUTE OF SCIENCE, INDIA**

Professor, Dept. of Mechanical Engineering

Ph: +91 44-2257 4697; Email: dhiman@iitm.ac.in

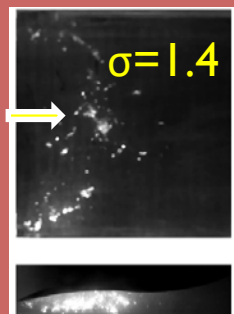
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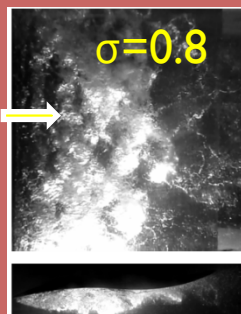
- **Cavitation and two-phase flow**
- **Microscale flow and flow devices**
- **Turbomachinery**



S-blade

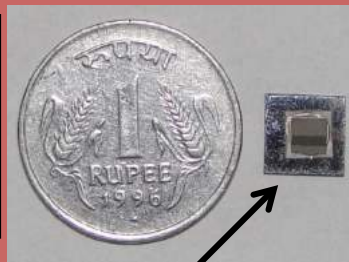
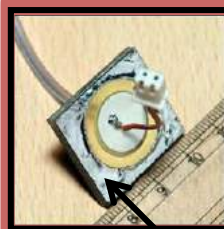


$\sigma = 1.4$



$\sigma = 0.8$

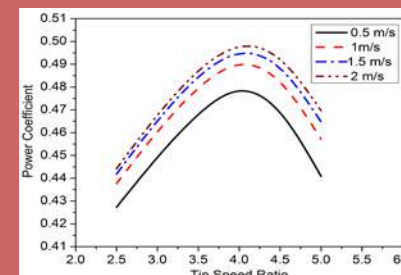
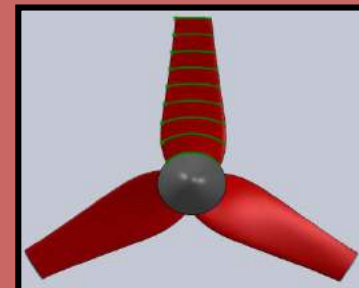
Development of cavitation  
over S-blade



Micropump



Micropumping system  
for electronic cooling



Hydrokinetic turbine



# Prof. R GNANAMOORTHY, Dr Eng (Japan)

Professor, Department of Mechanical Engineering

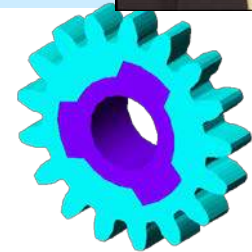
044-27476302; gmoorthy@iitm.ac.in

<http://www.iiitdm.ac.in/faculty.php?pid=RGM>

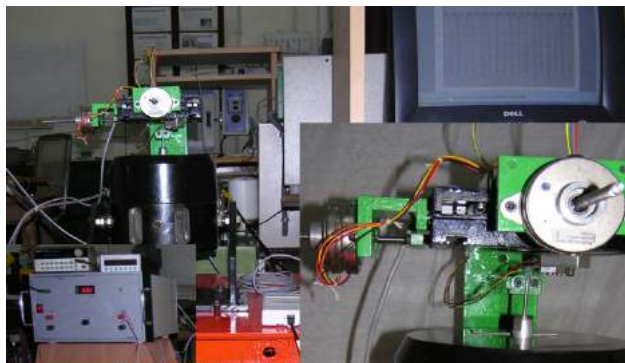
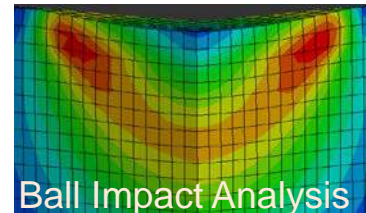


## Focus

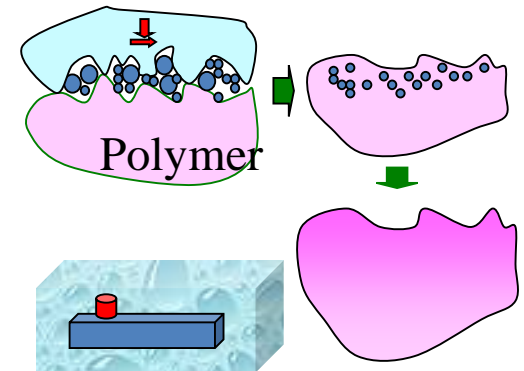
- 'Engineering' Surfaces for Improved Performance
- Damage Tolerant Design and Tribo Design
- Advanced Materials & Product Design
- High Performance Test Machines and Product Development



Duplex  
Gear



*'Engineering' Surfaces for Nanostructure*



*Damage Mechanisms*

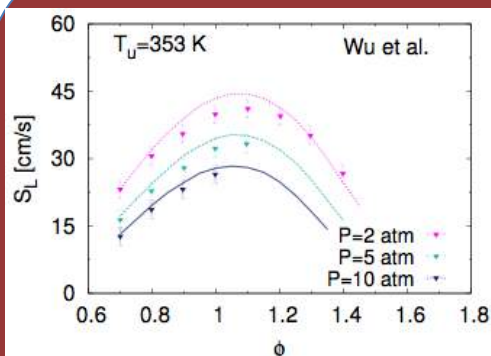


**Dr. Krithika Narayanaswamy**  
Assistant Professor, Mechanical Engineering  
044-2257-4650; krithika@iitm.ac.in  
<https://mech.iitm.ac.in/meiitm/personnal/dr-krithika-narayanaswamy/>



## Major Areas of Research

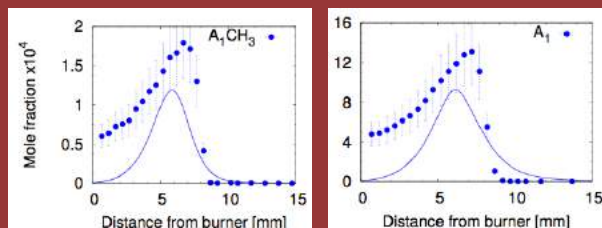
- Chemical kinetic modeling of transportation fuel surrogates
- Development of compact kinetic schemes and reduction methods
- Reactive flow simulations with accurate finite rate chemistry



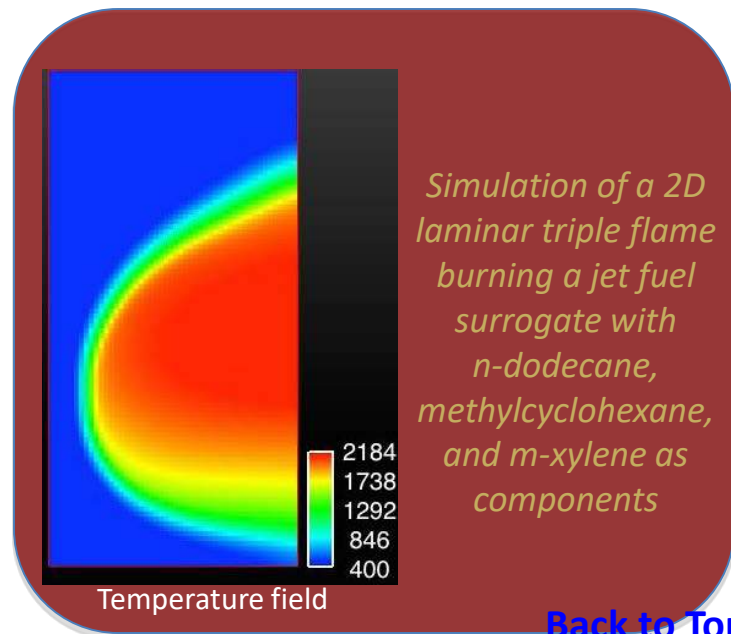
Laminar flame speeds

Symbols – experiments (literature)  
Lines – simulations (using proposed kinetic scheme)

*Chemical kinetic modeling of methylcyclohexane, which is a potential candidate to represent the cycloalkane class in transportation fuels*



Amounts of aromatics in a rich methylcyclohexane flame



*Simulation of a 2D laminar triple flame burning a jet fuel surrogate with n-dodecane, methylcyclohexane, and m-xylene as components*

Temperature field



# Dr. Krishna Kannan

## PHD, Texas A&M University, USA

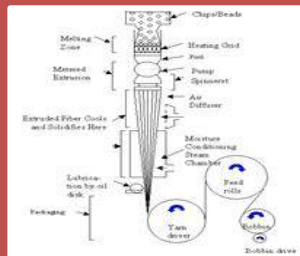
Professor, Dept. of Mechanical Engineering

044-2257-4708; [krishnakannan@iitm.ac.in](mailto:krishnakannan@iitm.ac.in)

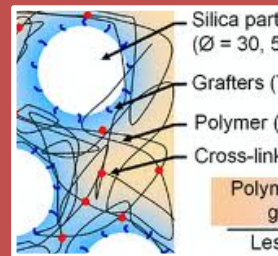
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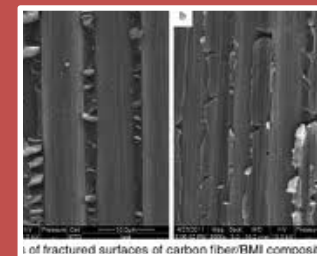
- **Broad area of research:** Continuum mechanics
- **Research focus:** Development of constitutive equations using rigorous and systematic thermodynamical frameworks describing many phenomena such as crystallization of polymeric melts, and viscoelasticity and chemical aging of polymeric materials
- **Some applications:**



Constitutive equations for fiber spinning of crystallizing polymeric melts



Constitutive equations for vulcanization of rubber and thermo-mechanical behavior of (viscoelastic) filled networked rubbers



Constitutive equations for chemical aging of composites





# Dr. Krishnan Balasubramaniam

Professor, Mechanical Engineering

044-2257-4662; [balas@iitm.ac.in](mailto:balas@iitm.ac.in)

<http://www.cnde-iitm.net/balas/index.html>



## Major Areas of Research

- Non-destructive Imaging & Evaluation of Materials, Structures, Products
- Structural Health Monitoring using in-situ Sensor Systems
- Measurements of Material Properties and In-Process Parameters.

GPR Testing Techniques and  
Models for Structures

IN-PROCESS monitoring of Cure  
Properties of Concrete,  
Polymers, and Joints

Material Property  
Measurements at Ambient  
Temperatures and Elevated  
temperatures up to 1500 C

← Applying Acoustic and Electromagnetic Spectrum for Industrial Measurements →

[Back to Top](#)





Dr. J. M. Mallikarjuna

Ph.D., IIT Madras, India

Professor, Dept. of Mechanical

044-2257-4698; jmmallik@iitm.ac.in

<http://www.iitm.ac.in/component/faculty/78/jmmallik/>



- Alternate fuels – Vegetable oils, Biodiesel, Hydrogen, Ethanol, Methanol, LPG, Biogas, CNG
- In-cylinder flows, liquid and air interaction analysis using PIV and CFD in 4 and 2 Stroke engines
- HCCI Engines – Liquid and gaseous fuels, GDI engines



Performance and Emission characteristics of alternate fuels. Engine modifications for liquid and gaseous fuels. Combustion characteristics.



In-cylinder flows and air-fuel interaction in 4S and 2 stroke engines is done through PIV and CFD analysis



HCCI – usage of liquid and gaseous fuels for HCCI operation, engine modifications, performance, emission and combustion characteristics is done. Diesel, LPG, biogas have been tried



# Dr. P.V.Manivannan

## PhD, IIT Madras, India

Associate Professor, Department of Mechanical Engineering

Ph:044-22574710; Cell: 9444952257 Email: pvm@iitm.ac.in

<http://www.iitm.ac.in/component/faculty/78/pvm/>



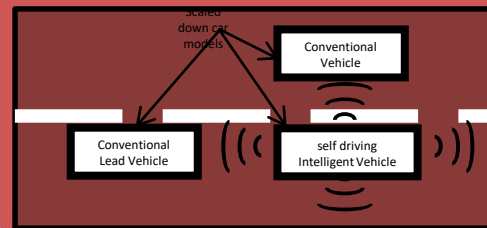
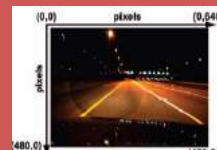
## Major Areas of Research

- **Automotive Control systems:** Engine Management Systems (SI, CI, Hydrogen Fueled Engines ), Electric Power Steering, Active Suspension system (MR damper), etc.
- **Robotics and Sensor Network:** Robotics / Unmanned Vehicle Guidance and Control, Sensors and Sensor Network (wired / wireless), Automated Highway System (AHS) & Intelligent Vehicles
- **Industrial automation:** Embedded Controller and Real Time Operating System (RTOS) for Mechatronic System

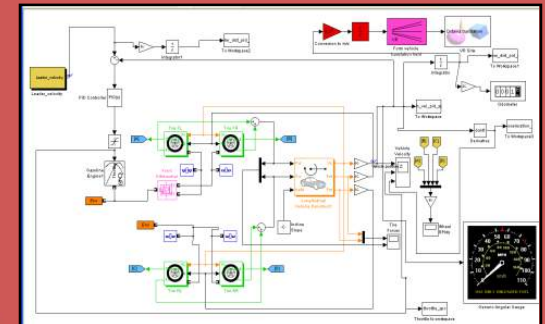
### Automotive Control Systems



### Automated Highway System (AHS) and Intelligent Vehicles



### Real Time Embedded Controller Design (Modeling, Simulation, Optimization)

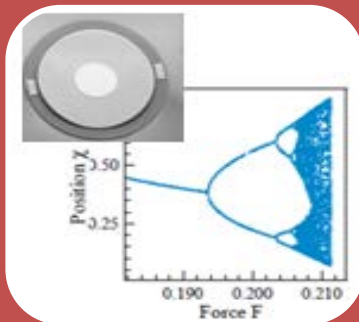




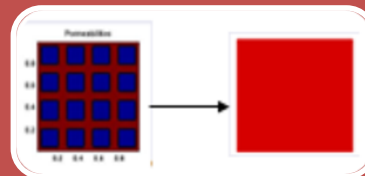
**Dr. Manoj Pandey**  
**PHD, Cornell University, USA**  
Asst. Professor, Dept. of Mechanical Engineering  
044-2257-4658; mpandey@iitm.ac.in  
<http://www.iitm.ac.in/...>



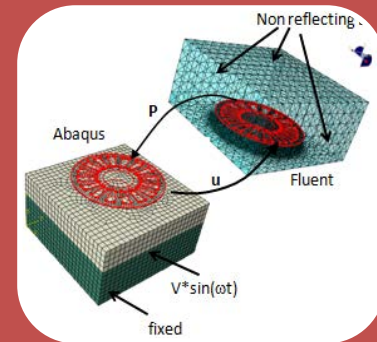
- Reduced Order Modeling and Nonlinear Dynamics of Resonant MEMS.
- Finite Element based Multi scale Modelling of Elastic Plastic Applications.
- Multi Physics analysis of MEMS.



Nonlinear Modeling and  
Analysis of MEMS



Multiscale  
Modeling/Homogenization  
for composites



Multi-Physics Analysis



# Dr. Mayank Mittal

Assistant Professor, Mechanical Engineering

IIT Madras, Chennai - 600036

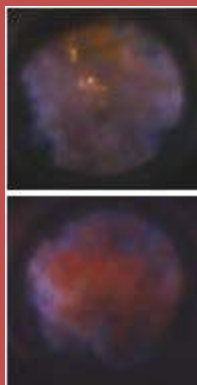
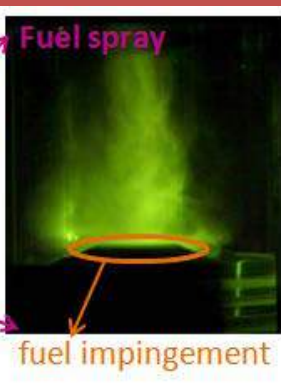
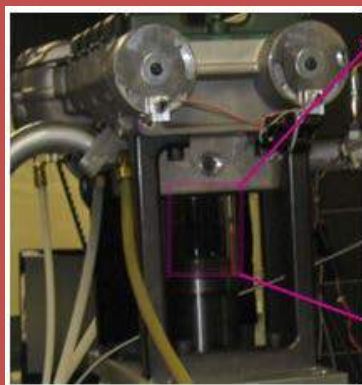
+91-44-2257-4680; mmittal@iitm.ac.in

<https://www.iitm.ac.in/info/fac/mmittal>



## Major Areas of Research

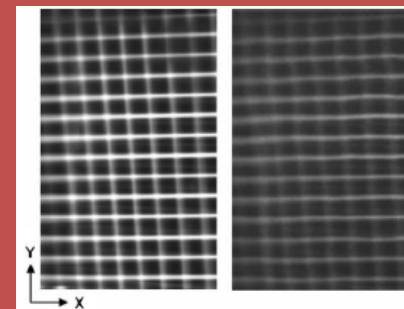
- Experimental diagnostics and modeling of advanced internal combustion engine; alternate fuels; aftertreatment system
- Laser-based diagnostics for flow and combustion
- Signal and image processing; computer vision



In-cylinder fuel spray and combustion visualization



Laser grid inside the engine cylinder



Undelayed and delayed images of molecular tagging velocimetry



# Dr. Narasimhan Swaminathan

## PHD, Georgia Institute of Technology, USA

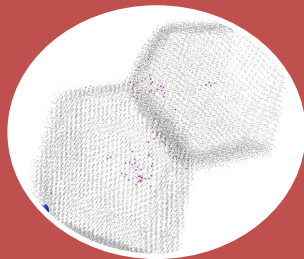
Associate Professor, Dept. of Mechanical Engineering

044-2257-4743; [n.swaminathan@iitm.ac.in](mailto:n.swaminathan@iitm.ac.in)

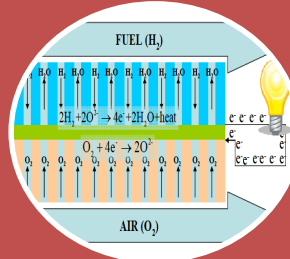
<http://www.iitm.ac.in/component/faculty/78/n.swaminathan/>



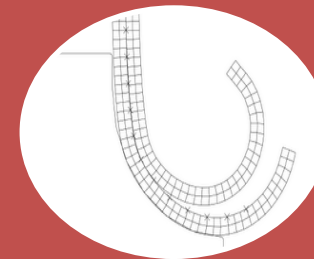
- Grain size and defect kinetics interactions in ceramics
- Material property determination using atomistic methods
- Finite element modeling of multiphysics phenomena



Radiation damage in nuclear materials with nanosized grains



Interactions between electrochemistry and mechanics in fuel cell electrolytes



Crashworthiness of composite materials

**Computational materials science and mechanics**





**Dr. PARAG RAVINDRAN**  
**PHD, TEXAS A&M University, USA**  
Associate Professor, Dept. of Mech Engg., IITM  
044-2257-4714; [paragr@iitm.ac.in](mailto:paragr@iitm.ac.in)  
<http://www.iitm.ac.in/component/faculty/78/paragr/>



- Constitutive modeling of viscoelastic materials
  - Modeling of creep response in metals
  - Modeling of fatigue loading in fibre reinforced composites
- 
- Linear and non-linear constitutive models for viscoelastic materials within a thermodynamic framework.
  - Development of continuum models for creep in copper.
  - Thermo-mechanical response of glass-epoxy composites: coupling between the thermal and mechanical response in composites.
  - Development of continuum models for composites and polymers and comparison to experiments involving cyclic loading.



Dr. Piyush Shakya  
Assistant Professor  
Machine Design Section  
Department of Mechanical Engineering  
Indian Institute of Technology Madras



Areas of interest:

1. Condition monitoring
2. Fault diagnosis and prognosis
3. Innovative signal processing
4. Bearings, Gears



Failed bearings samples after dismantling



**Dr. Prabhu Rajagopal**  
**PhD, Imperial College London, U.K.**  
Associate Professor, Dept. of Mechanical Engineering  
044-2257-4741; prajagopal@iitm.ac.in  
<https://sites.google.com/site/iitmprabhu>



## Ultrasonic techniques for inspection, monitoring and control

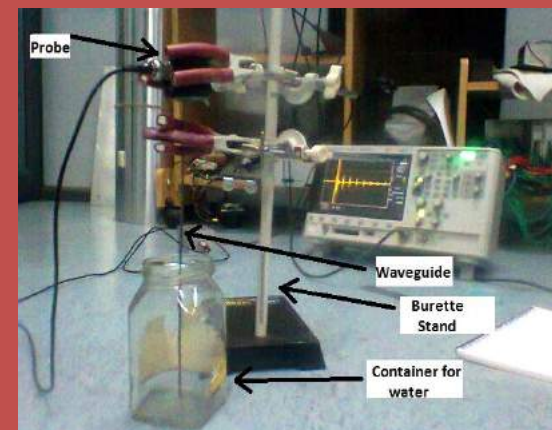
- Nondestructive Evaluation & Structural Health Monitoring
- Manufacturing Process Control



Inspection of pipe networks  
(e.g., Oil and Gas Industry ,  
Heat Exchanger Tubes)



Monitor structural health  
(e.g., aircraft wings, ship  
hull, wind turbines)



Measurement of liquid level  
(e.g., Underground/  
pressurized fluid reservoir)



**Dr. M. PRAKASH MAIYA**

**PHD, IIT Bombay, India**

**Professor, Dept. of Mechanical Engineering**

044-2257-4650; [mpmaiya@iitm.ac.in](mailto:mpmaiya@iitm.ac.in)

<http://mech.iitm.ac.in/Faculty/mpm/home.php>



- Sorption Technology
- Solid State Hydrogen Storage
- Air-conditioning and Ventilation

#### •Sorption Technology

1. Adsorption coolers
2. Absorption systems
3. Cogeneration
4. Desalination

#### •Solid State H<sub>2</sub> Storage

1. Material characterization
2. HMT and Reactor design
3. Cooling and Heat storage systems
4. H<sub>2</sub> compressors

#### •Air-conditioning and Ventilation

1. Hybrid AC systems
2. Wall / Concrete and Passive cooling
3. Desiccant and Evaporative cooling
4. Industrial ventilation





Dr. B V S S S PRASAD

PHD, Indian Institute of Technology Kharagpur

Professor, Dept. of Mechanical Engineering

044-2257-4671; prasad@iitm.ac.in



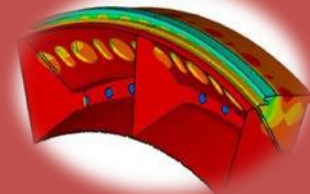
- Turbomachines/ Gas Turbine Blade Cooling Technology
- Energy/Fluidization Technology
- Computl. and Exptl. Heat Transfer /AUSM Schemes, Heat Flux measurements



Impingement cum film cooling, pin fin cooling, conjugate heat transfer



Combined Cycle Power Generation, Fluidized Bed Boilers



CFD applied to engineering applications like turbomachines, Advanced computational schemes ; Experimental methods with heat flux measurements







# Dr. V. RAGHAVAN

## PHD, IIT Madras, India

Professor, Dept. of Mechanical Engineering

044-2257-4712; raghavan@iitm.ac.in

<http://www.iitm.ac.in/component/faculty/78/raghavan/>



- Liquid Fuel Droplet Evaporation and Combustion – alcohols and biofuels
- Laminar Flames – Hydrogen and oxygen enhanced flames, flame stability studies
- Heterogeneous Combustion – pool flames, coal and biomass gasification



Liquid Fuel droplet  
Evaporation and  
Combustion



Laminar Flame studies



Heterogeneous  
combustion



# Dr. V Raghu Prakash, Ph.D. (IISc)

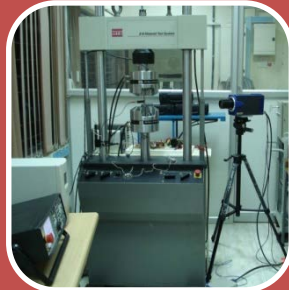
Professor, Dept. of Mechanical Engineering

044-2257-4694; raghuprakash@iitm.ac.in

<http://www.mech.iitm.ac.in/Faculty/vrp/home.php>



- Fatigue, Fracture and Failure Analysis
- Materials Characterization
- Crash Performance
- Product Design



Life Prediction and  
Residual Life Extension



Development of crash  
compliant structures



New Product  
Development



**Dr. Raju Sethuraman**

Professor, Dept. of Mechanical Engineering  
I.I.T. Madras, Chennai-600036

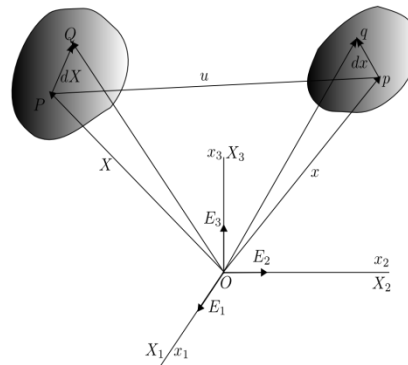
044-2257-4673; sethu@iitm.ac.in

[http://www.iitm.ac.in/....](http://www.iitm.ac.in/...)



## Research Area/Focus : Computational Solid Mechanics

Modeling and simulation of structural materials undergoing inelastic finite deformation.





**Dr. N. Ramesh Babu**

**Professor, Department of Mechanical Engineering**  
IIT Madras, Chennai - 600 036

+91-44-2257 4675 (O); [nrbabu@iitm.ac.in](mailto:nrbabu@iitm.ac.in)

<http://mech.iitm.ac.in/Faculty/nrb/home.php>

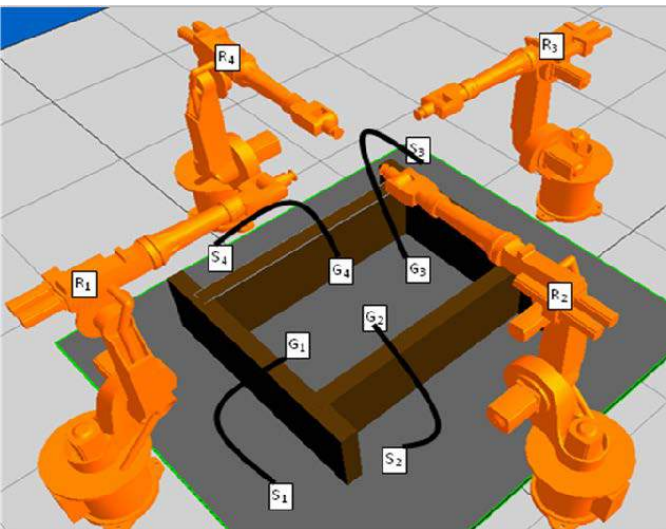


## Automation in Manufacturing

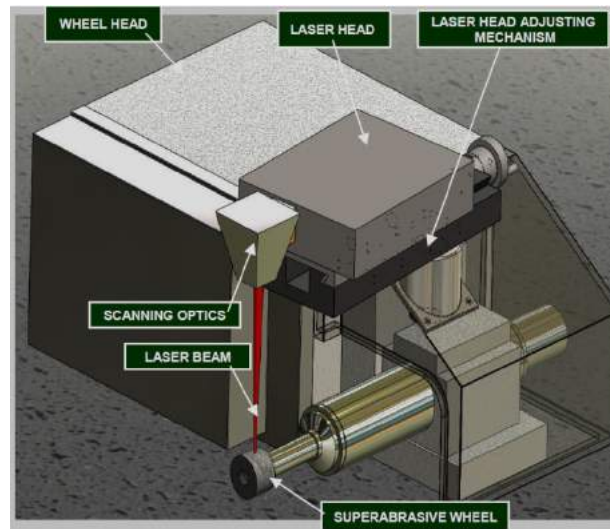
- Automation concepts in sheet metal bending, laser and water jet machining
- Motion planning of multiple robots for cooperative and coordinated manipulation
- Reverse engineering of PLC control programs
- Tool path generation for complex surface machining

## Advanced Machining Processes

- Development of Next Generation Precision Grinding Machine Tool
- Laser Dressing of Super abrasive Grinding Wheels
- Macro and micro abrasive waterjet machining
- Ice bonded abrasive polishing process
- Grinding of brittle materials



**Motion planning of Multiple Robots**



**Laser Dressing of Grinding wheel**



**Micro abrasive waterjet machining**





Dr. Ramkumar Penchaliah

Ph.D., University of Southampton, UK

Assistant Professor, Dept. of Mechanical Engineering

044-22574816; ramkumar@iitm.ac.in

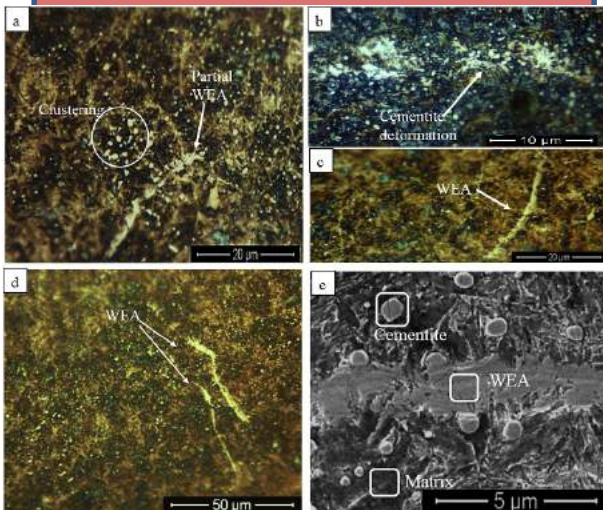
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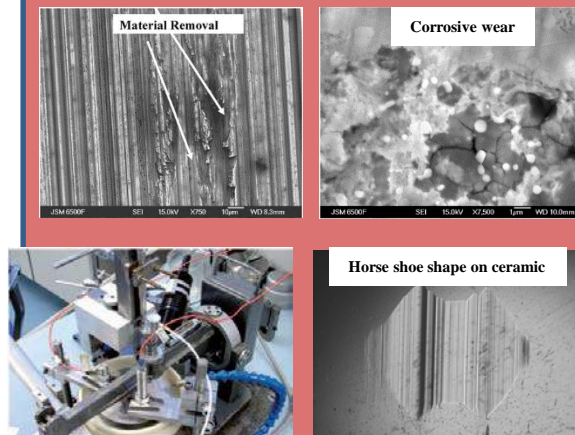
## Major Areas of Research

- Automotive Tribology and Tribo design of Machine Components
- Wind Turbine Gearbox Bearing Failures (WEC)
- Surface Engineering : Surface Texture and Coatings (Bio-implants/PRCL)
- Wear Simulation models for Prediction

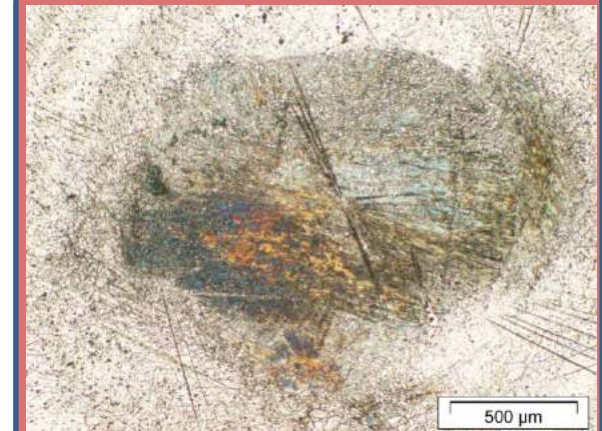
### WEA Formation



### Contaminants Effects



### Failed DLC Tappet





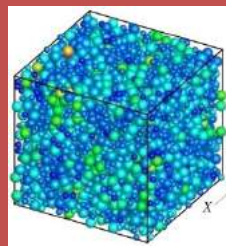


**Dr. Ratna Kumar Annabattula**  
Ph. D., University of Groningen, The Netherlands  
Associate Professor, Mechanical Engineering  
044-2257-4719; [ratna@iitm.ac.in](mailto:ratna@iitm.ac.in)  
<http://home.iitm.ac.in/ratna>

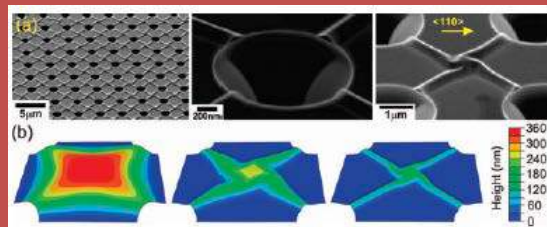


## Major Areas of Research

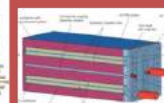
- Thermo-mechanics of Granular Materials
  - Nuclear fusion, Li-Ion batteries, Thermal energy storage
- Nature Inspired Microsystem Design
- Multi-Scale Modeling of Materials



Micromechanics of granular materials for nuclear fusion

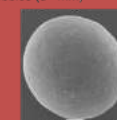


Spontaneous formation of three dimensional micro structures from pre-stressed thin films



Module of HCPB blanket ( ~m)

Pebbles (d ~mm)



Li4SiO4 (~500 μm)

Development of novel meso-scale computational techniques to bridge the micro and continuum length scales

**Computational Solid Mechanics for Sustainable Energy and Microsystem Design**



# Dr. G. L. Samuel

Professor

Manufacturing Engineering Section  
Department of Mechanical Engineering

Email: samuelgl@iitm.ac.in;

Web: <http://mech.iitm.ac.in/Faculty/gls/home.php>

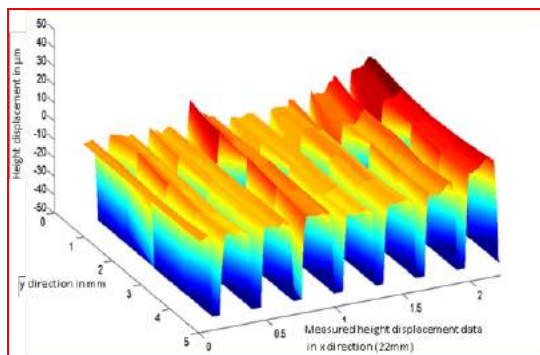


## Research Areas

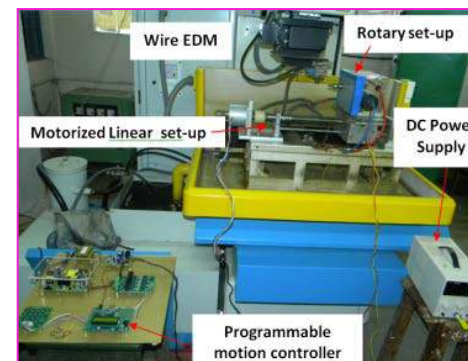
- Micro machines – process modeling
- Metrology and Computer Aided Inspection – measurement and evaluation of surface characteristics
- Wire Electrical Discharge Machining – study of machining process and characterization



Micro Machining set-up



3D profiles measured using Capacitance sensor



Wire EDM Turning set-up



Dr. Sateesh Gedupudi

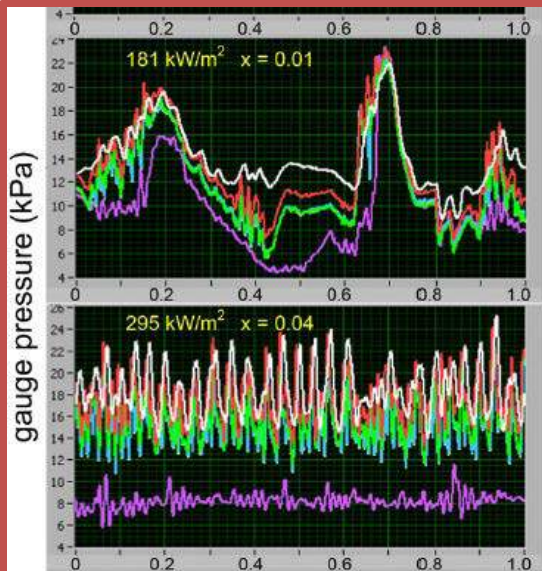
Ph.D., IIT Madras, India

Assistant Professor, Mechanical Engineering

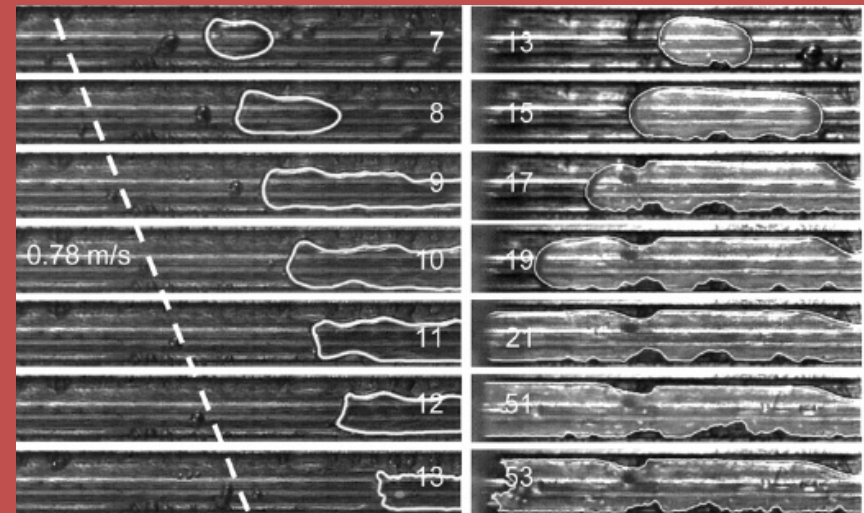
044-2257-4721; sateeshg@iitm.ac.in



- Phase-change heat transfer(flow boiling and pool boiling) and flow instabilities
- Heat exchangers
- Non-conventional energy sources



Local pressure fluctuations at different axial positions in a microchannel



Video images of bubble growth in a 0.6 mm  $D_h$  channel (a)without inlet compressibility and (b) with inlet compressibility (flow reversal)



# Sathyan Subbiah

Associate Professor, Department  
of Mechanical Engineering, IIT



Ph. D., 2006, Georgia  
Institute of Technology

M. S., 2000, University of  
Illinois Urbana Champaign

B. Tech, 1997, Indian  
Institute of Technology  
Madras

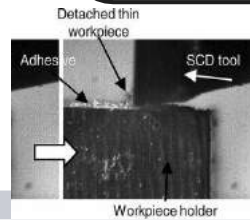
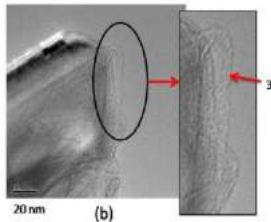
Email: [sathyans@iitm.ac.in](mailto:sathyans@iitm.ac.in)  
Phone: +91-44-2257-4669

## Expertise

- Machining (at all scales (meso, micro to nano))
- Abrasive polishing
- Experimental and process simulation

## Industry Related Experiences

- Worked in US-Automotive manufacturing industry for 3 years
- While in academia, collaborated/ing with following industries:
  - Aerospace (Rolls Royce Singapore)
  - Reliance Petrochemical
  - Ace Micromatic Grinding
  - Saint Gobain Research India
  - SVP Laser
  - Titan



**Machining**  
(at all scales  
(meso, micro  
to nano))

Graphene  
Exfoliation

Thin sheet film  
micro-machining

Large ship  
propeller



# Prof. A. Seshadri Sekhar

## PHD, IIT Madras, India

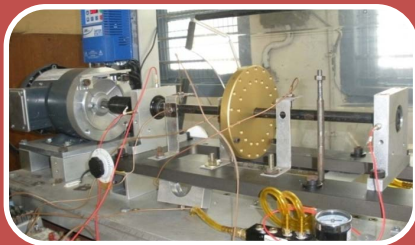
Professor, Dept. of Mechanical Engineering

044-2257-4709; [as\\_sekhar@iitm.ac.in](mailto:as_sekhar@iitm.ac.in)

[http://www.iitm.ac.in/component/faculty/78/as\\_sekhar/](http://www.iitm.ac.in/component/faculty/78/as_sekhar/)

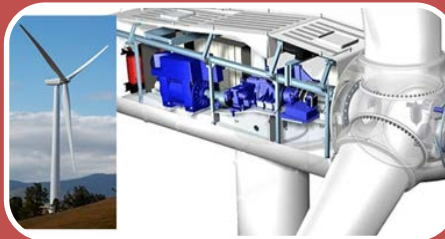


- Rotor Dynamics.
- Fault Identification and Condition Monitoring.
- Tribology- Rolling element bearings and Hydro dynamic bearings.



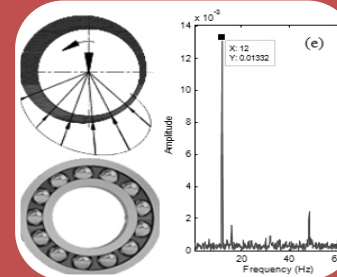
### Rotating machinery:

Composite shafts dynamics; Fault modeling and detection; MCSA



### Wind turbine:

Gearbox dynamics and condition monitoring



### Bearings & Seals:

RE bearing defects; Fluid film bearing roughness effects ; CFD of Seals





Dr. SHAMIT BAKSHI

PhD, IISc Bangalore, India

Professor, Dept. of Mechanical Engineering

044-2257-4700; [shamit@iitm.ac.in](mailto:shamit@iitm.ac.in)

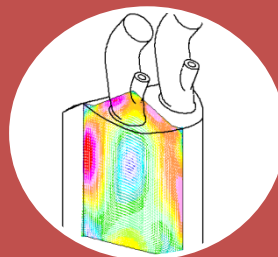
<http://www.iitm.ac.in/component/faculty/78/shamit/>



- Droplet processes (Droplet Evaporation, Droplet Impact)
- IC Engine process simulation
- Atomization and sprays



Marangoni convection during droplet evaporation can be utilized in micro-mixing



Simulation of flow and mixing processes in a gasoline direct injection engine



Atomization of liquid sheet from a impinging jet injector

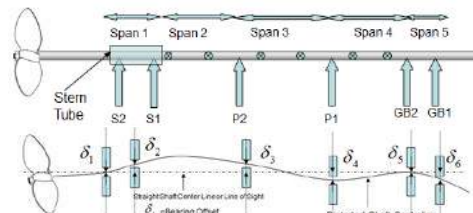
**DROPLET AND SPRAY PROCESSES IN ENGINES AND OTHER APPLICATIONS**



**Dr. Shankar Krishnapillai**  
**PhD, University of Oxford, UK**  
 Professor, Dept. of Mechanical Engineering  
 044-2257-4701; skris@iitm.ac.in



- Optimization Methods
- Vibrations
- Machine Design
- Socially Relevant Technology



### Optimization Methods:

1. Multi-Objective Optimization
2. Improved Algorithms
3. Hybrid methods
4. Applications to Machine Design, Dynamics problems.

### Vibrations:

1. Structural Dynamics
2. Machine Dynamics
3. Vibration Control
4. Inverse problems and Health Monitoring

### Machine Design:

1. General Machine Design
2. Design for Socially Relevant Applications
3. Alternative Energy for Rural applications.



# Dr. SHYAMA PRASAD DAS

## PHD, INDIAN INSTITUTE OF SCIENCE, INDIA

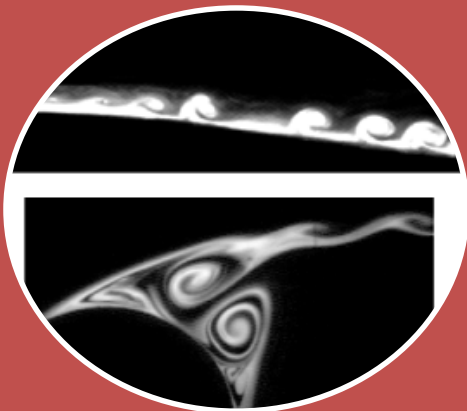
Asst. Professor, Dept. of Mechanical Engineering

044-2257-4667; [spdas@iitm.ac.in](mailto:spdas@iitm.ac.in)

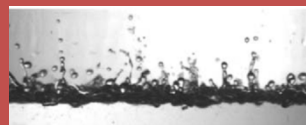
<http://mech.iitm.ac.in/Faculty/sydas/home.php>



- Unsteady Hydrodynamics, Aerodynamics and Turbomachines
- Interfacial Hydrodynamics and Transport
- Phase Change Heat Transfer in Mini System



Hydrodynamic instability and boundary layer separation



Gravity and capillary waves



Pulsating heat pipe





# Dr. Somashekhar S. Hiremath

Associate Professor, Department of Mechanical Engineering

044-2257-4681; somashekhar@iitm.ac.in

<http://mech.iitm.ac.in/PEIL%20HOME%20PAGE/Members/Prof.Somasekhar/Soma%20sekhar.html>



## Areas of Research

- Fluid Power System : Electro hydraulic Servovalves, Autonomous Actuators, Hydraulic Hybrids
- Micromachining : Micro-EDM, Micro ECSM, Micro-AJM, Micro-HAJM
- Mechatronic System : Sensor and Actuator Integration to Precision Mechanical System
- Robotics : Trajectory Planning and Control, Obstacle Avoidance etc
- Modeling & Simulation : Optimization of process parameters



**Abrasive Flow Machine for Producing Nano level Finish on Complex and Inaccessible Internal Features**



**Micro-ECSM: Hybrid Machining Approach for Machining a Non-conducting Engineering Materials**



**Micro-EDM for Micro-machining of Holes and Channels for Micro Fluidic Applications & New Approach for Nano Particle Generation**

[Back to Top](#)

Cutting-edge Interdisciplinary Research Activities and Provide Technology Transfer and Consultancy Services to Industry and Governmental agencies



# Dr. S. Soundarapandian

## PHD, Southern Methodist University, USA

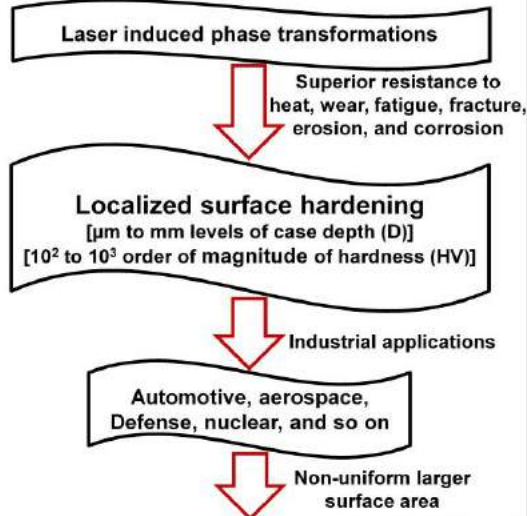
Assistant Professor, Dept. of Mechanical Engineering

044-2257-4718; [sspandian@iitm.ac.in](mailto:sspandian@iitm.ac.in)

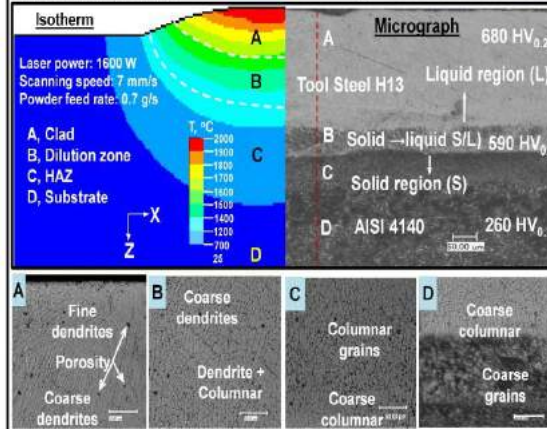
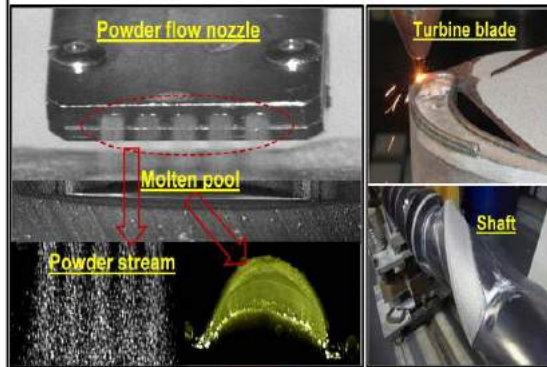
<http://www.iitm.ac.in/component/faculty/78/sspandian/>



### Laser surface hardening



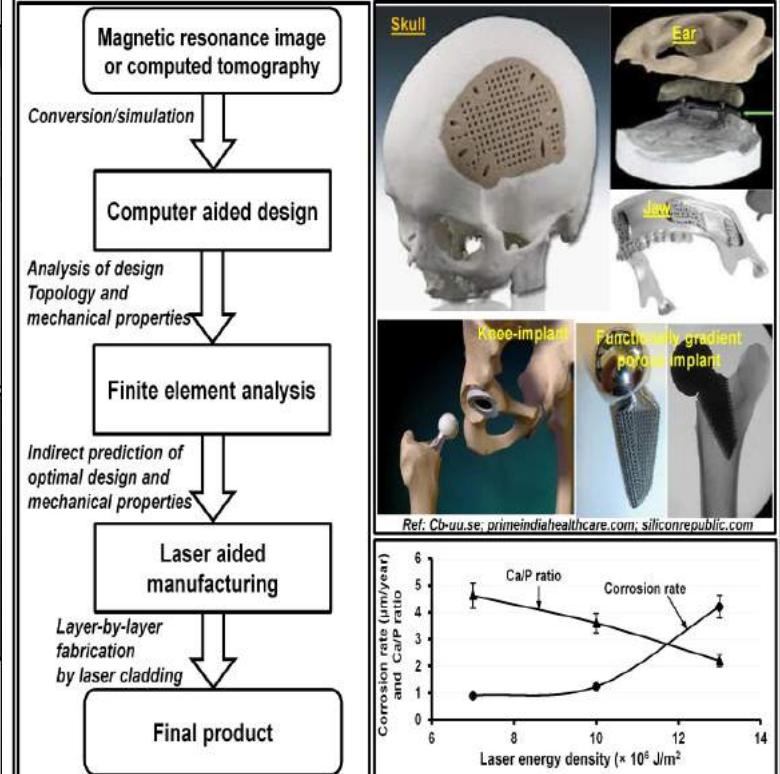
### Direct diode laser wear-resistant cladding



## *"Laser is an answer in search of a question"*

### Research focus: Laser-aided surface engineering (LASE)

#### Laser-aided manufacturing of bio-degradable functionally gradient porous implants





# Sourav Rakshit

Assistant Professor, Mechanical Engineering

204 Machine Design Section

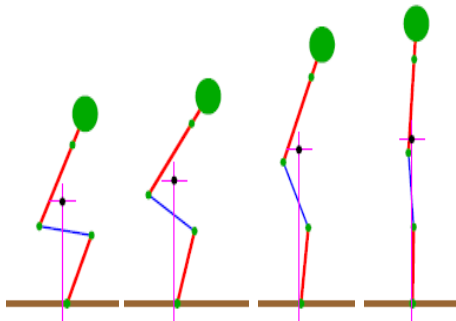
srakshit@iitm.ac.in

+91-044-22574693

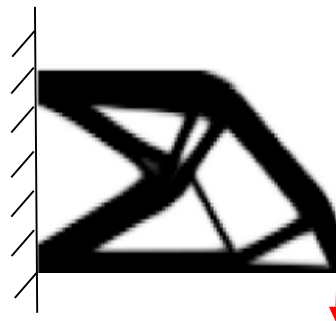
<https://mech.iitm.ac.in/meiitm/personnal/sourav-rakshit/>



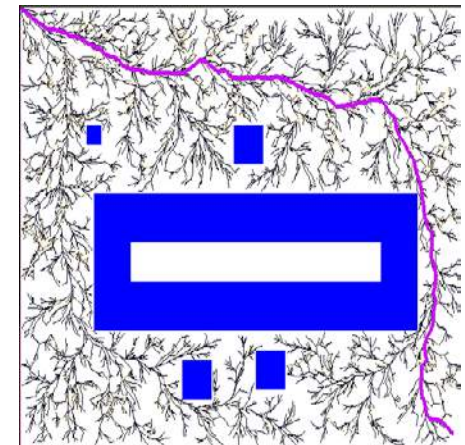
Optimization in biomechanics



Topology optimization



Robotics and motion planning





# Dr. Srikrishna Sahu

## PhD, Imperial College London, UK

Assistant Professor, Mechanical Engineering

044-2257-4713; ssahu@iitm.ac.in



- Optical experimental methods for two-phase flow and combustion research: ILIDS, PIV, PLIF, Optical Connectivity
- Spray-turbulence interaction, spray evaporation, liquid jet atomization
- Image processing, POD analysis

ILIDS

PIV



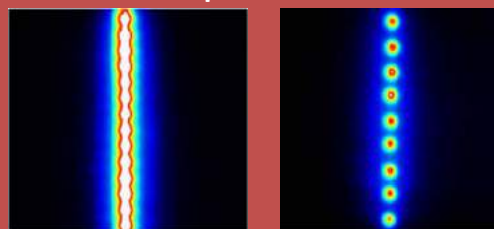
+



Simultaneous droplet size, velocity, number density and gas velocity around each droplet in a spray

Droplet Evaporation

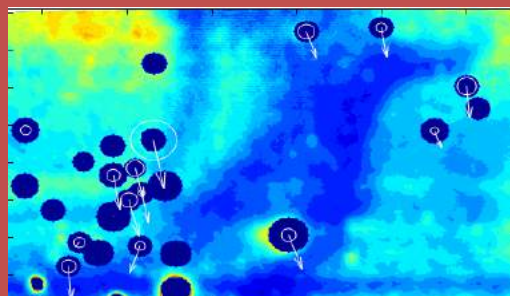
Droplet stream



D : 200  $\mu$ m

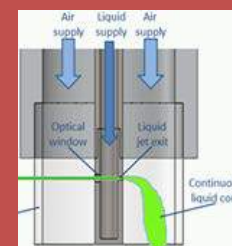
D : 50  $\mu$ m

Spray

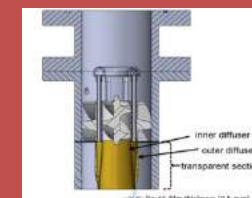
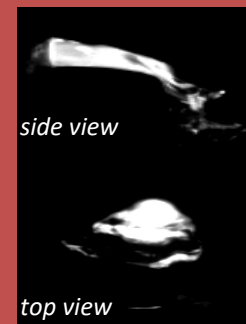


D : 15-100  $\mu$ m

Liquid jet atomization



Cross flow atomizer



Swirling flow atomizer





Dr. K. SRINIVAS REDDY

Ph. D., IIT Delhi, India

Professor, Dept. of Mechanical Engineering

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<http://mech.iitm.ac.in/Faculty/ksr/home.php>



- Solar Energy Conversion/ Concentration Solar Power Technologies
- Estimation & Measurement of Thermo-physical Properties/Thermal Conductivity
- Energy & Environment/ 4E (Energy–Exergy–Environmental–Economic) Analyses



Design and Development of Solar Parabolic Dish Cavity Receiver Systems for Power Generation and Hydrogen Production



Integration and Optimization of High Performance Solar Concentrating Photovoltaic Systems for Cogeneration and Tri-generation



Estimation of effective thermal conductivity of two-phase engineering materials



# Dr. K. Srinivasan

## PhD, IIT Kanpur, India

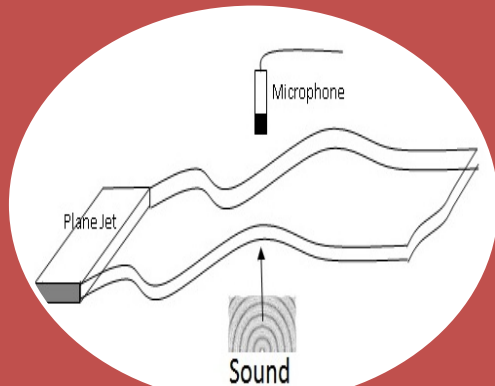
Professor, Dept. of Mechanical Engineering

+91 (44) 2257-4703; [ksri@iitm.ac.in](mailto:ksri@iitm.ac.in)

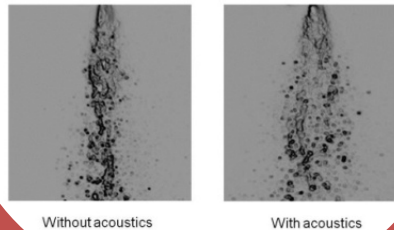
<http://goo.gl/w6f6x>



- Jet Flow and Noise
- Active and Passive Control of Flow, Noise and Combustion
- Resonant Acoustics



JET FLOW & ACOUSTICS



FLOW CONTROL



RESONANT ACOUSTICS





Dr. Sujatha Chandramohan

PHD, IIT Madras, India

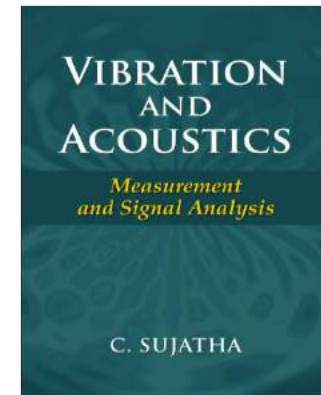
Professor, Dept. of Mechanical Engineering

044-2257-4682; sujatha@iitm.ac.in

<http://www.iitm.ac.in/component/faculty/78/sujatha>



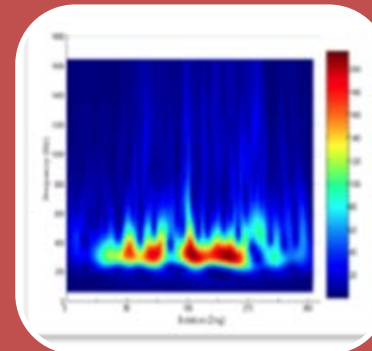
- Vehicle Dynamics
- Machine Dynamics
- Vibration Signal Analysis
- Human Body Vibration



RIDE & HANDLING OF  
ROAD, OFF-ROAD AND  
RAILWAY VEHICLES



MACHINERY CONDITION  
MONITORING



INSTRUMENTATION &  
SIGNAL ANALYSIS



HAND ARM VIBRATION

**VIBRATION, ACOUSTICS AND SIGNAL ANALYSIS**

[Back to Top](#)





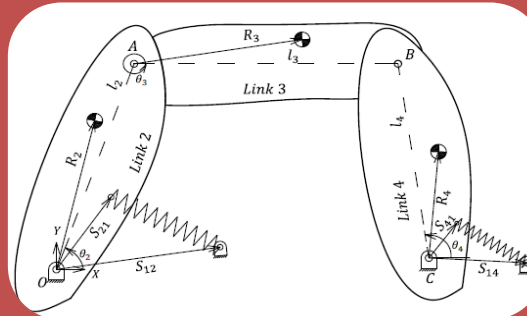
**Dr. Sujatha Srinivasan**  
**PhD, The Ohio State University, USA**  
Associate Professor, Dept. of Mechanical Engineering  
044-2257-4728/5695; [sujsree@iitm.ac.in](mailto:sujsree@iitm.ac.in)  
<https://home.iitm.ac.in/r2d2>



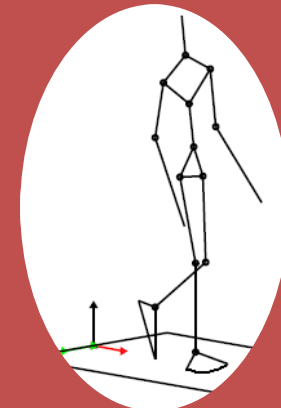
- Prosthetics, Orthotics and Assistive Devices
- Mechanisms
- Movement Biomechanics



Standing Wheelchair



Mechanisms



Biomechanics

FOCUS: Rehabilitation Research and Device Development (R2D2)



# Dr. Sundararajan Natarajan

## PhD, Cardiff University, Wales, UK

Associate Professor, Mechanical Engineering

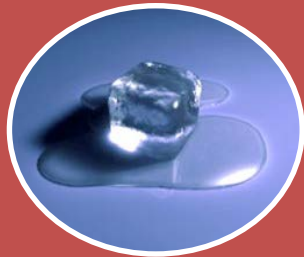
044-2257-4656; [snatarajan@iitm.ac.in](mailto:snatarajan@iitm.ac.in)

<http://home.iitm.ac.in/snatarajan>

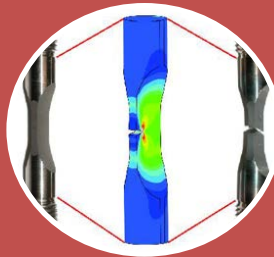


### Major Areas of Research

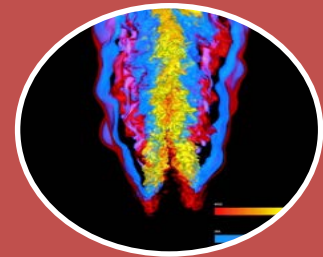
- Free and moving interfaces
- Multi-field coupled problems
- Computational Mechanics (FEM, XFEM, Meshless, Isogeometric analysis, Polygonal FEM, Scaled Boundary FEM)
- Multiscale methods



Melting/Solidification



Growth of flaw leading  
to complete failure



Flame front  
propagation

Leverage the centrality of mathematical formulations to have an impact in variety of fields

[Back to Top](#)



**Dr. Sushanta Kumar Panigrahi**

**PHD, IIT Roorkee, India**

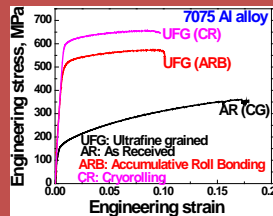
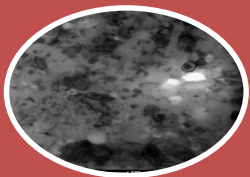
Associate Professor, Dept. of Mechanical Engineering

044-2257-4742; skpanigrahi@iitm.ac.in

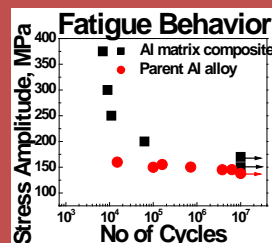
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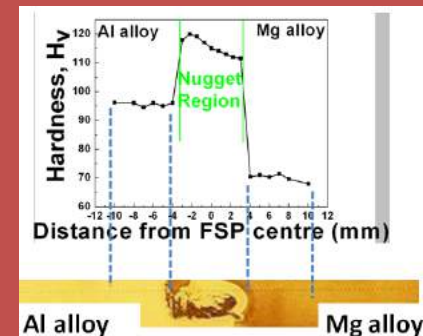
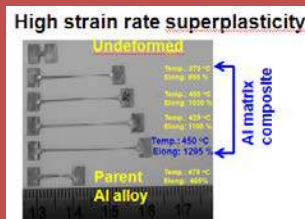
- **Development /manufacturing of advanced materials**  
(Bulk ultrafine/nano grained materials, metal matrix composites, nano composites, high strain rate superplastic materials, advanced materials as per design etc.)
- **Fundamental behavior of advanced materials**  
(Materials characterization, mechanical properties and machining related studies)
- **Joining and processing of similar and dissimilar materials**



Properties of Bulk  
UFG/Nano Materials



Behavior of Metal Matrix  
Nano Composites



Joining and Processing of Similar  
& Dissimilar Materials by Solid  
State Processes



Dr. S Varunkumar  
Assistant Professor, Mechanical Engineering  
044-2257-4717; varuns@iitm.ac.in



## Major Areas of Research

- Biomass gasification and combustion
- CO kinetics and emission prediction
- Combustion instability in solid rocket motors

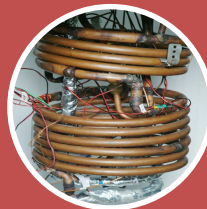


**Dr. G. Venkatarathnam**  
Professor of Mechanical Engineering  
044-2257-4685; gvenkat@iitm.ac.in



## Major Areas of Research

- Development of new generation of refrigerators and liquefiers
- Mixed refrigerant processes, refrigerant mixtures, low GWP refrigerants
- High efficiency heat exchangers, Thermodynamics, Process Simulation



Patents on Mixtures, new  
mixed refrigerant liquefiers,  
refrigerators

Organic Rankine  
Cycle based small  
power plants

Cooling of telecom  
equipment

Development of next generation Refrigeration Systems and Refrigerants





# Dr. Vishal V. R. Nandigana

PHD, University of Illinois at Urbana-Champaign, USA

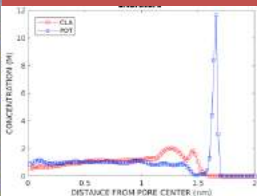
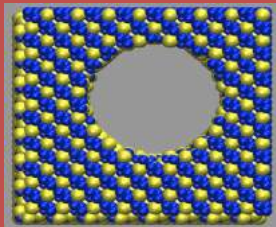
Assistant Professor, Dept. of Mechanical Engineering

044-2257-4668; nandiga@iitm.ac.in

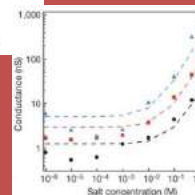
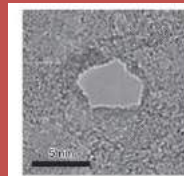
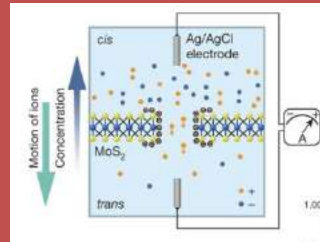
<https://home.iitm.ac.in/nandiga/index.html>



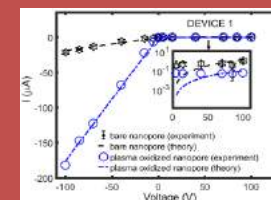
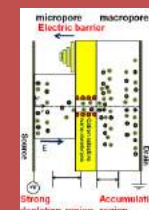
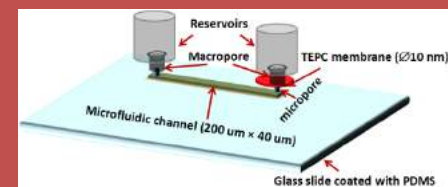
- Computational Nanofluidics – Understanding fundamental ion transport in solid-state nanochannels and nanopores.
- Nanomaterials – Energy harvesting using advanced 2D MoS<sub>2</sub> nanomaterials.
- Nano circuits - Nanofluidic based circuits like nanofluidic diodes for sensor applications.



**Computational  
nanofluidics**



**Nanomaterials**



**Nano circuits**

**BROAD DESCRIPTION OF THE BANDWIDTH/AREA OF RESEARCH**



INDIVIDUAL FACULTY PROFILE

# DEPARTMENT OF METALLURGICAL AND MATERIALS ENGINEERING

# LIST OF FACULTY

[Ajay Kumar Shukla](#)

[Anand K Kanjarla](#)

[Balasubramanian M](#)

[Bhattacharya S.S](#)

[Gandham Phanikumar](#)

[Ganesh Sundara Raman S](#)

[Hari Kumar K.C](#)

[Janaki Ram G.D](#)

[Kamaraj M](#)

[Lakshman Neelakantan](#)

[Manas Mukherjee](#)

[Murty B.S](#)

[Murugaiyan Amirthalingam](#)

[Parasuraman Swaminathan](#)

[Pradeep K G](#)

[Prathap Haridoss](#)

[Ranjit Bauri](#)

[Ravi Kumar N.V](#)

[Ravi Sankar Kottada](#)

[Sabita Sarkar](#)

[Sampath V](#)

[Sampath Kumar T.S](#)

[Sankaran S](#)

[Satyesh Kumar Yadav \(Profile yet to be uploaded\)](#)

[Somnath Bhattacharyya](#)

[Sreeram K Kalpathy](#)

[Srinivasa Rao Bakshi](#)

[Subramanya Sarma V](#)

[Sundararajan G](#)

[Tiju Thomas](#)

[Uday Chakkingal](#)



**Dr. Ajay Kumar Shukla**

Assistant Professor, Metallurgical and Materials Engineering

044-2257-4762; shukla@iitm.ac.in



## **Major Areas of Research**

- **Process modeling, control and optimization of iron and steelmaking.**
- **Computational thermodynamics and its application to high temperature metallurgical processes.**
- **Application of Artificial Intelligence (ANN, GA) to metallurgical processes.**



# Dr. Anand K. Kanjarla

Assistant Professor, Metallurgical and Materials Engineering

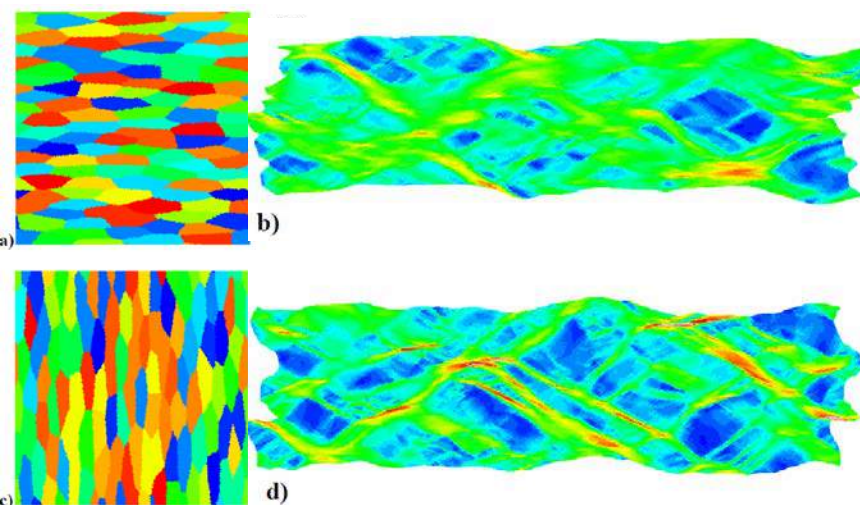
044-2257-4753; kanjarla@iitm.ac.in



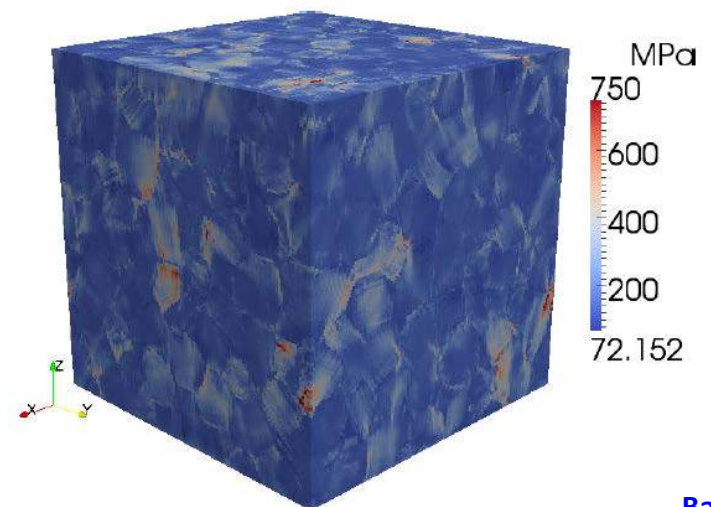
## Major Areas of Research

- Micromechanical modelling of polycrystalline materials.
- Mechanical anisotropy of materials : crystallographic texture
- Mechanics of irradiated microstructures

Effect of grain morphology on shear band formation in an Aluminum alloy



Occurrence of stress concentrations close to grain boundaries in deformed Zirconium sample







# Dr. M. Balasubramanian

Professor, Metallurgical and Materials Engineering

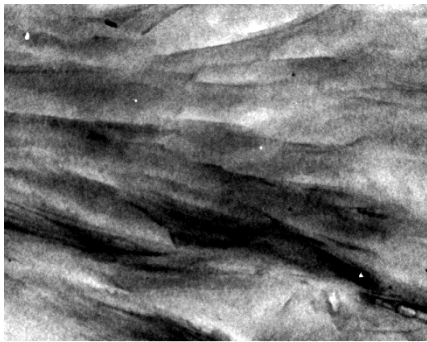
044-2257-4767; mbala@iitm.ac.in

<https://mme.iitm.ac.in/mbala/>



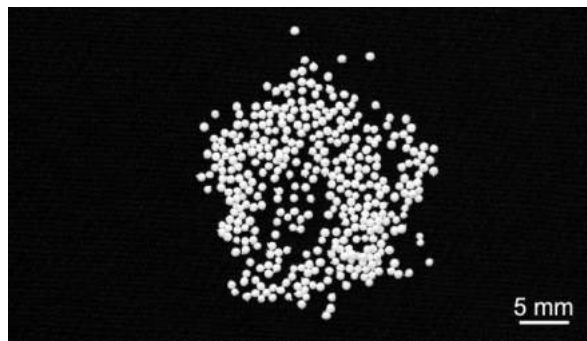
## Major Areas of Research

- Processing of advanced ceramics
- Processing of composite materials including nanocomposites



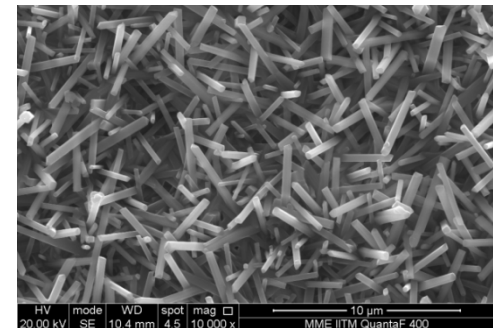
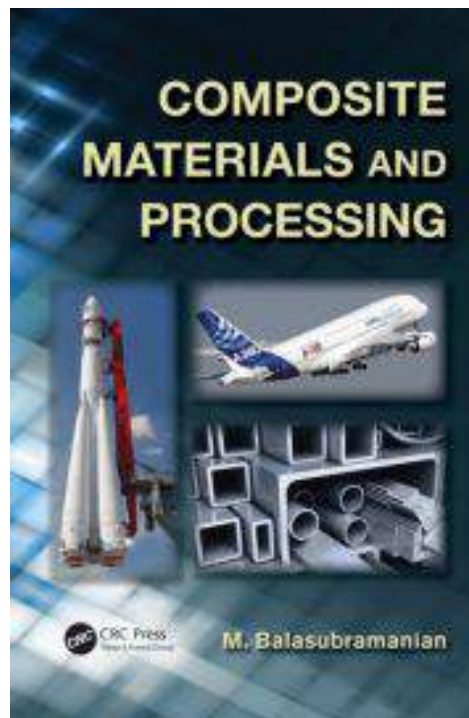
100 nm

Clay-polyester nanocomposite

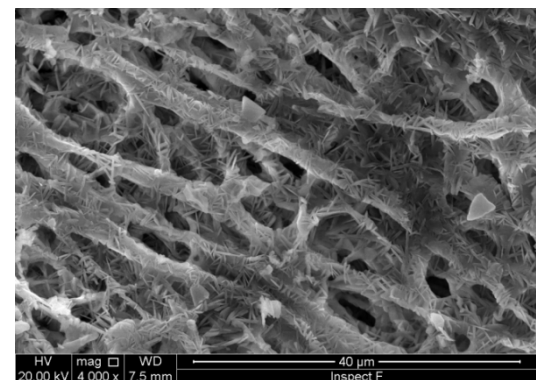


5 mm

Alumina-zirconia minispheres



Microstructure of porous mullite



Alumina platelets formed on egg-shell membrane bio-template

[Back to Top](#)



# Prof. S.S. Bhattacharya

Nano Functional Materials Technology Centre,  
Materials Testing Facility – Materials Forming Lab  
Department of Metallurgical & Materials Engineering

Ph.: +91 44 2257 4765 Email: ssb@iitm.ac.in  
<http://mme.iitm.ac.in/ssb>

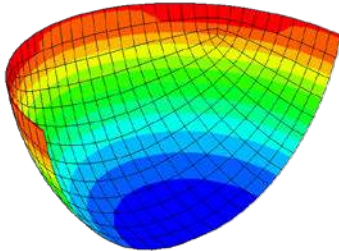


Major areas of research:

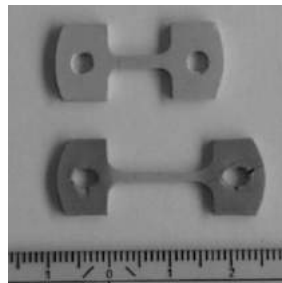
- Synthesis, Consolidation and Sintering of nanostructured materials
- Characterisation of Structural and Functional Nanocrystalline Ceramics
- Superplasticity (SP) and Superplastic Forming (SPF) of Materials
- Metal Forming and Mechanical Behaviour of materials



SPF of Ti-6Al-4V



SPF – FE Modeling



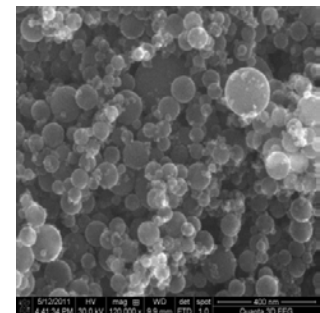
SP of nano zirconia



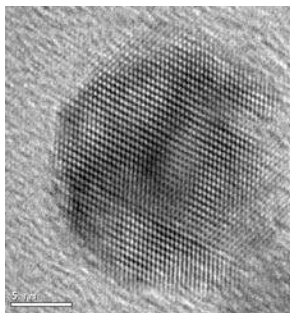
SPF/DB of nanoceramics



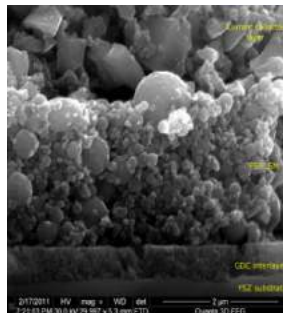
Chemical vapour synthesis set-up (top)  
Flame synthesis set-up (bottom)



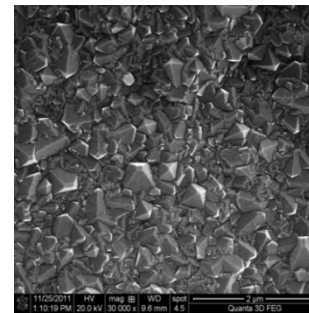
Nanocrystalline  
alumina



A nanotitania  
particle



Nano LSM for  
fuel cells



NCD coating  
on tool





**Dr. Gandham Phanikumar**  
**Professor, Metallurgical and Materials Engineering**  
044-2257-4770; gphani@iitm.ac.in



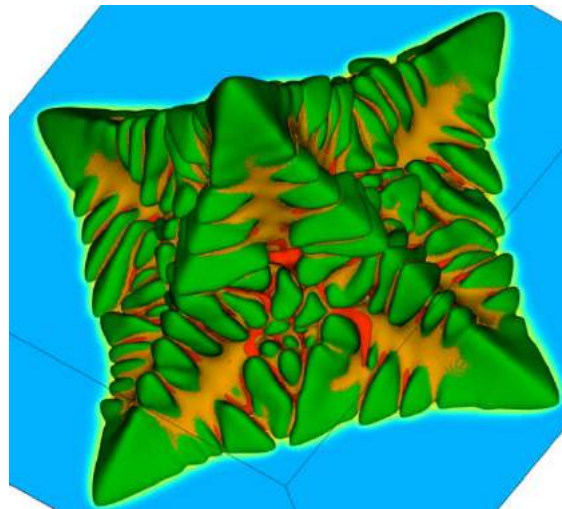
Major Areas of Research

- Solidification – experiments & modeling
- Phasefield simulation of microstructure evolution
- Materials Joining

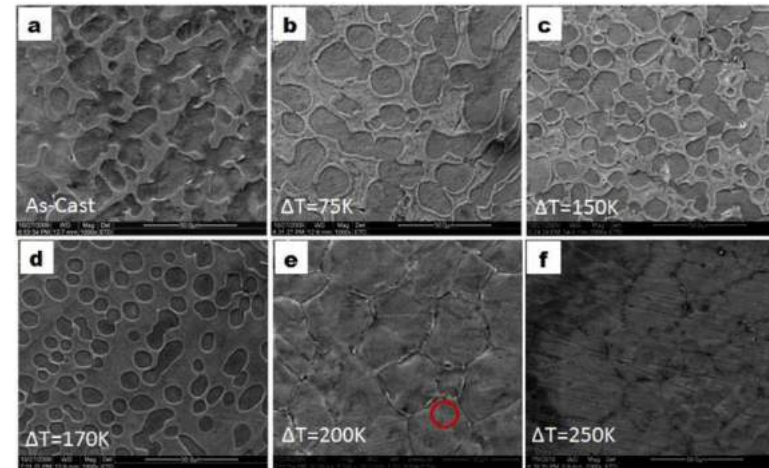
**Electromagnetic Levitation  
for undercooling**



**3D simulation of dendrite**



**Microstructure evolution**



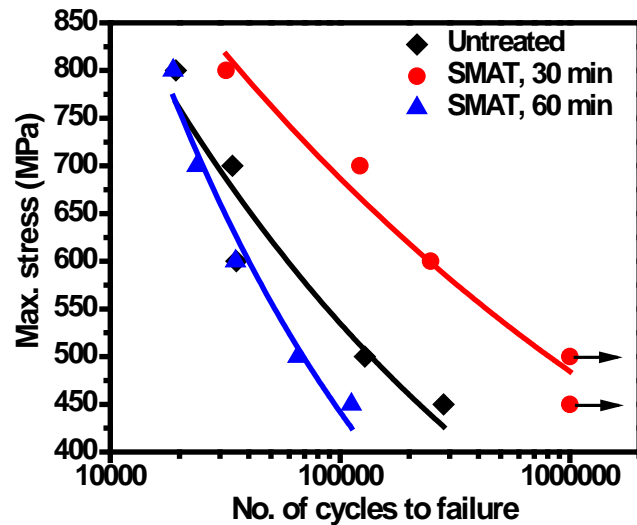


# Dr. S. Ganesh Sundara Raman

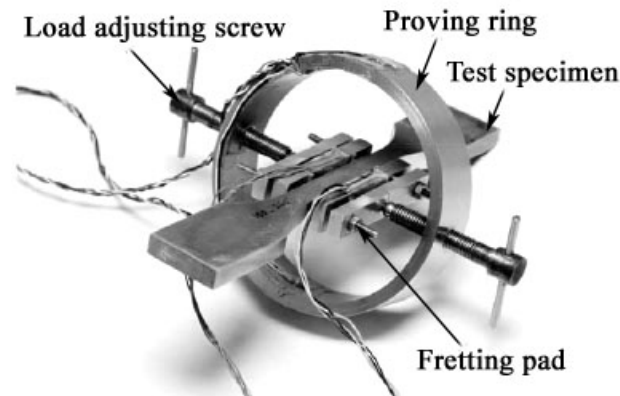
Professor, Metallurgical and Materials Engineering  
044-22574768; ganesh@iitm.ac.in



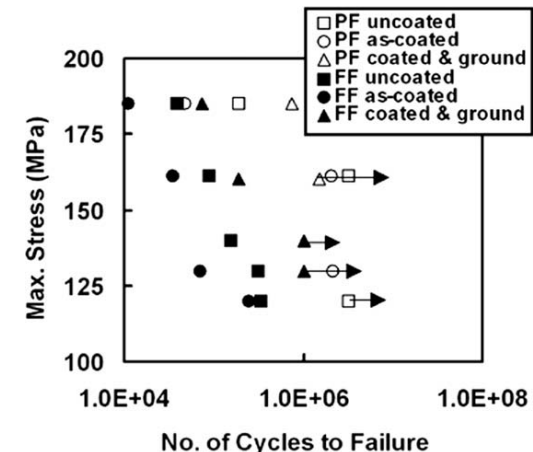
- Fatigue Behaviour of Materials and Weldments
- Fretting Fatigue and Fretting Wear
- Surface Modification, Coatings and Thermal Spray Processing



Effect of Surface Mechanical Attrition Treatment (SMAT) on Fatigue Lives of Ti-6Al-4V



Fretting Pads and Proving Ring Assembly used in Fretting Fatigue Testing



Effect of Grinding on Plain Fatigue (PF) and Fretting Fatigue (FF) Lives of AA 6061

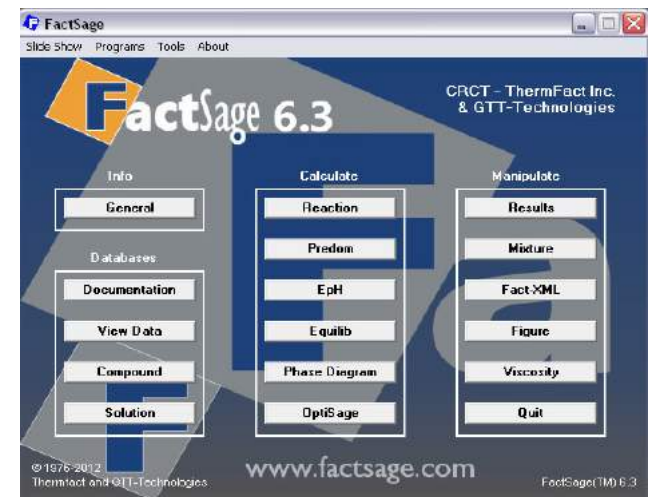
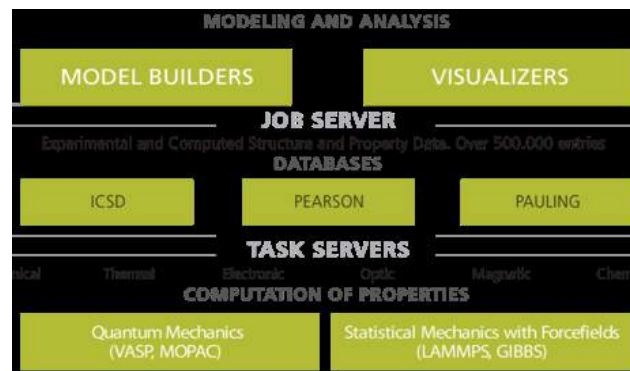
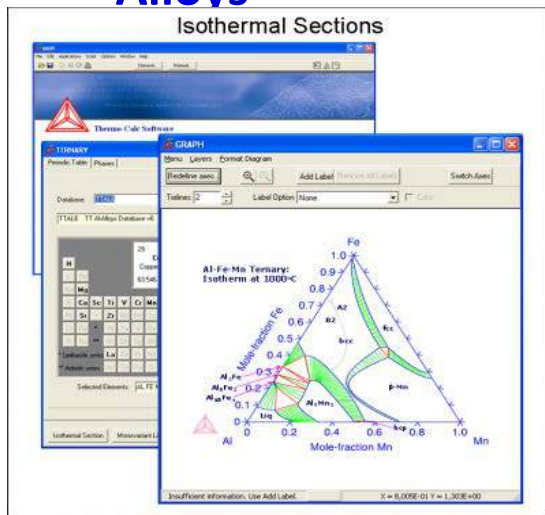


**K.C. Hari Kumar**  
Professor, Metallurgical and Materials Engineering  
044-2257-4766; kchkumar@iitm.ac.in



## Major Areas of Research

- Gibbs Energy Modelling of Materials Employing Calphad
- Applications of Density Functional Theory in Materials Science
- Modelling of Diffusion Controlled Transformations in Ferrous and Non-ferrous Alloys







**Dr. G.D. Janaki Ram**

Professor

Materials Joining Laboratory

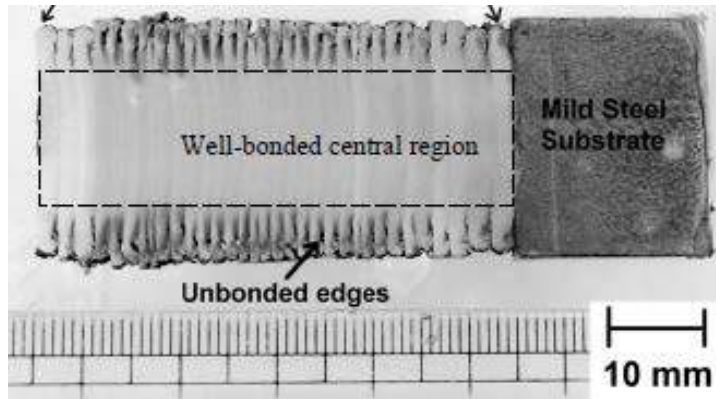
Metallurgical and Materials Engineering

IIT Madras, Chennai 600 036, India

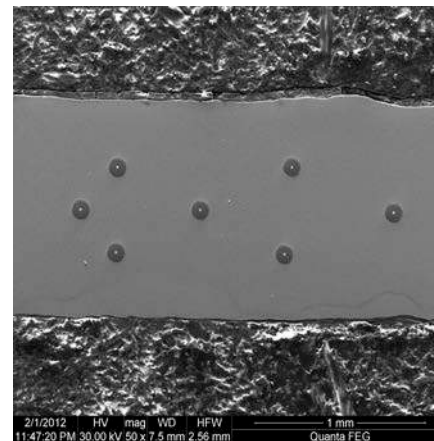
+91-44-22574780, +91-9840597364, jram@iitm.ac.in



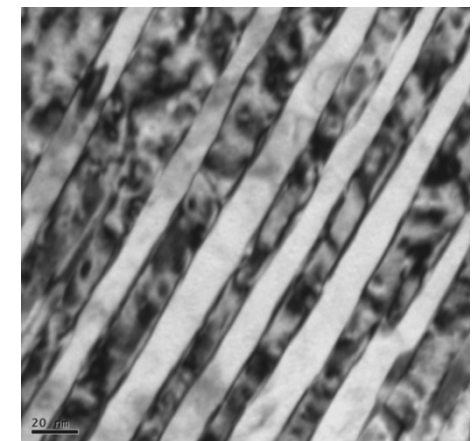
**Research Interests: Welding, Additive manufacturing, Failure analysis**



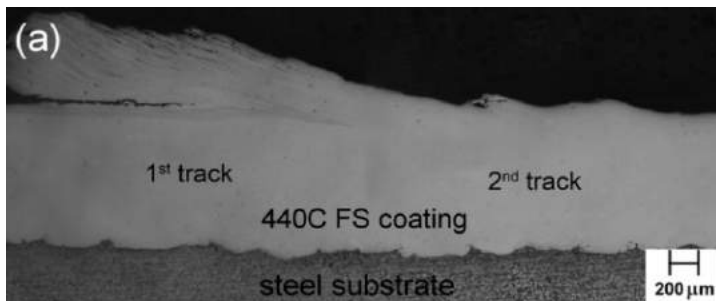
**Additive manufacturing with  
friction processes**



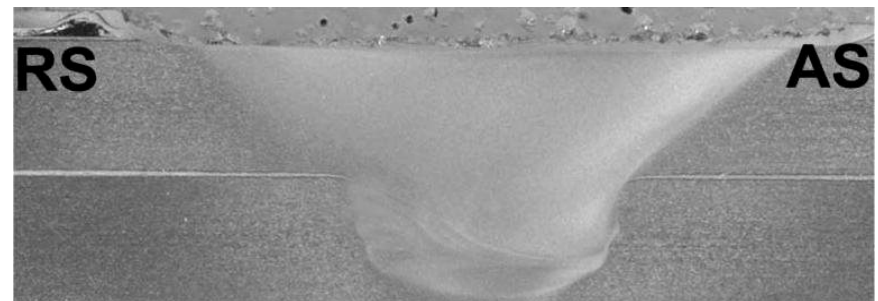
**SiC fiber reinforced  
titanium composite**



**Carbide-free bainite,  
armor steel weld**



**Multi-track friction surfaced coating**



**Friction stir seam weld, AA 2014-T4**



**Dr. M. Kamaraj**

Professor, Metallurgical and Materials Engineering

044-2257-4768; kamaraj@iitm.ac.in

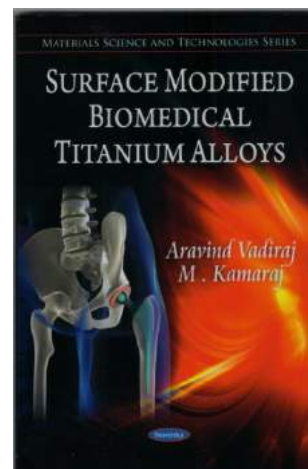


## Major Areas of Research

- Life enhancement of power plants (thermal/hydro/nuclear) components by surface coatings
- Development of coatings for Bio-implants
- Wear properties: Correlations of Microstructure-process parameters

Slurry erosion wear test

### Sliding wear test (Pin-on-Disc)





**Dr. Lakshman Neelakantan**  
Associate Prof., Metallurgical and Materials Engineering  
044-2257-4786; [nlakshman@iitm.ac.in](mailto:nlakshman@iitm.ac.in)



## Major Areas of Research

- Corrosion characteristics of engineering materials and coatings
- Electrochemical behaviour of NiTi, NiTi-X Shape Memory Alloys (SMAs)
- Smart coatings for corrosion protection
- Electro-dissolution, -planarization and -deposition
- Micro and mechano electrochemistry
- Corrosion behaviour of Metallic Bipolar Plates



# Dr. Manas Mukherjee

Assistant Professor

Metallurgical and Materials Engineering

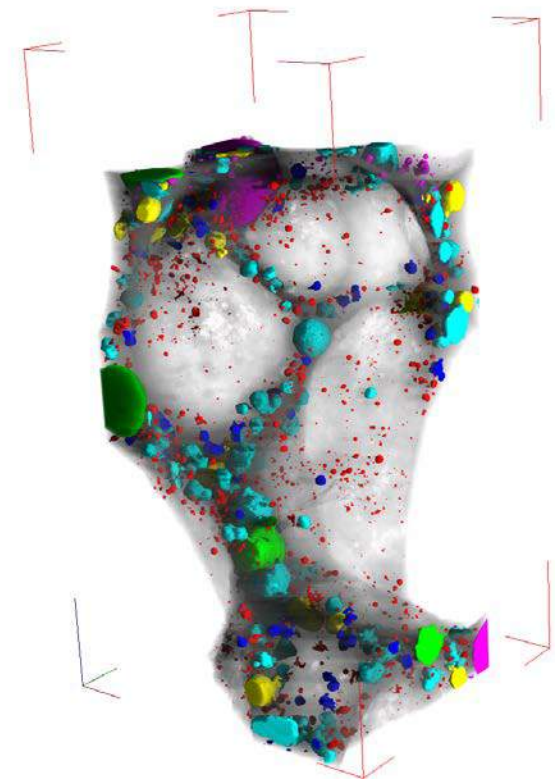
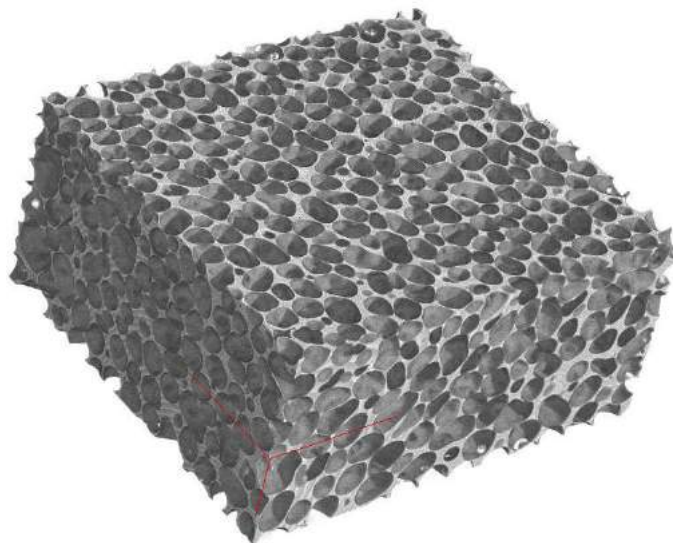
+91-44-2257-4782; manas.mukherjee@iitm.ac.in

<http://mme.iitm.ac.in/manas.mukherjee/>



## Major Areas of Research

- Metal foams - processing and characterization
- Physics of metal foaming
- X-ray tomography-based structural analysis







# Dr. B.S. Murty

Institute Professor, Metallurgical and Materials Engineering

044-2257-4754; murty@iitm.ac.in; www.mme.iitm.ac.in/murty

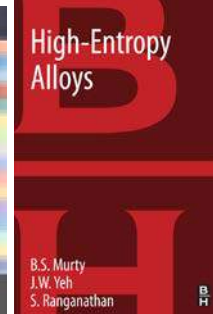
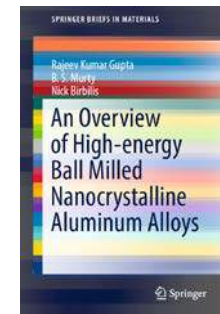
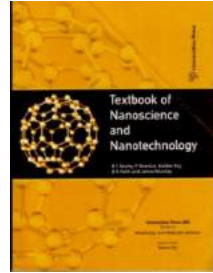


## Major Areas of Research

- Development of structural and functional nano materials
- Development of high entropy alloys and bulk metallic glasses
- In-situ metal matrix composites and metal foams

## Research Facilities in the Group

- Fritsch P-5 and Simoloyer high energy ball mills
- Spark plasma sintering and microwave sintering furnace
- Local Electrode Atom Probe (LEAP)
- TEM (Tecnai T12, T20)
- Dual Beam FIB (Helios)
- XRD (Panalytical)
- Nanoindenter (Hysitron)
- Dilatometer (up to 1650°C)
- DSC/TGA (up to 1500°C)



**Local Electrode  
Atom Probe**



**Spark Plasma  
Sintering**



[Back to Top](#)



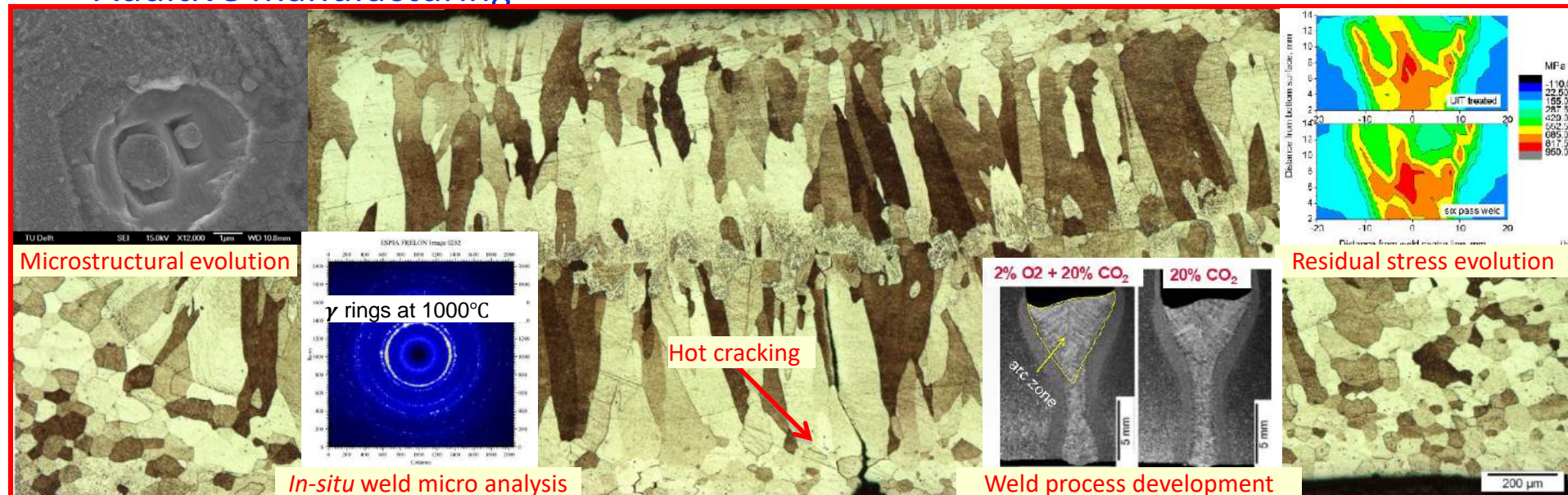


**Dr. Murugaiyan Amirthalingam**  
 Assistant Professor, Metallurgical and Materials Engg.  
 044-2257-4784; murugaiyan@iitm.ac.in  
<https://home.iitm.ac.in/murugaiyan/>



## Major Areas of Research

- Welding metallurgy and welding processes modelling
- Steel product development and thermomechanical processing
- *In-situ* 3D synchrotron X-ray diffraction and
- Additive manufacturing





# Dr. Parasuraman Swaminathan

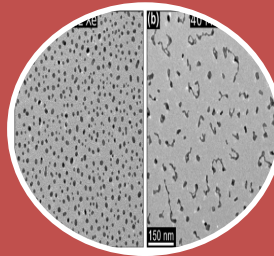
PhD, University of Illinois at Urbana Champaign, USA  
Associate Professor, Dept. of Metallurgy and Materials Engineering  
[swamnthn@iitm.ac.in](mailto:swamnthn@iitm.ac.in)



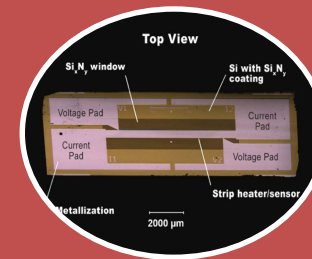
- Electronic Materials – semiconductor quantum dots
- Nanoparticle assembly by physical vapour deposition
- Nanocalorimetry - Phase transformation in thin metal/alloy films



LEDs, LASERs



Catalyst arrays



Nanocalorimetry –  
enthalpy measurements



# Dr.-Ing. K. G. Pradeep

PhD, RWTH Aachen University, Germany  
Assistant Professor, Dept. of Metallurgical and  
Materials Engineering

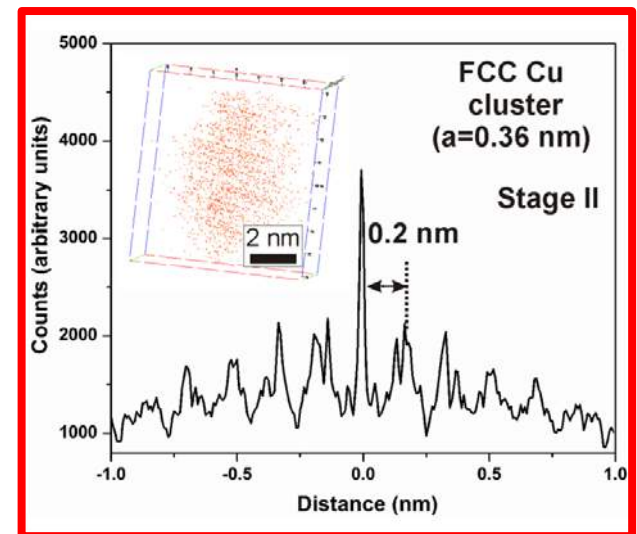
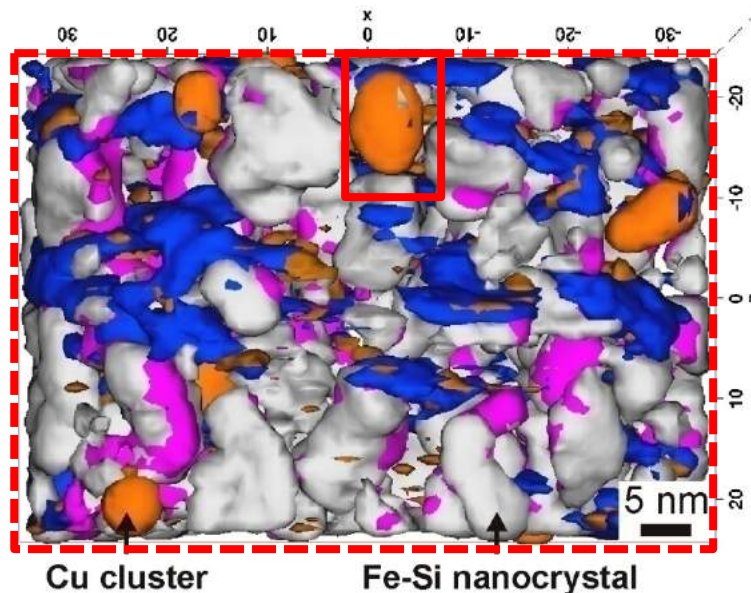
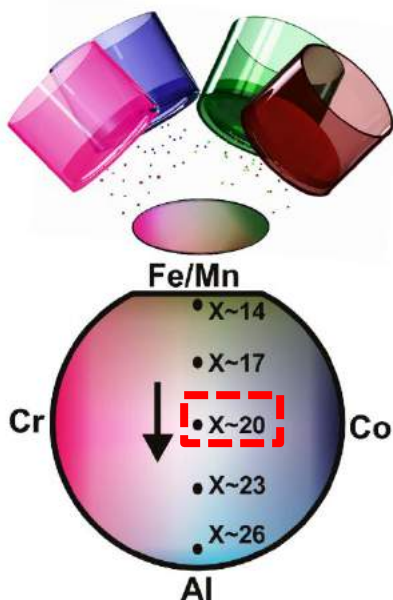
Tel: +91-(0)44-2257-4764

Email: kgprad@iitm.ac.in



- Combinatorial alloy design - Development of advanced, high strength materials.
- Magnetic materials - Rare-earth free permanent magnets and nanocrystalline soft magnets.
- Correlative microscopy - Methods for hierarchical nano-scale characterisation involving atom probe tomography and multiple electron microscopy methods.

## Combinatorial alloy design and near atomic scale characterization







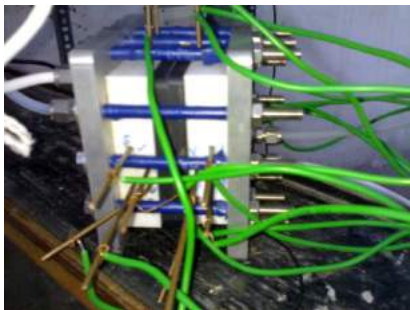
**Dr. Prathap Haridoss**  
Professor, Metallurgical and Materials Engineering  
044-2257-4771; prathap@iitm.ac.in



## Major Areas of Research

- **Proton Exchange Membrane (PEM) Fuel Cells: Materials and Technology**
- **Carbon Nanotubes (CNTs): Synthesis and Applications**

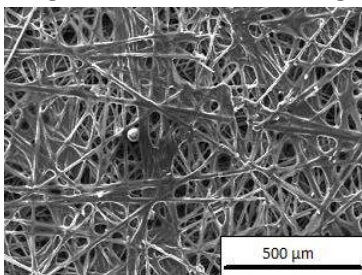
### PEM Fuel Cells



Segmented fuel cell testing



Fuel cell powered bicycle,  
using commercially available  
components

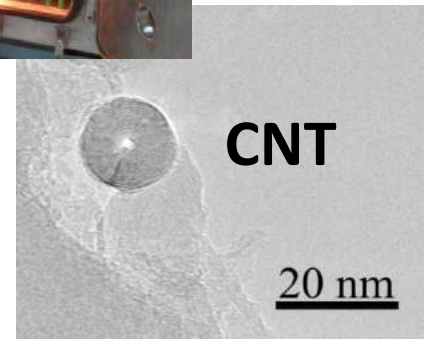
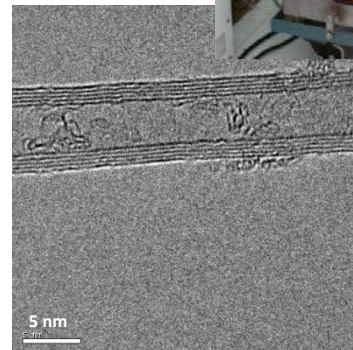


Enhanced Gas Diffusion Layer

### Carbon Nanotubes



Modified Arc  
Discharge method  
for synthesis of  
Carbon Nanotubes



Carbon Nanotubes in different orientations



# Dr. Ranjit Bauri

Professor

Dept. of Metallurgical and Materials Engineering

IIT Madras, Chennai 600 036

044-2257-4778; rbauri@iitm.ac.in



## Major Areas of Research

- Solid Oxide Fuel Cells (SOFC)
- Al and Ti based Metal Matrix Composites
- Friction Stir Processing (FSP)
- EBSD, Microstructure-Property Correlation

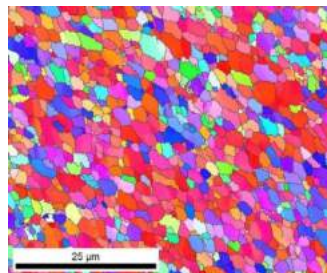
Impedance Analyzer



SOFC anode



FSP Microstructure of Al



Mini tensile tester







**Dr. rer. nat. Ravi Kumar, N. V**  
 Professor, Metallurgical & Materials Engineering  
 044-2257-4777; nvrk@iitm.ac.in  
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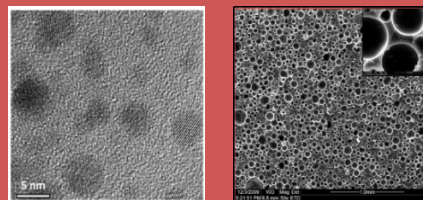
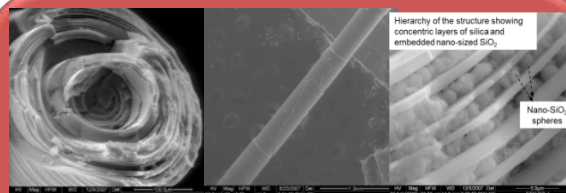
## Major Areas of Research

- Processing/design of molecular precursors for structural and functional applications (*Eg: UHT ceramics, transparent ceramics, thermoelectrics, coatings*)
- Biomaterials & biomimetics for technological applications (*Eg: Superhydrophobicity, adhesion studies*)
- Spectrochemical characterization (NMR, FTIR), structural characterization (*XRD, X-ray residual stress analysis, SEM, AFM, TEM*)
- Evaluation of properties: Creep, thermal shock, indentation fracture mechanics, novel mechanical testing techniques

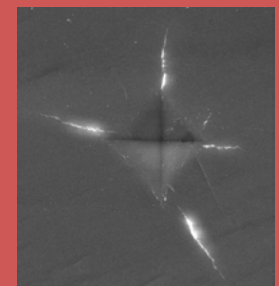
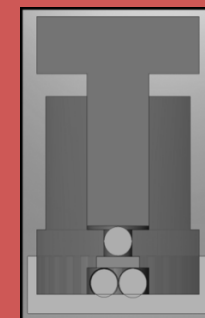
### Design of molecular precursors & ceramics

14 Si	40 Zr	41 Nb	42 Mo
	72 Hf	73 Ta	74 W

Materials Chemistry



Structural Characterization



Mechanical properties



**Dr. Ravi Sankar Kottada**

Associate Professor

Metallurgical and Materials Engineering

ravi.sankar@iitm.ac.in

+91 44 2257 4779



## Primary research interests:

- High temperature deformation of advanced materials
- Multi-component high entropy alloys and their deformation behavior
- High temperature life-term prediction of advanced materials
- Creep of magnesium-base alloys



**Dr. Sabita Sarkar**

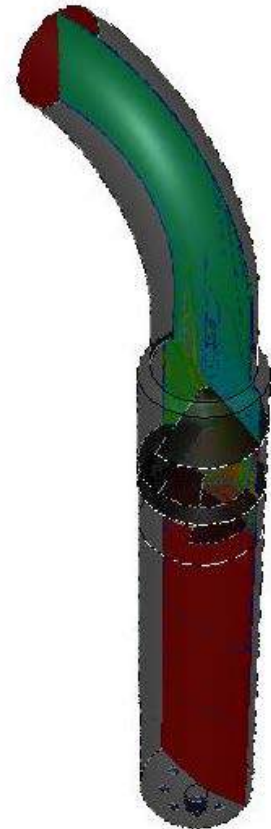
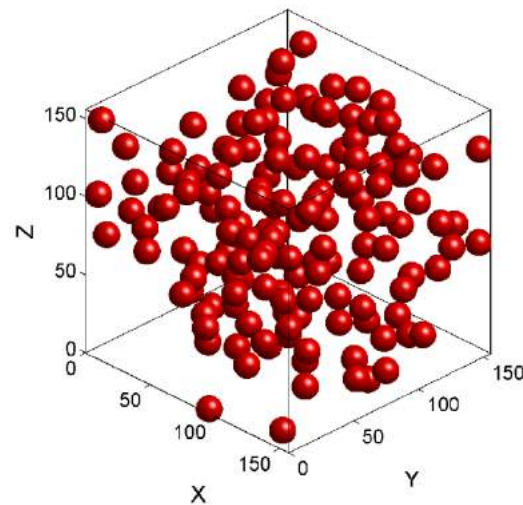
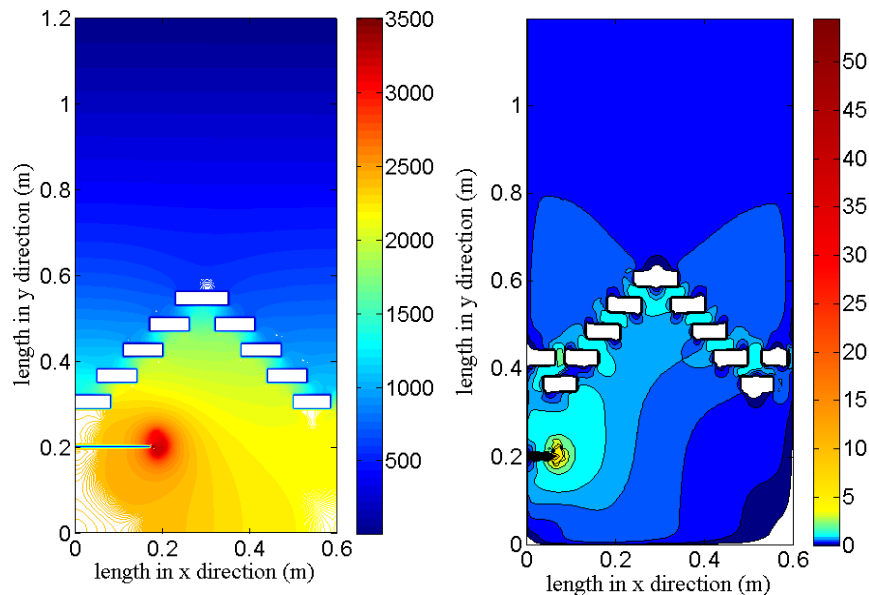
Assistant Professor, Metallurgical and Materials Engineering

044-2257-4755; sabita.sarkar@iitm.ac.in



## Major Areas of Research

- ❖ Process modeling/design/intensification of metallurgical and chemical processes
- ❖ Modelling and simulation of
  - Flow through packed bed, fluidized bed
  - Heat and mass transfer
  - Granular flow, multi-phase flow, reacting flow etc.



Reactor design and optimization

Simulation of flow through randomly packed particle



# Dr. V. Sampath

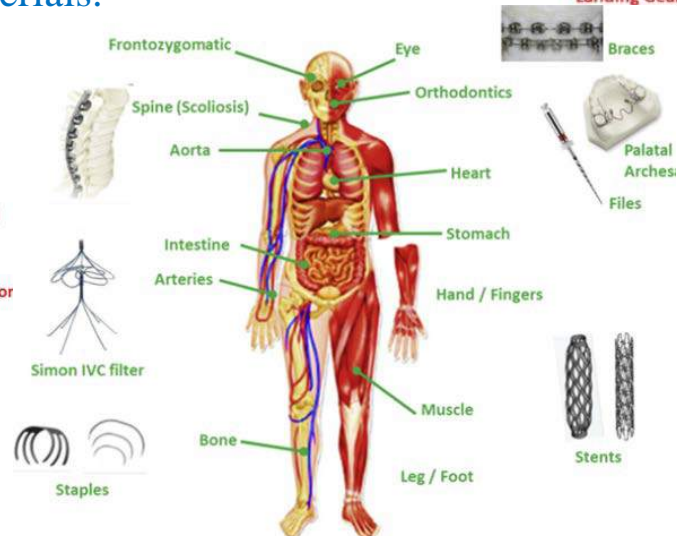
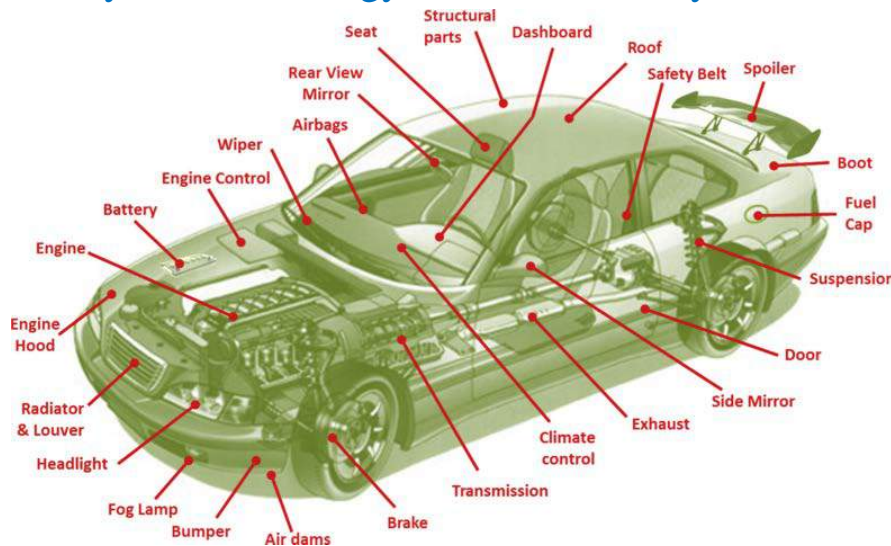
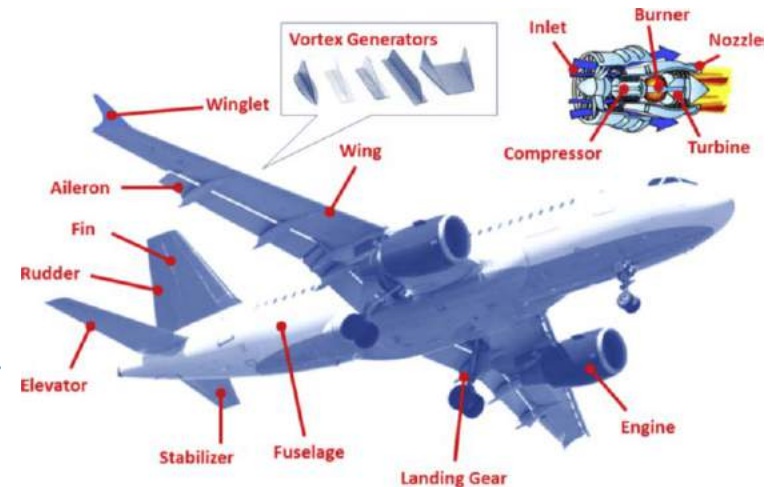
Professor, Metallurgical and Materials Engineering

044-2257-4773; vsampath@iitm.ac.in



## Major Area of Research

- Novel Shape Memory Alloys and Smart Materials for Automotive, Aerospace, Biomedical and Commercial applications.
- Nanocrystalline shape Memory Alloys for advanced applications.
- Composites and Smart composites for structural and other applications.
- Physical Metallurgy and Failure analysis of materials.







**Dr. T.S.Sampath Kumar**  
Professor, Metallurgical and Materials Engineering  
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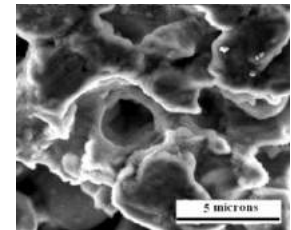
## NANOSTRUCTURED BIOMATERIALS

**for orthopedic and dental applications**

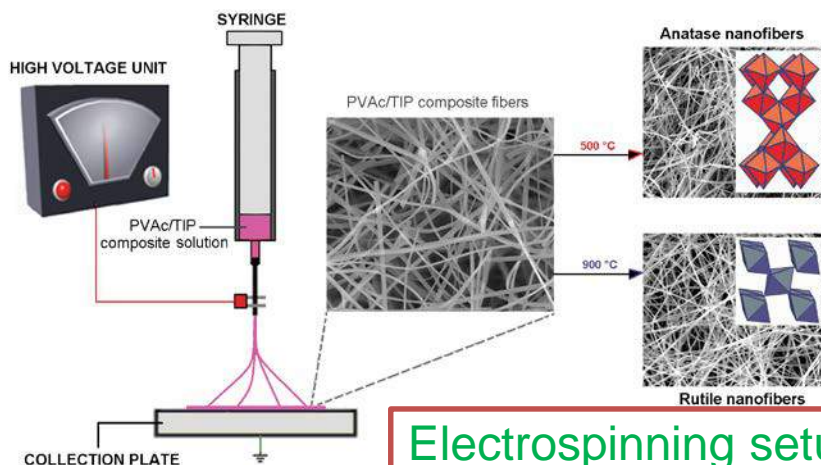
- ➡ Nanocrystalline calcium phosphate ceramics, coatings & cements
- ➡ Antimicrobial materials & drug delivery systems
- ➡ Bioresorbable & bioactive nano composites
- ➡ Nanostructured metallic implants

**value added engineering of egg shell & corals**

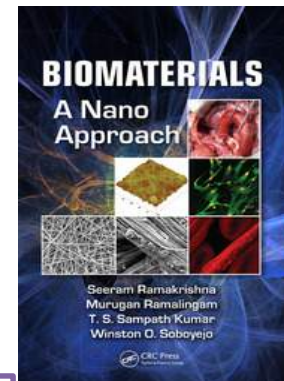
**accelerated processing**



Bioactive ball milled  
Ti-hydroxyapatite



**Electrospinning setup** Periapical cyst with bone grafts



[Back to Top](#)





**Dr. S. Sankaran**

Professor,  
Metallurgical and Materials Engineering  
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## Major Areas of Research

- Structural materials processing through deformation and solidification techniques
- Microstructure-mechanical behaviour relationships
- Electron microscopy

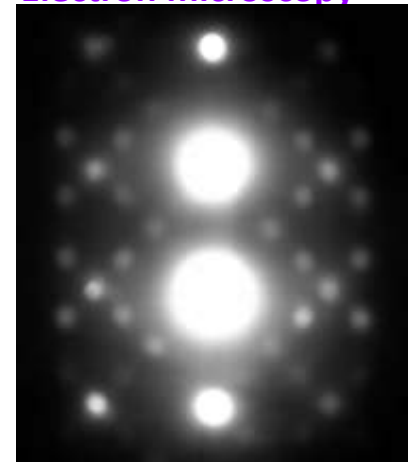
**Deformation processing (rolling mill)**



**Metal foams**



**Electron microscopy**





# Dr. rer. nat. Somnath Bhattacharyya

Associate Professor, Metallurgical & Materials Engineering

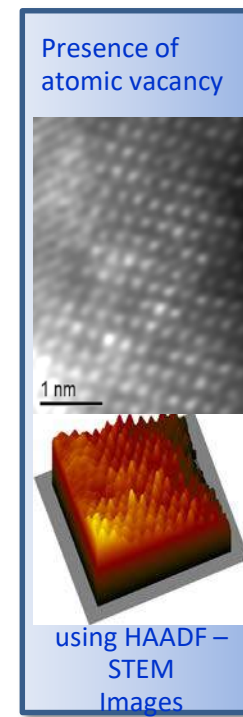
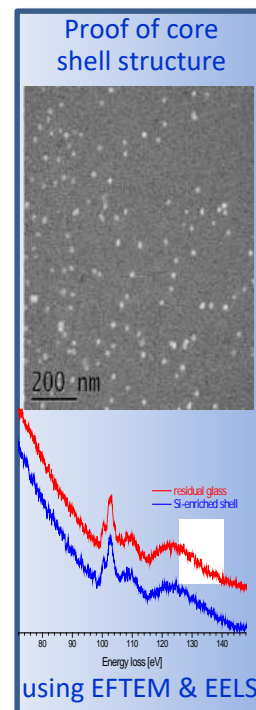
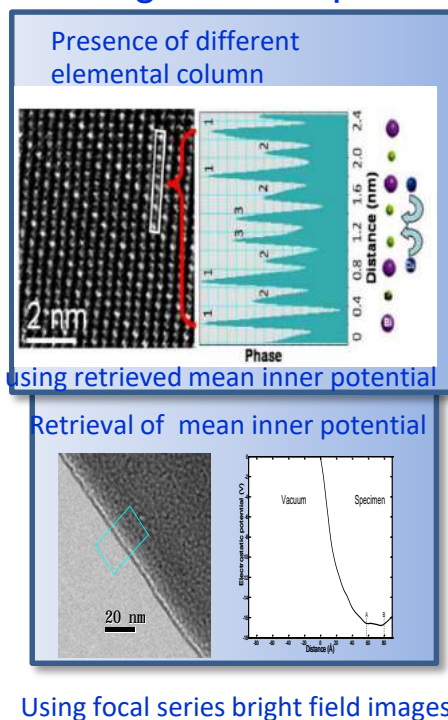
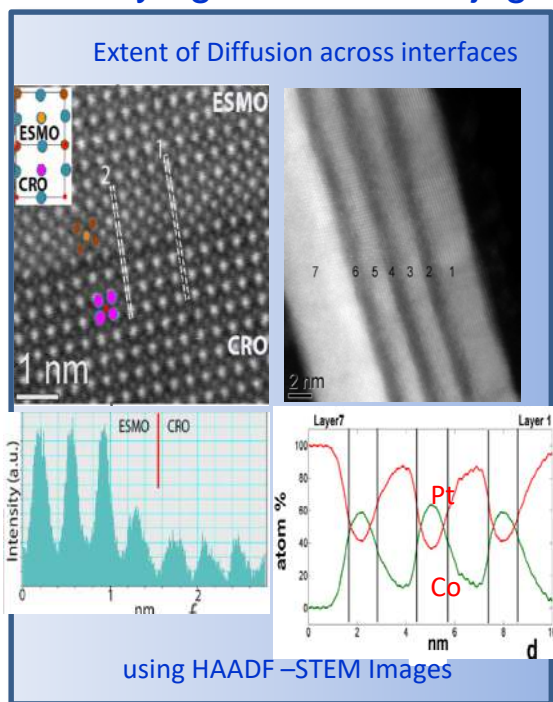
044-2257-4760; somnathb@iitm.ac.in

<https://sites.google.com/site/nanoscopytem/home/>



## Major Areas of Research

- Studying correlation of the structure and chemistry of materials at atomic scale with physical properties using Transmission Electron Microscopy
- Development of new methodology related to TEM/STEM to study materials
- Studying nano-bio conjugation using electron probe



[Back to Top](#)



# Dr. Sreeram K. Kalpathy

Assistant Professor, Metallurgical and Materials Engineering

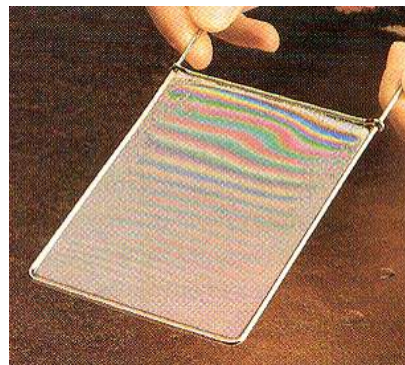
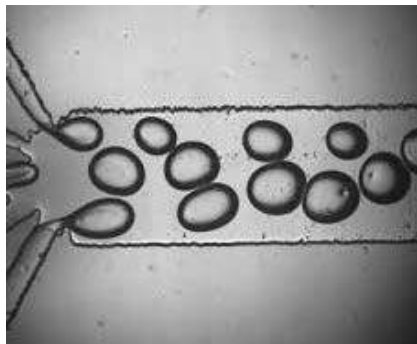
044-2257-4761; sreeram@iitm.ac.in

<https://www.iitm.ac.in/info/fac/sreeram>

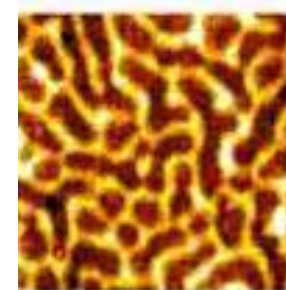
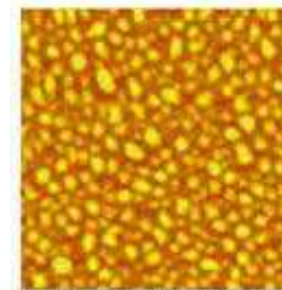
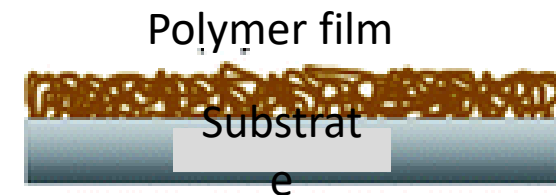


## Major Areas of Research

- ✕ Colloids, Polymers, Soft Matter
- ✕ Interfacial Fluid Mechanics
- ✕ Physical Chemistry of Surfaces
- ✕ Coating and Printing Methods



**Dynamics of Colloidal Foams, Bubbles, Drops, Films**



**Morphological patterns  
from  
polymer film dewetting**





# SRINIVASA RAO BAKSHI

Associate Professor, Metallurgical and Materials Engineering

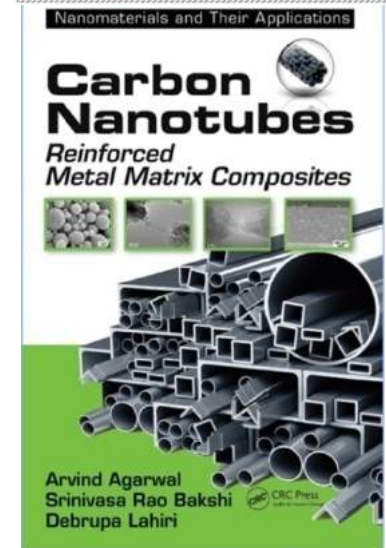
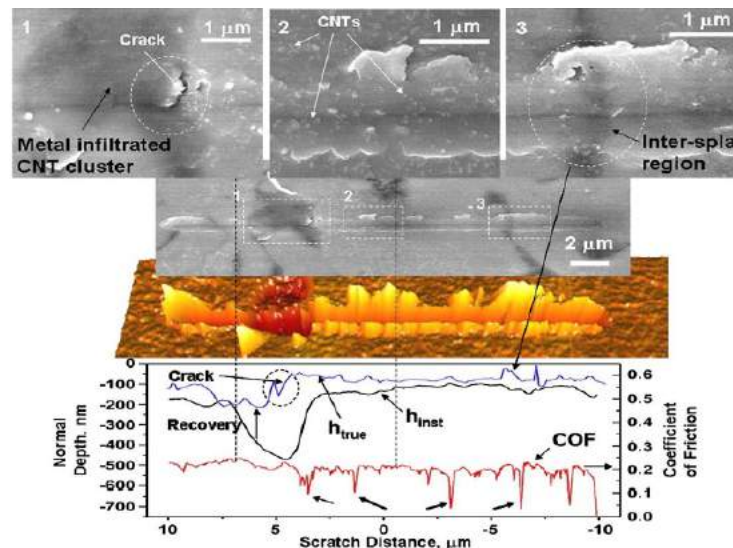
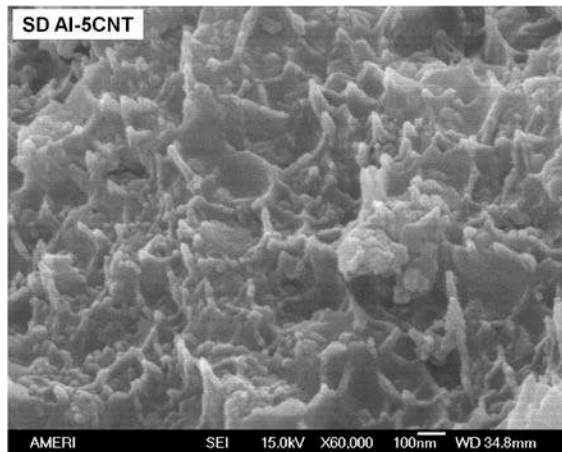
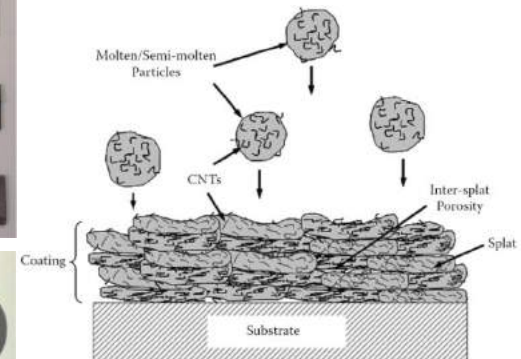
T: 044 2257 4781; M: 8056073710; E: sbakshi@iitm.ac.in

<http://www.mme.iitm.ac.in/sbakshi>



## Major Areas of Interest

- Carbon nanotube reinforced metal matrix composites
- Thermal spray coatings and bulk structures
- Ultra-high temperature ceramic composites
- Hard metal matrix nanocomposites by reaction sintering
- Nanomechanical testing of materials



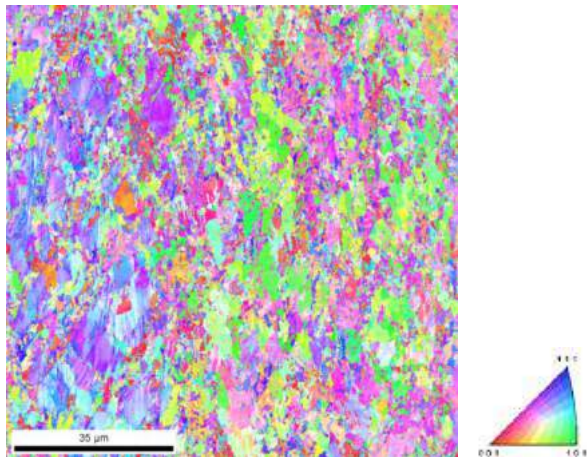


**Dr. V. Subramanya Sarma**  
Professor, Metallurgical and Materials Engineering  
044-2257-4774; vsarma@iitm.ac.in

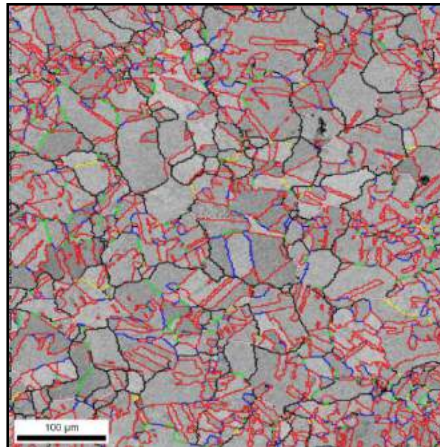


## Major Areas of Research

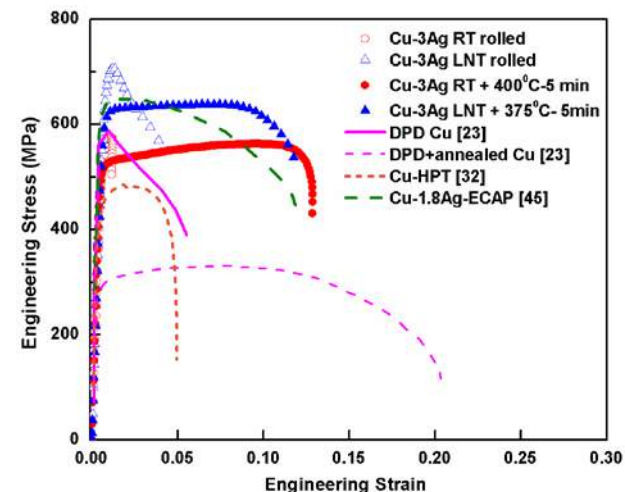
- Thermo-mechanical processing
- Bulk ultra fine grained / nanostructured metals and alloys
- Crystallographic texture and grain boundary engineering



Orientation imaging microscopy of ultrafine grained Cu-Al alloy



Grain boundary engineered austenitic stainless steel,



Tensile properties of ultra fine grained high strength and ductile Cu-Ag alloy





## Dr. G. Sundararajan

Professor, Metallurgical and Materials Engineering

044-2257-4759; gsundar@arci.res.in



### Major Areas of Research

- Tribiological behaviour of metallic materials, composites, ceramics and coatings.
- Static and Dynamic Indentation Behaviour of metallic materials.
- Thermal spray coatings (detonation spray & cold spray).
- Novel Coating Technologies (Micro Arc Oxidation, Boronising, EB-PVD, Pulsed Electrodeposition)
- Laser surface modifications and processing (transformation hardening, cladding, surface alloying and cutting).
- **Ceramics Processing & characterisation (oxide & non-oxide)**
- **Nano dispersion strengthened steels**



# Dr. Tiju Thomas

Assistant Professor, Metallurgical & Materials Engineering

044-2257-4757; tijuthomas@iitm.ac.in

<http://mme.iitm.ac.in/tijuthomas>

[www.tijuthomas.net](http://www.tijuthomas.net)

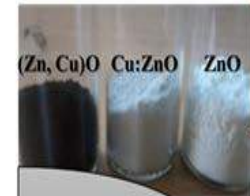
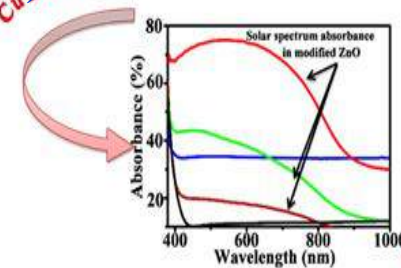


## Major Areas of Research

- Energy materials
- Environmental remediation materials
- Nitrides, oxynitrides, oxides (in nano-, meso- and bulk forms)
- Photofunctional materials (for solar cells, photocatalytic applications)
- Optical materials and devices
- Surfaces, interfaces and transformation of nanostructures
- Green approaches to functional nanomaterials

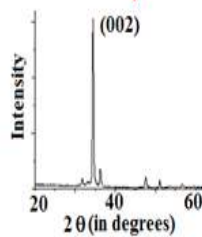
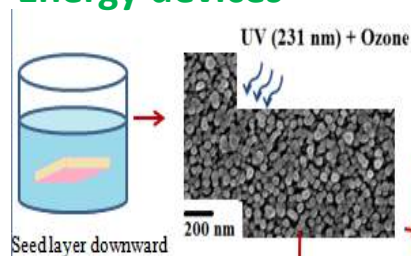
## Photofunctional & optical materials

Cu<sup>2+</sup> incorporation improves solar spectrum absorbance of ZnO upto 61% from 0.4%

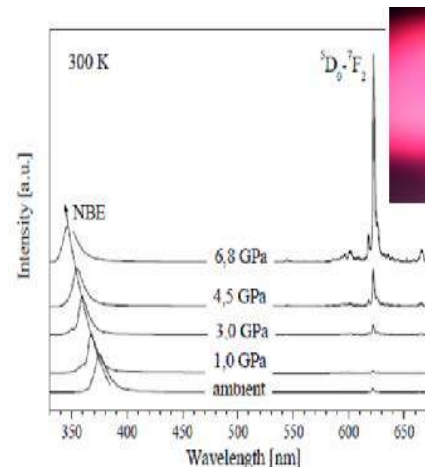
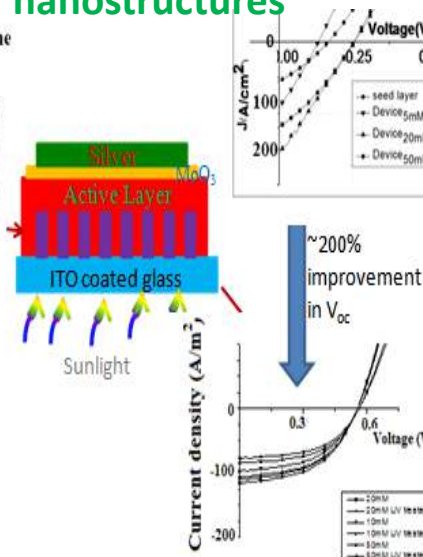


Water remediation using modified ZnO

## Energy devices



## Engineered nanostructures



## Light emitting materials & devices

[Back to Top](#)



# Dr. Uday Chakkingal

Ph.D, Rensselaer Polytechnic Institute, USA  
Professor, Dept. of Metallurgical and Materials Engg.

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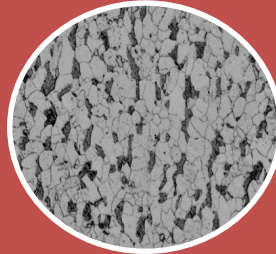
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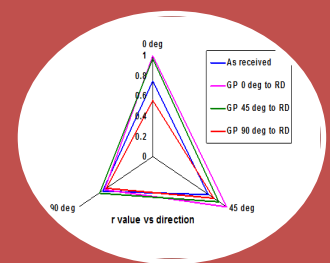
- Metal Forming Processes
- Severe Plastic Deformation Processes
- Sheet Metal Forming
- Advanced High Strength Steels



Production of Ultra fine grained Al, Ti and Mg alloys



Forming of Advanced High Strength Steel Sheets



Improvement in drawability of Al alloy sheets

**BROAD DESCRIPTION OF THE BANDWIDTH/AREA OF RESEARCH**



INDIVIDUAL FACULTY PROFILE

# DEPARTMENT OF OCEAN ENGINEERING

# LIST OF FACULTY

[Abdus Samad](#)

[Bhattacharyya S K \(Profile yet to be uploaded\)](#)

[Deepak Kumar](#)

[Jitendra S Sangwai](#)

[Krishnankutty P](#)

[Murali Kantharaj](#)

[Nallayarasu S](#)

[Nilanjan Saha \(Profile yet to be uploaded\)](#)

[Palaniswamy Ananthakrishnan \(Profile yet to be uploaded\)](#)

[Panneer Selvam R](#)

[Rajesh R Nair](#)

[Rajiv Sharma](#)

[Sannasiraj S.A](#)

[Shanmugam P](#)

[Srinivasan Chandrasekaran](#)

[Sriram V](#)

[Sundaravadivelu R](#)

[Surendran Sankunny](#)

[Suresh Kumar G](#)

[Suresh Rajendran](#)

[Tarun K Chandrayadula \(Profile yet to be uploaded\)](#)

[Vijayakumar R](#)





# Dr. Abdus Samad

Associate Professor, Department of Ocean Engineering

044-2257-4826; [samad@iitm.ac.in](mailto:samad@iitm.ac.in)

<http://www.doe.iitm.ac.in/samad/>

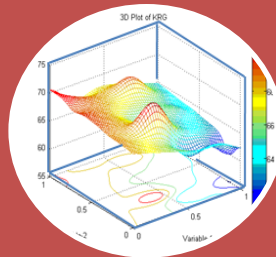


## Major Areas of Research

- Ocean energy: Design and optimization of turbines
- Single and multi-objective optimization: Surrogate modelling, Genetic algorithm
- Multiphase pumps- Artificial lifts: Design optimization, Correlation development



Redesign energy harvesting turbines to get higher efficiency, power and operating range: Numerical and experimental approach



Code development for surrogate based optimization and implementation in engineering systems



Multi-phase and multi-component flow pumps: design optimization through experimental and numerical approach

← Applying CFD and optimization techniques to find optimal performances →



# Dr. Deepak Kumar PHD, IIT DELHI, INDIA

Associate Professor, Dept. of Ocean Engineering

044-2257-4828; [deepakkumar@iitm.ac.in](mailto:deepakkumar@iitm.ac.in)

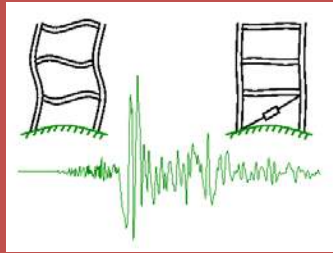
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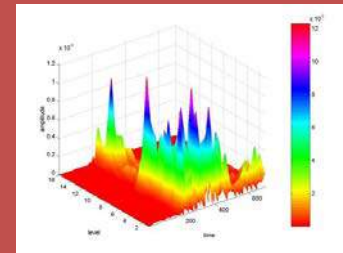
- Stochastic dynamics, control, stability of structure
- Time frequency analysis of nonlinear systems
- Experiments related to structure dynamics and control



Dynamic control of onshore and offshore structures for earthquake, wind, hydrodynamic loadings



Controlling the nature of response of onshore and offshore structures



Development and modification of techniques for analysis of system



Dr. Jitendra S. Sangwai

PhD, IIT Kanpur, India

Associate Professor, Petroleum Engineering Program

Dept. of Ocean Engineering

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<http://www.iitm.ac.in/oedep>



- Enhanced Oil Recovery
- Gas Hydrates
- Flow Assurance



Phase Equilibrium Studies  
Gas Hydrates for Storage and  
Transportation  
Semiclathrate Hydrates



CO<sub>2</sub> sequestration  
Emulsions and Polymer Flooding  
Ionic Liquids for EOR



Wax and Asphaltene Dissolution  
Microbial Degradation of Waxes  
Nanofluids for Flow Assurance



# Dr.P.Krishnankutty

PhD, IIT Madras, India

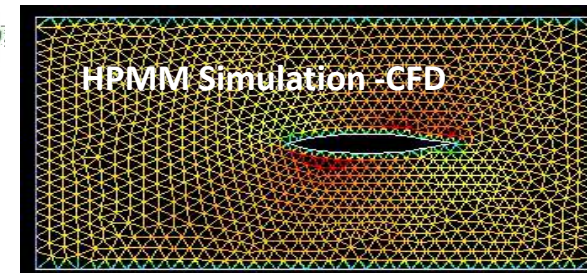
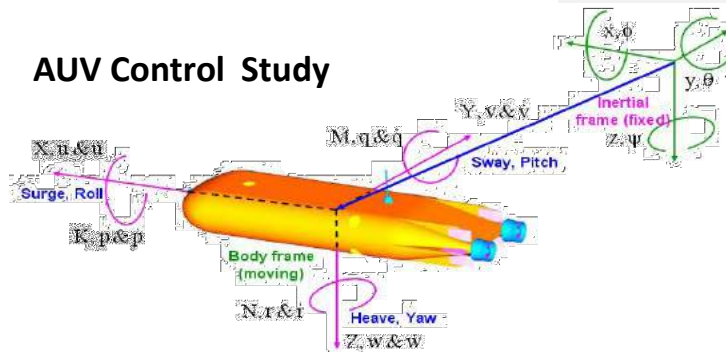
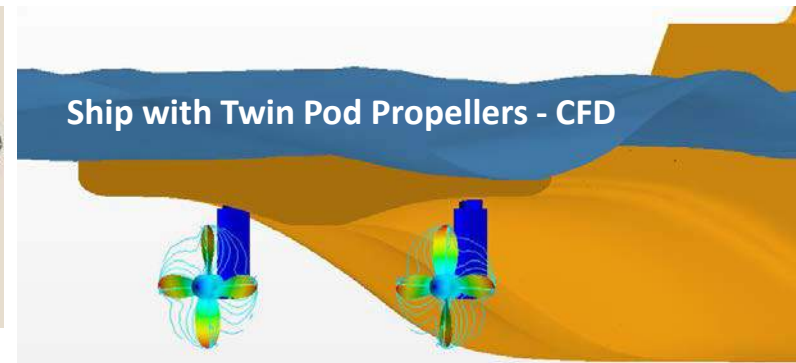
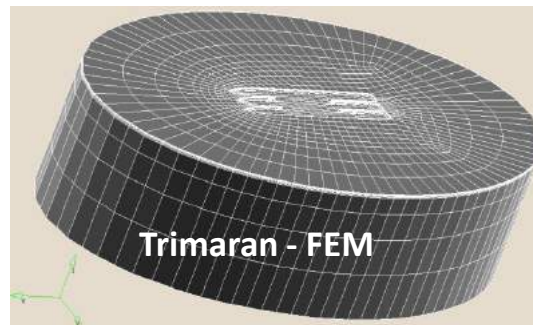
Professor, Dept. of Ocean Engineering

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<http://www.oec.iitm.ac.in/krishnankutty.html>



- **Marine Hydrodynamics/Wave-Structure Interaction.**
- **Ship Motion/ Passenger Comfort; Ship Maneuvering & Control**
- **Marine Vehicles/Wave Wash/ Powering & Propulsion**



[Back to Top](#)

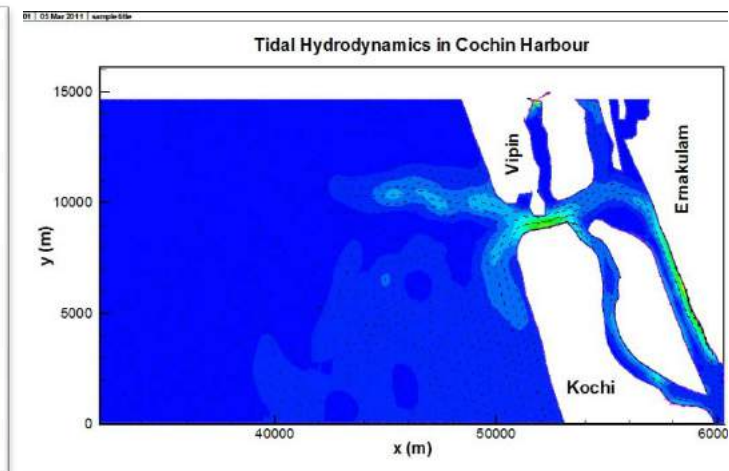
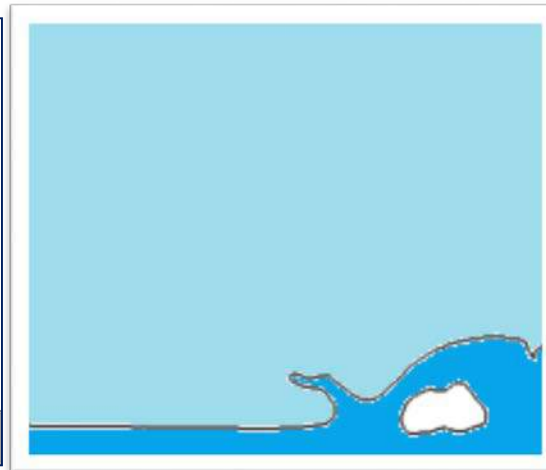
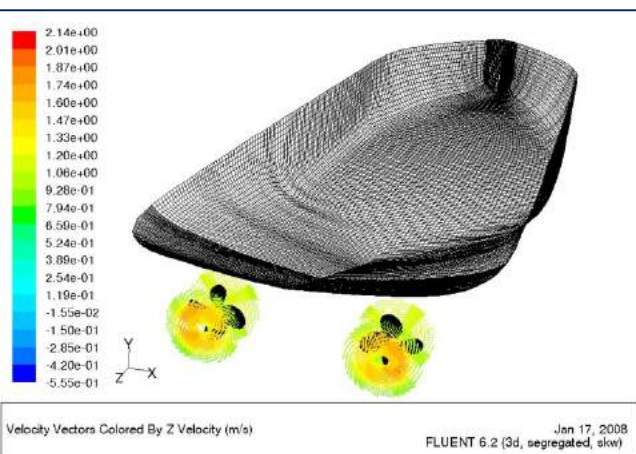




**Dr. Murali Kantharaj**  
**PHD, IIT Madras, INDIA**  
Professor, Dept. of Ocean Engineering  
044-2257-4816; murali@iitm.ac.in  
[http://www.oec.iitm.ac.in/Faculty\\_murali.html](http://www.oec.iitm.ac.in/Faculty_murali.html)



- Computational Hydrodynamics using Potential flow and RANS approaches.
- Free surface / dynamic boundary hydrodynamics – ALE FEM & Level sets.
- Coastal hydrodynamics – tsunami – storm surge – flow vegetation interaction – morphodynamics.







# Prof. S. Nallayarasu

## PH.D, National University of Singapore

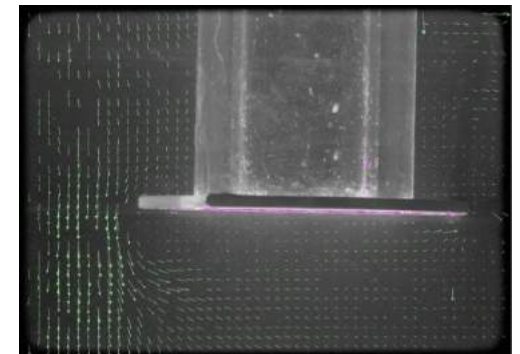
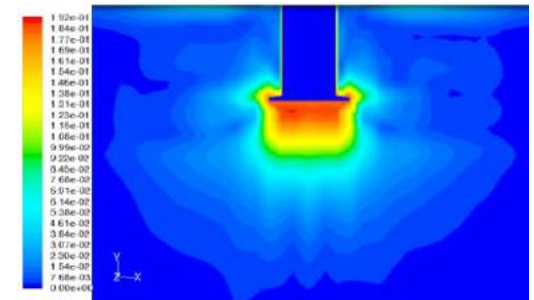
Professor, Dept. of Ocean Engineering

044-2257-4819; [nallay@iitm.ac.in](mailto:nallay@iitm.ac.in)

[http://www.oec.iitm.ac.in/prof\\_nallayarasu.html](http://www.oec.iitm.ac.in/prof_nallayarasu.html)



- Hydrodynamic response of Spar hulls.
- Offshore wind energy.
- Reliability in offshore structures.
- Effect of heave damping plates.
- Flow visualisation and VIV.
- Deep water risers.





# Dr. R.Panneer Selvam

## Ph.D., IIT Madras, India

Professor, Dept. of Ocean Engineering

044-2257-4807; pselvam@iitm.ac.in

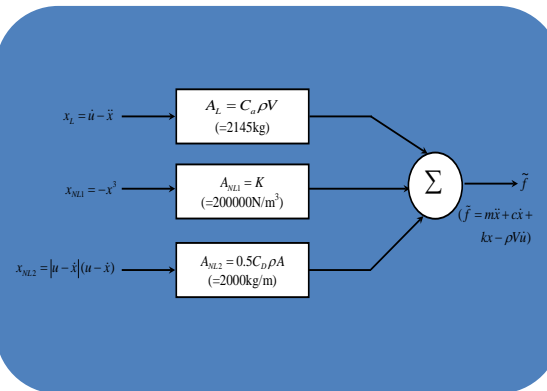
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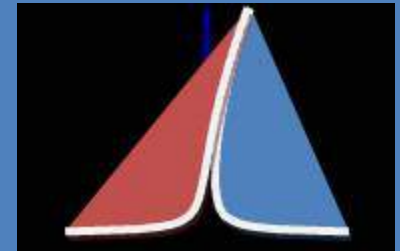
- Hydrodynamic Analysis of Offshore Structures
- Parameter Identification of Ocean Engineering Systems
- Nonlinear Dynamic Analysis of Offshore Structures



- (i) Numerical and Experimental studies on Floaters for offshore wind energy
- (ii) Emerging New Concepts of Offshore structures for Oil and Gas industry – Numerical and Experimental studies



- (i) Identification of parameters of floating offshore structures – includes ships in waves and calmwater
- (ii) Simulation of motion of ships in seas and calmwater (maneuvering)



Simulation of nonlinear responses of offshore floating systems



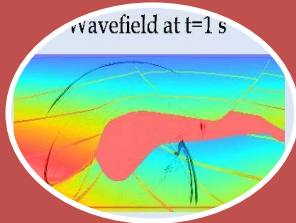
## Dr. Rajesh R. Nair

Associate Professor, Petroleum Engineering Programme,  
Dept of Ocean Engineering, IIT Madras

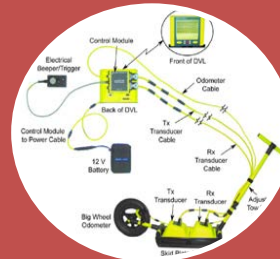
<http://www.iitm.ac.in/component/faculty/80/rajeshnair/>  
044-2257-4824; [rajeshnair@iitm.ac.in](mailto:rajeshnair@iitm.ac.in)



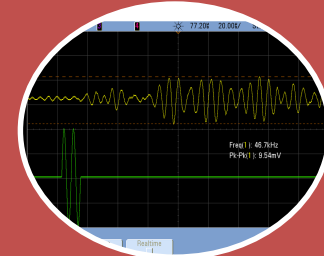
- Seismic Data Analysis & Subsurface reservoir characterization for Oil and Gas
- Ground Penetrating Radar analysis and Shallow subsurface characterization
- Laser Doppler Vibrometer measurements, Hydrofraking (Shale, Coal) and rock anisotropy



Seismic Imaging & Data  
analysis for oil and Gas  
reservoirs



GPR Data analysis



LLDV &HYDROFRACKING  
STUDIES (SHALE, COAL)

**Subsurface characterization : Shallow and Deep(Seismics and GPR) & Lab scale Hydrofraking & Rock anisotropy studies (Shale, Coal)**



# Dr. Rajiv Sharma

## Ph.D., IIT Kharagpur, India

Associate Professor, Department of Ocean Engineering

+91-44-2257-4822; [rajivatri@iitm.ac.in](mailto:rajivatri@iitm.ac.in)

<http://sites.google.com/site/rajivatri/>



- Computer-aided design; Design of deepwater drilling solutions and floating structures;
- Computational geometric mechanics; Computer aided geometric design, computational geometry, visualization, and their applications in design, robotics and manufacturing;
- Dynamic data driven forecasting systems; Participatory/democratic economy; and
- Iso-geometric analysis for fluids and structures.

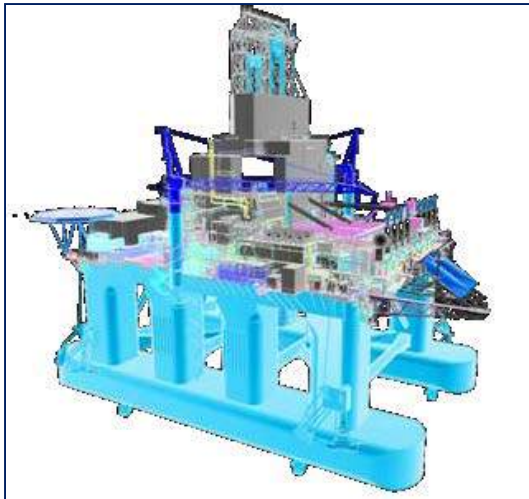


Figure 1: Designed optimum semi-submersible

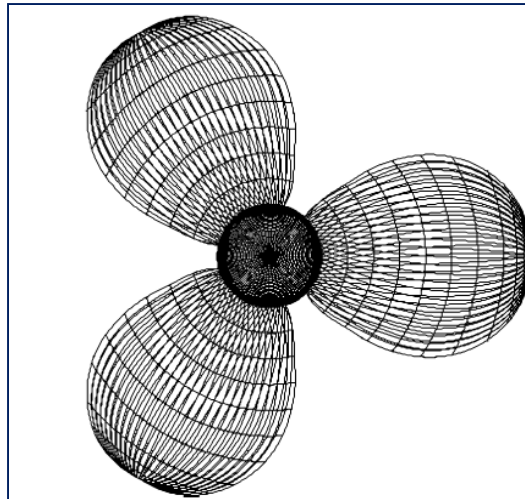


Figure 2: CAD model of a propeller.

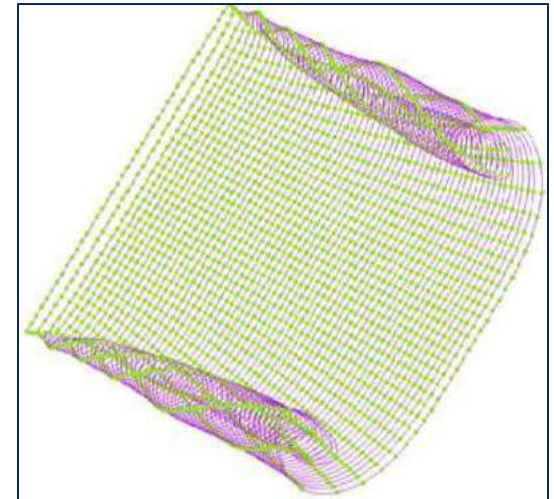


Figure 3: Computed wake behind a propeller.





# Dr. S.A. Sannasiraj

Professor & Head, Department of Ocean Engineering

B.E. (Civil Engg.), M.E. (Civil-Structural Engg.), Ph.D. (Ocean Engg.)

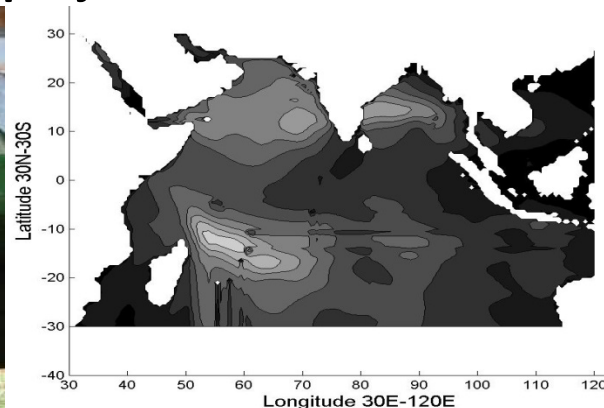
Email: sasraj@iitm.ac.in



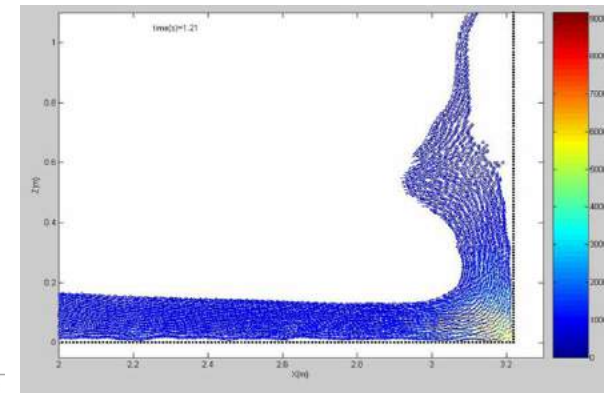
- Supervised 14 PhDs
- 80 Refereed Journal papers
- Completed 16 major research projects
- Involved in 200 Industrial projects
- FEM & SPH simulation of Nonlinear free surface waves
- Laboratory investigation of Wave Breaking & Wave impact on structures
- Wind-wave modelling and Data Assimilation



Breaking wave impact on a vertical wall



Assimilated wind-wave Prediction over Indian waters



SPH simulation of Nonlinear sloshing

**BROAD DESCRIPTION OF THE BANDWIDTH/AREA OF RESEARCH**





**Dr. P. SHANMUGAM**

**PHD, Anna University, India**

**Professor, Dept. of Ocean Engineering**

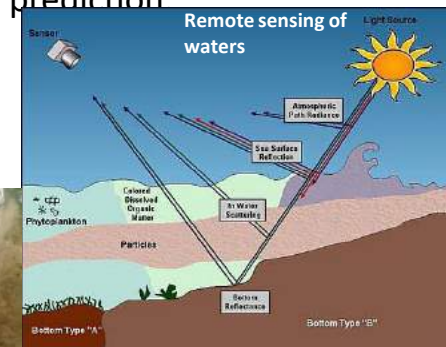
044-2257-4818; pshanmugam@iitm.ac.in

[http://www.oec.iitm.ac.in/Asst\\_prof\\_Shanmugam.html](http://www.oec.iitm.ac.in/Asst_prof_Shanmugam.html)



- Ocean Optics and Imaging / Focus on the study of 3-D character of underwater light fields by experiments and modelling.
- Satellite Oceanography/ Focus on the development of algorithms to retrieve ocean environmental parameters from remote sensing data.
- Ocean acoustics / Focus on the characterization of seafloor (morphology, sediment sequence, minerals, oil seepage, buried objects)

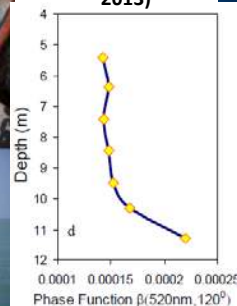
**Potential applications:** Underwater light fields and visibility, search and recovery, underwater optical communication, underwater object detection and image processing, sediments transport, dissolved carbon transport, detection of ocean biological hazards, Oil spill, bathymetry, internal waves, currents, eddies, fronts, and climate prediction



Shanmugam, August 2012 Cruise Experiments



New scattering phase function (Sundarabalan and Shanmugam, JQSRT 2013)

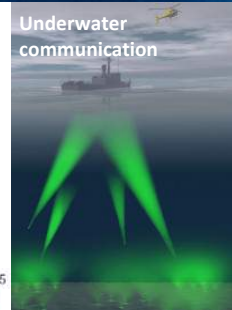


Underwater detection and typing

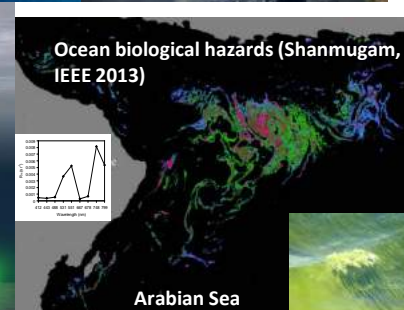


Atmospheric correction (Shanmugam, Anneles Geophysics 2012)

Arabian Sea

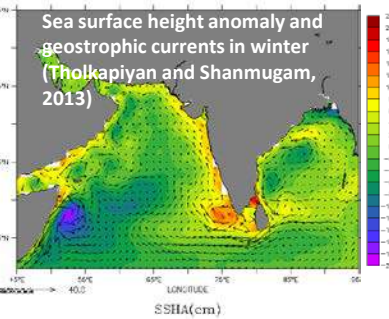


Underwater communication



Ocean biological hazards (Shanmugam, IEEE 2013)

Arabian Sea



Sea surface height anomaly and geostrophic currents in winter (Tholkapiyan and Shanmugam, 2013)

[Back to Top](#)



Dr. SRINIVASAN CHANDRASEKARAN

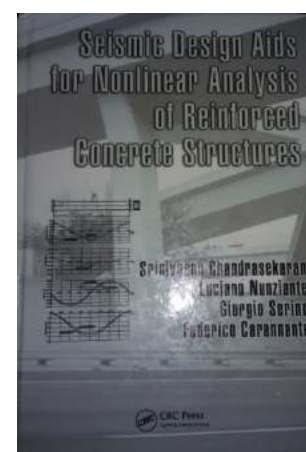
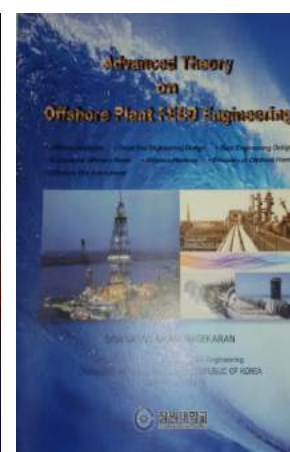
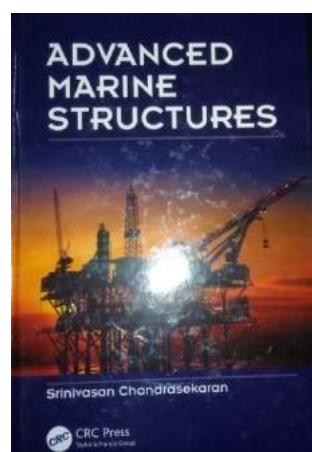
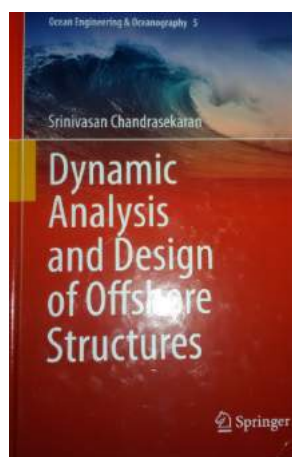
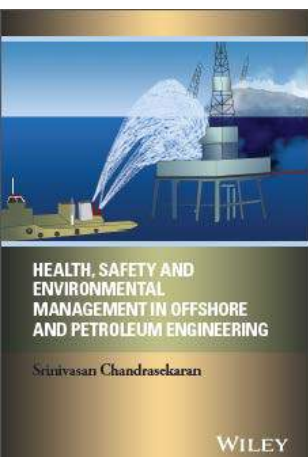
PHD, IIT DELHI, INDIA

Professor, Dept. of Ocean Engg

044-2257-4821; drsekaran@iitm.ac.in



- Offshore TLPs and triceratops/ dynamic analysis of deep-water structures
- Renewable energy/Design and development of wave energy devices
- Petroleum engineering/Health, Safety and environmental management applied to oil and gas industries





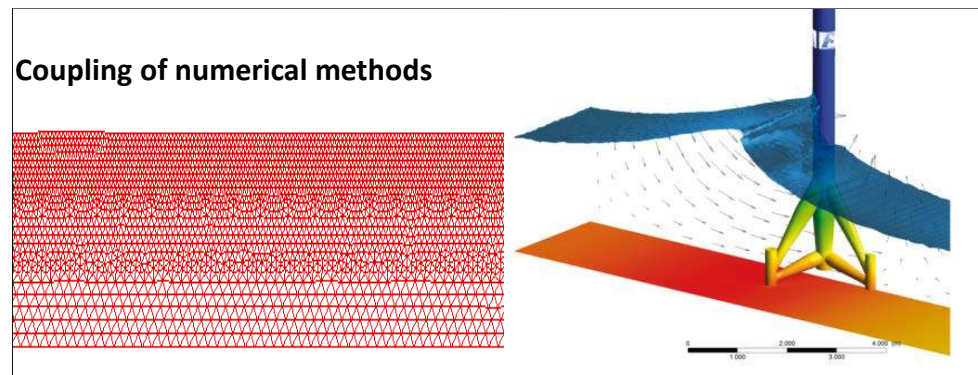
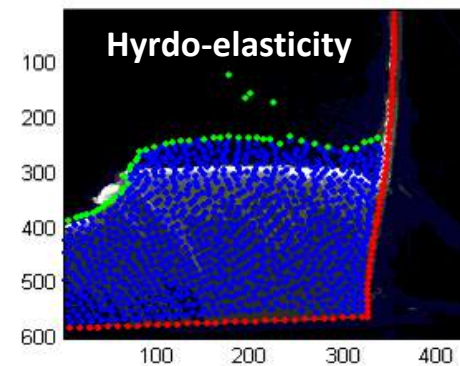
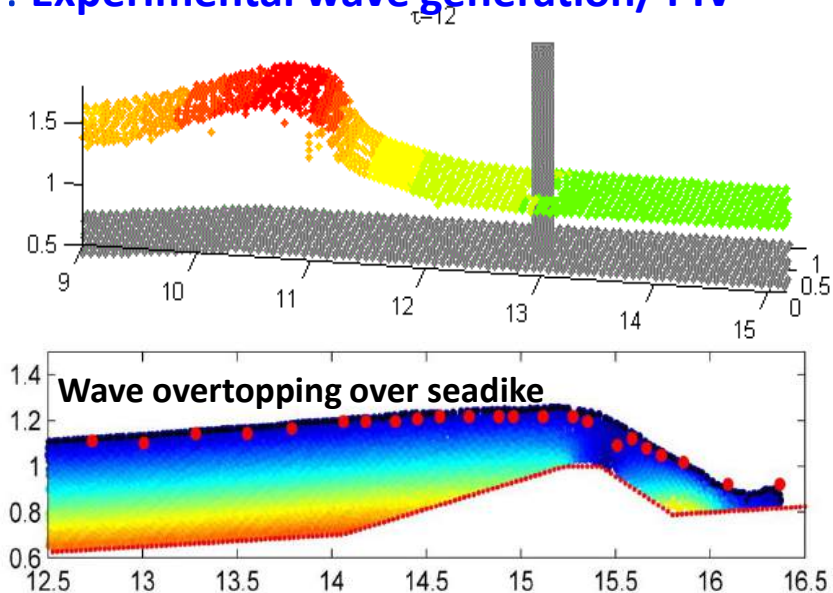


**Dr. V.Sriram, B.E., Ph.D.,**  
**Associate Professor, Dept. of Ocean Engineering**  
044-2257 4813; vsriram@iitm.ac.in  
<http://www.oec.iitm.ac.in/sriram.html>



## Major Areas of Research

- Numerical modeling/computational hydrodynamics, Meshfree methods
- Hydro-elasticity
- Violent wave-current-structure interactions
- Experimental wave generation/ PIV



Wave interactions with offshore wind turbine support structure



Dr. R. SUNDARAVADIVELU , PhD.,  
INDIAN INSTITUTE OF TECHNOLOGY MADRAS, INDIA

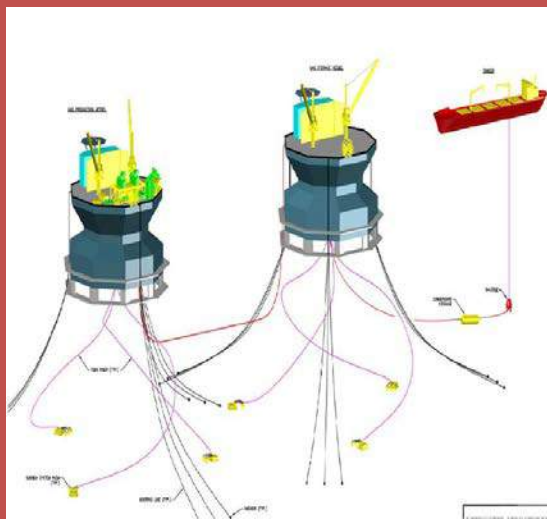
Professor, Dept. of Ocean Engineering

044-2257-4810; rsun@iitm.ac.in

<http://www.iitm.ac.in> ; <http://www.oec.iitm.ac.in>;



- Deep Water Offshore Structures
- Port Infrastructure for VLCC and 18000 TEU Vessels
- OTEC , Offshore Wind Energy and Desalination



**NON-SHIP SHAPED FPSO FOR GAS FIELD  
LNG TRANSPORT**



**DREDGING NEW MOUTH IN CHILLIKA  
LAKE FOR PROTECTION OF WET LAND**



**MODEL STUDY ON  
BERM BREAKWATER**



# Prof. Surendran Sankunny

## Ph.D., Yokohama National University, Japan

Professor, Dept. of Ocean Engineering

044-2257-4815; [sur@iitm.ac.in](mailto:sur@iitm.ac.in)

[http://www.oec.iitm.ac.in/surendran\\_home.html](http://www.oec.iitm.ac.in/surendran_home.html)



- Ship shaped hull dynamics(experimental, theoretical & numerical)
  - a)Motion control using active fins
  - b)Influence of moon-pool shapes on moored hull
  - c)Maneuvering and optimization of ship routes
- Fracture Mechanics of metals(isotropic)and non-metals(anisotropic ) .
- Application of composite materials for marine construction
- Possible high-impact exploratory research themes
  - a)Applications of 3D printing in Ocean environment
  - b) Application of hydrophobic materials in Ocean environment
  - c) Wire-free instrumentation using smart phones(standard models eg: android, iphone)



Objects made in 3Dprint.



Magic sand with other matrices



Fin fitted model under test





**Dr. G. Suresh Kumar**  
**PHD, IISc (Bangalore), India**

Professor, Dept. of Ocean Engineering

044-2257-4814; [gskumar@iitm.ac.in](mailto:gskumar@iitm.ac.in)

[http://www.oec.iitm.ac.in/Suresh\\_kumar\\_home.html](http://www.oec.iitm.ac.in/Suresh_kumar_home.html)



- Numerical Modeling of Fluid Flow through Fractured Reservoir/ Dual-Continuum
- Numerical Modeling of Coupled Heat and Mass Transfer / Enhanced Oil Recovery
- Anomalous Transport / Non-Darcian, Non-Fickian & Scale-Dependent Phenomena

Groundwater Flow and  
Contaminant Transport  
Modeling

Enhanced Geothermal  
Energy (EGS) System

Radio-Nuclide Transport  
in Geo-Sphere



**Dr. Suresh Rajendran**

Asst. Professor , Ph:044-2257-4830

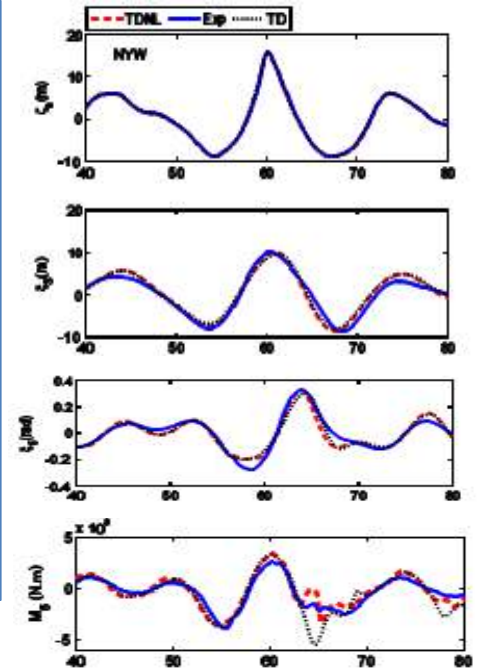
sureshr@iitm.ac.in

<http://www.doe.iitm.ac.in/sureshrajendran/>



## Area of Specialization

1. Numerical modelling of nonlinear ship motions and Loads
2. Hydroelasticity of ships and offshore structures
3. Manoeuvring of ships in waves
4. Dynamic Instability of Ships



[Back to Top](#)



# Dr. R VIJAYAKUMAR

PHD, Indian Institute of Technology Delhi, INDIA

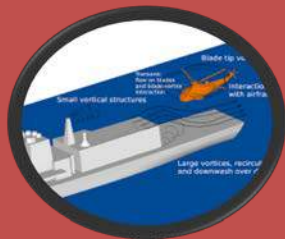
Asst Professor, Dept. of Ocean Engineering

044-2257-4829; vijay2028@iitm.ac.in

<http://www.oec.iitm.ac.in/vijay2028.html>



- Ship aerodynamics- smoke nuisance , ship helo interface
- Green ship initiative- Drag reduction methodology
- Autonomous underwater vehicles- Gliders
- Propeller studies- acoustic effect
- Astern Maneuvering study in shallow water



## Ship aerodynamic

Smoke nuisance- exhaust getting into intake.

Ship helo interface- Solution to problem of helicopter landing on ships.

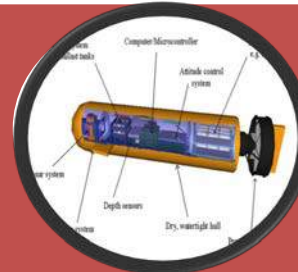
Ship superstructure stealth



## Green Ship initiatives-Drag reduction studies

Effect of stern flap in increasing propulsive efficiency

Micro bubble/air layer drag reduction



## Autonomous underwater vehicles

Manoeuvring studies of UW glider and development of prototype



## Propeller studies – acoustic effect

Low noise propeller design

**BROAD DESCRIPTION OF THE BANDWIDTH/AREA OF RESEARCH**



INDIVIDUAL FACULTY PROFILE

# DEPARTMENT OF PHYSICS

# LIST OF FACULTY

[Abhishek Misra \(Profile yet to be uploaded\)](#)

[Aravind G \(Profile yet to be uploaded\)](#)

[Arul Lakshminarayan](#)

[Ashwin Joy \(Profile yet to be uploaded\)](#)

[Ayan Mukhopadhyay](#)

[Basudev Roy \(Profile yet to be uploaded\)](#)

[Chandra Kanth Mishra \(Profile yet to be uploaded\)](#)

[Dawood Kothawala](#)

[Dillip Kumar Satapathy](#)

[Ganesan A.R](#)

[Harish Kumar N](#)

[Jatin Rath](#)

[Jayeeta Bhattacharyya](#)

[Jim Libby](#)

[Kasi Viswanathan S \(Profile yet to be uploaded\)](#)

[Krishnamurthy C.V](#)

[Lakshmi Bala S](#)

[Mahaveer Kumar Jain \(Profile yet to be uploaded\)](#)

[Manoj Gopalakrishnan](#)

[Manu Jaiswal](#)

[Markandeyulu G](#)

[Murugavel P](#)

[Nanda B.R.K](#)

[Neelima M Gupte](#)

[Nirmala R](#)

[Panchanana Khuntia](#)

[Pattabiraman M](#)

[Prabha Mandayam](#)

[Prabhat Ranjan Pujahari](#)

[Prafulla Kumar Behera](#)

[Prahallad Padhan](#)

[Prasanta Kumar Tripathy](#)

[Prem B Bisht](#)

[Rajesh Narayanan \(Profile yet to be uploaded\)](#)

[Ramachandra Rao M.S](#)



[Ramaprabhu S](#)

[Sankaranarayanan V](#)

[Santhosh P.N](#)

[Satyanarayana M.V](#)

[Sethupathi K](#)

[Shantanu Mukherjee \(Profile yet to be uploaded\)](#)

[Sivarama Krishnan](#)

[Somnath Chanda Roy](#)

[Srinivas V](#)

[Sriramkumar L](#)

[Subrahmanyam A](#)

[Subramanian V](#)

[Sudakar Chandran](#)

[Sunethra Ramanan](#)

[Sunil Kumar P.B](#)

[Suresh Govindarajan](#)

[Vaibhav Madhok](#)

[Vidya Praveen Bhallamudi \(Profile yet to be uploaded\)](#)

[Vijayan C](#)

[Yasir Iqbal \(Profile yet to be uploaded\)](#)



# Dr. Arul Lakshminarayan

## Ph. D., SUNY Stony Brook, NY, USA.

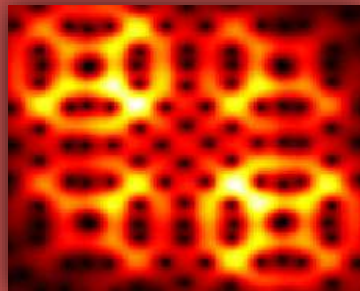
Professor, Dept. of Physics

044-2257-4878; arul@iitm.ac.in

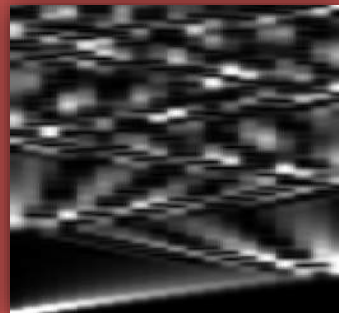
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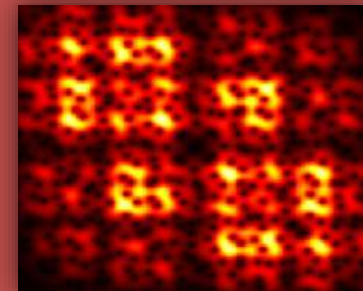
- Nonlinear Dynamics: Hamiltonian and Quantum Chaos
- Quantum Information: Entanglement. Applications to many body systems
- Statistical Mechanics: Random Matrix Theory and Extreme Value Statistics



Quantum Chaos: Simple Models to Applications



Quantum Entanglement



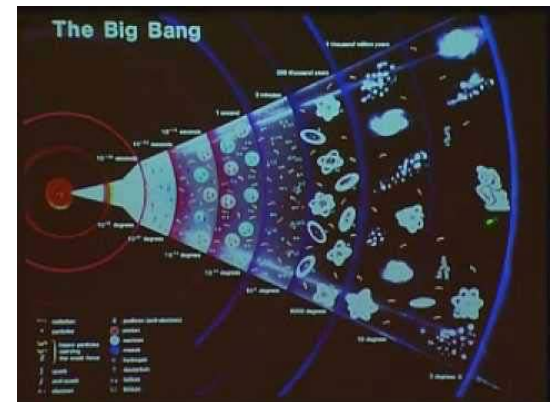
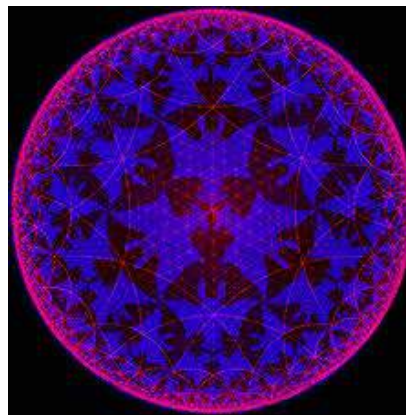
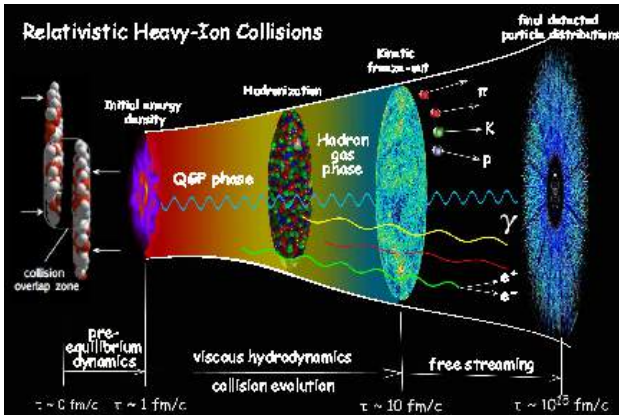
Random Matrix Theory and Applications

← **Complex Quantum Systems, Quantum Information, Random matrix theory** →

# Dr Ayan Mukhopadhyay

## My research interests are:

- (i) Developing a new fundamental theoretical framework for strongly interacting & strongly correlated systems**
- (ii) Applications of novel non-perturbative paradigm to confinement in QCD, Quark-Gluon Plasma and high-Tc superconductivity**
- (iii) To understand the fundamentals of the holographic correspondence of string theory**
- (iv) Infrared issues in quantum gravity with ramifications on the information loss paradox of black holes and the stability of our Universe**





# Dr. Dawood Kothawala

## Ph.D., IUCAA, Pune

Assistant Professor, Department of Physics

044-2257-4848; dawood@iitm.ac.in



- **Thermodynamical aspects of gravity, Black hole entropy**
- **Statistical mechanics and thermodynamics in curved spacetime**
- **Implications of a “minimal spacetime interval”**

### Thermodynamical aspects of gravity, Black hole entropy:

- Thermodynamic structure of gravitational field equations
- Hawking radiation and semi-classical aspects of black hole entropy
- Horizon thermodynamics in higher derivative theories

### Statistical mechanics and thermodynamics in curved spacetime:

- Thermal systems in curved space-times
- Entropy of *self-gravitating systems* and horizon entropy
- Interplay between *quantum and thermal fluctuations*

### Implications of a “minimal spacetime interval”:

- *Quantum field propagators* in presence of a minimal length
- Minimal length and *space-time singularities*
- Quantum field theories based on *deformed quantization*



# Dr. Dillip Kumar Satapathy

## PhD, Humboldt University, Germany

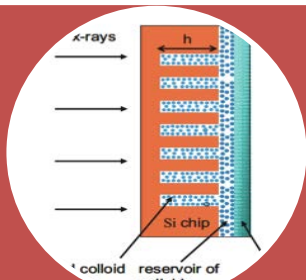
Associate Professor, Dept. of Physics

044-2257-4899; dks@iitm.ac.in

[https://www.physics.iitm.ac.in/people\\_files/faculty/dilip.html](https://www.physics.iitm.ac.in/people_files/faculty/dilip.html)

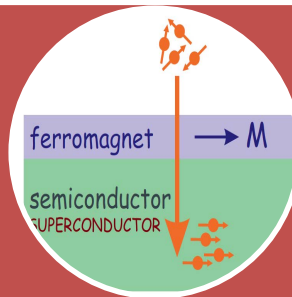


- Soft matter in confinement (confined fluids)
- Physics of complex oxide heterostructures
- Structure and dynamics of materials by X-ray and neutron scattering



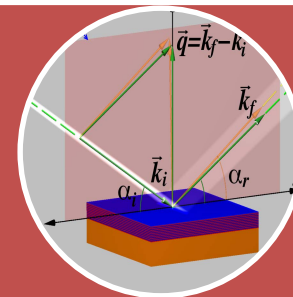
Microfluidics

Friction & lubrications  
Glass transition in polymer  
films



Spintronics

Oxide based electronics



Non-destructive  
characterization of structure-  
property relations in materials

**Condensed matter physics research by using scattering techniques**





# Dr. A R Ganesan

## PhD, IIT Madras, India

Professor, Dept. of Physics

044-2257-4891; [arg@iitm.ac.in](mailto:arg@iitm.ac.in)

[https://www.physics.iitm.ac.in/people\\_files/faculty/ganesan.html](https://www.physics.iitm.ac.in/people_files/faculty/ganesan.html)



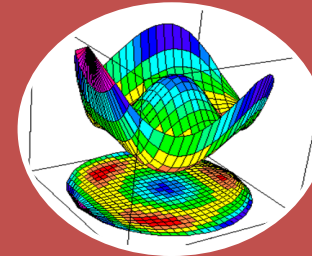
- Applied Optics and Laser Instrumentation
- Holography and Speckle Metrology
- Adaptive Optics and Vision Science



Laser based optical measurement techniques and Fiber optic sensors



Holographic and Laser speckle Interferometry for Engineering Metrology



Adaptive Optics for far field imaging and correction of human ocular aberrations

**BROAD DESCRIPTION OF THE BANDWIDTH/AREA OF RESEARCH**



# Dr. N. Harish Kumar

## PHD, University of Hyderabad, India

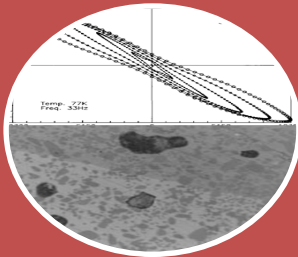
Professor, Dept. of Physics

044-2257-4879; [nhk@iitm.ac.in](mailto:nhk@iitm.ac.in)

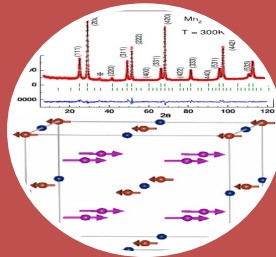
<http://www.iitm.ac.in/component/faculty/81/nhk/>



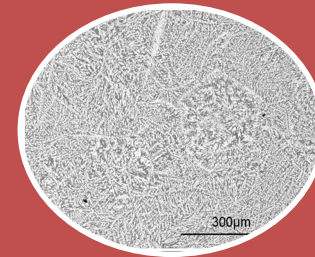
- Research Area/Focus 1 Superconductivity
- Research Area/Focus 2 Spintronics
- Research Area/Focus 3 Novel Magnetic Materials



Second generation high  $T_c$   
superconducting current leads



Half metallic Spin injection  
electrodes  
Dilute magnetic Semiconductors  
for Magneto-optoelectronics



Novel magnetic sensors and  
devices

**Advanced Magnetic Materials**



# Jatin Rath

Professor, Department of Physics

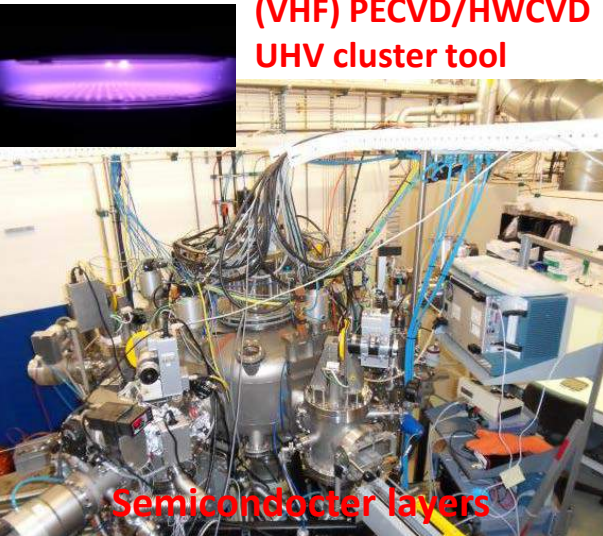
+91 44 2257 4855, jkr@iitm.ac.in

<https://physics.iitm.ac.in/jkr>



## (CVD) Processing

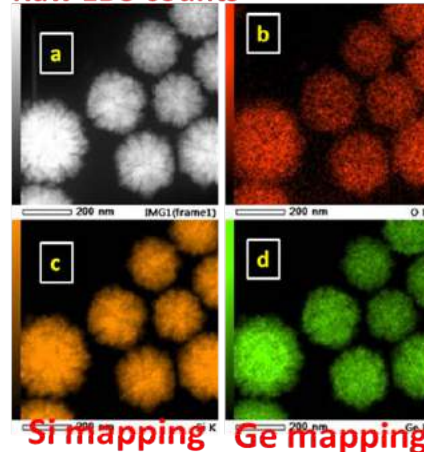
(VHF) PECVD/HWCVD  
UHV cluster tool



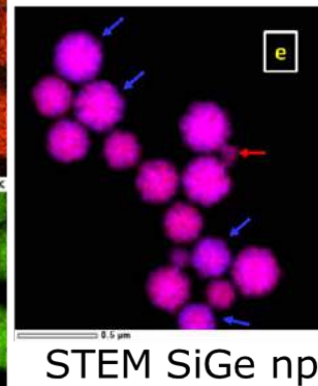
Semiconductor layers

## (Nano) materials

Raw EDS counts

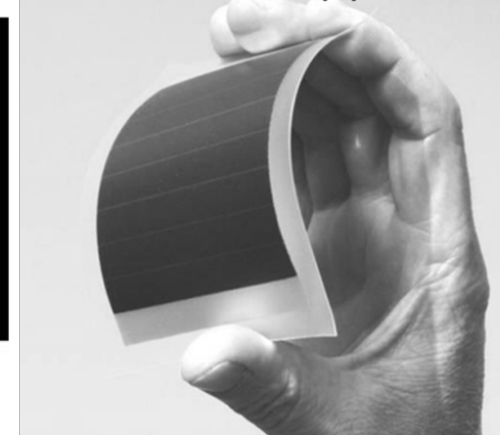


Overlay image



## Devices

Solar cells on cheap plastics



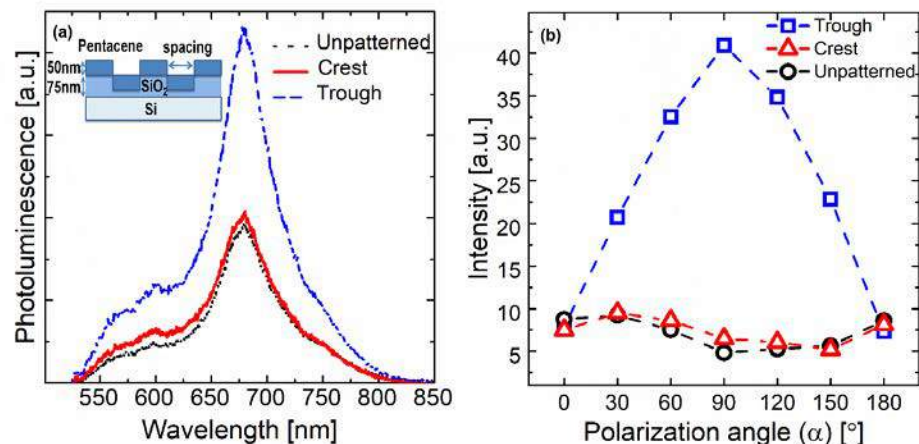


**Dr. Jayeeta Bhattacharyya**  
PhD Tata Institute of Fundamental Research  
Assistant Professor, Physics  
044-2257-4856; jayeeta@iitm.ac.in



## Major Areas of Research

- Spectroscopic study of organic semiconductors
- Time resolved measurements – Ultrafast spectroscopy
- Investigation of carrier dynamics in THz domain



Effect of surface patterning on pentacene thin films



THz time domain spectroscopy set-up





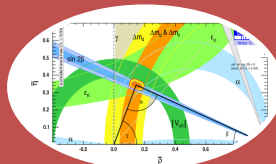
**Dr. Jim Libby**  
**D. Phil., University of Oxford, UK**  
Professor, Dept. of Physics  
044-2257-4885; libby@iitm.ac.in  
[https://www.physics.iitm.ac.in/people\\_files/faculty/libby.html](https://www.physics.iitm.ac.in/people_files/faculty/libby.html)



- Experimental particle physics
- CP violation – origin of the matter anti-matter asymmetry in the universe
- Neutrino physics – studies with the India-based Neutrino Observatory (INO)



Particle detector  
development for INO



Measurements of CP  
violation using existing data  
from collider experiments



Simulation studies for  
future high luminosity  
flavour factories

**Instrumentation and data analysis for particle physics**





**Dr. C. V. Krishnamurthy**  
**PHD, IIT Madras, India**  
Associate Professor, Dept. of Physics  
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<http://www.iitm.ac.in/...>



- Acoustic/Elastic Wave Propagation (Simulations / Experiments)
- Electromagnetic Wave Propagation (Simulation / Experiments)
- Thermal physics (Molecular Dynamics based approach / Experiments)
- High resolution capacitance sensing (Computational / Experimental aspects)

Linear and Nonlinear  
Wave-Matter  
Interactions for Imaging  
Applications

Heat absorption and  
transport in meso- and  
nano-scales  
(Fourier / non-Fourier  
heat conduction in  
complex media;  
and thermal imaging)

Dielectric response of  
materials on meso- and  
nano-scales



Dr. S. Lakshmi Bala  
Ph.D., Madras University, India  
Professor, Dept. of Physics  
044-2257-4869; slbala@physics.iitm.ac.in



- Open quantum systems
- Dynamical systems
- Anholonomies in classical and quantum systems

Nonclassical effects in  
wavepacket dynamics, Bose  
Einstein condensates

Ergodicity properties of  
quantum expectation values  
in light-atom interactions

Berry phases and Hannay  
angles in atom optics

**Theoretical aspects of the interaction of the radiation field with atoms**



**Dr. Manoj Gopalakrishnan**  
**PHD, Institute of Mathematical Sciences, India**

Associate Professor, Dept. of Physics

044-2257-4894; [manojgopal@iitm.ac.in](mailto:manojgopal@iitm.ac.in)

<http://www.physics.iitm.ac.in/~manoj>

**THEORETICAL STUDIES IN BIOPHYSICS AT THE LEVEL OF THE CELL**

- Noise and its impact on cellular functions
- Active transport in the cell and its properties

Motor protein motion  
and active vesicle  
transport

Microtubule dynamics in  
Cell division

Chemotaxis of micro-  
organisms

**PHYSICAL MODELING OF PROCESSES IN THE LIVING CELL**



# Dr. Manu Jaiswal

Graphene & 2D systems Lab

Associate Professor, Department of Physics

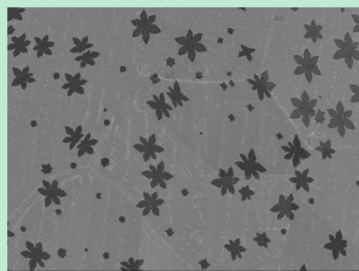
044-2257-4893; [manu.jaiswal@iitm.ac.in](mailto:manu.jaiswal@iitm.ac.in)

[http://www.physics.iitm.ac.in/~manu\\_jaiswal/](http://www.physics.iitm.ac.in/~manu_jaiswal/)



## Major Areas of Research

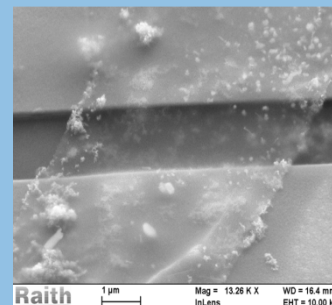
- ❖ Basic physics of 2D membranes. Graphene & 2D systems for flexible electronics.
- ❖ Structure, dynamics of water in confinement. Water purification.
- ❖ Interfacial phenomena in 2D. Devices and Sensors. Van der Waals heterostructures.
- ❖ Mesoscopic physics of graphene & 2D systems.
- ❖ Conducting polymers – soft matter and electrical transport.



Growth of Graphene by  
Chemical Vapor Deposition



Nanoscale transistor device  
with electron-beam lithography



Investigating Basic Physics and  
Applications

← SYNTHESIS

FABRICATION

CHARACTERIZATION →

[Back to Top](#)

Dr. G. MARKANDEYULU Professor, Dept. of Physics

PhD: Indian Institute of Technology Madras

Post-doctoral: IIT Kharagpur and TIFR

Date of joining the institute: April 7, 1993

044-2257-4870; [mark@iitm.ac.in](mailto:mark@iitm.ac.in) <http://www.iitm.ac.in/physics>



## Magnetic Materials and their applications

Magnetoimpedance  
in Fe and Co based  
ribbons and  
thin films

*Magnets with larger  
energy products than  
offered by ferrite  
magnets - proposal*

Magnetostriction:  
rare earth iron  
intermetallics; rare  
earth doped ferrites

*Magnetic field sensor  
using ribbons / thin  
films exhibiting  
magnetoimpedance*

Rare earth doped  
ferrite magnet  
materials and  
magnets

*Magnetostrictive active  
elements for high  
frequency applications  
and field sensing  
applications -  
proposal*

[Back to Top](#)





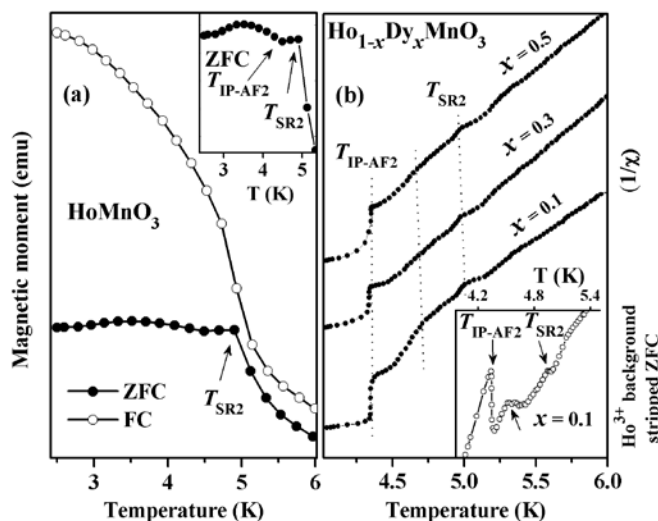
# Dr. P. Murugavel

Associate Professor, Dept. of Physics  
IIT-Madras

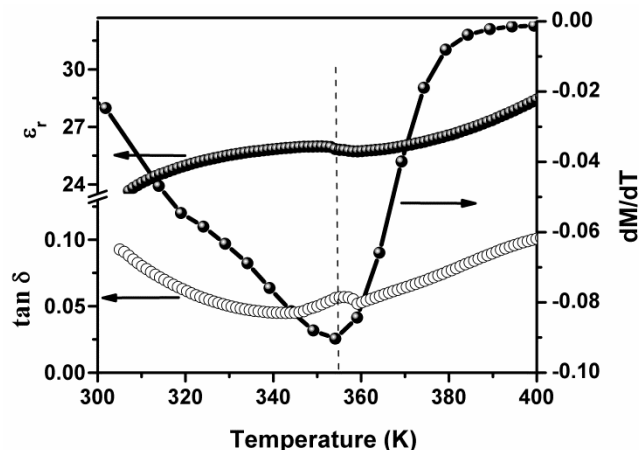
Ph: 044-2257-4897; Email: muruga@iitm.ac.in



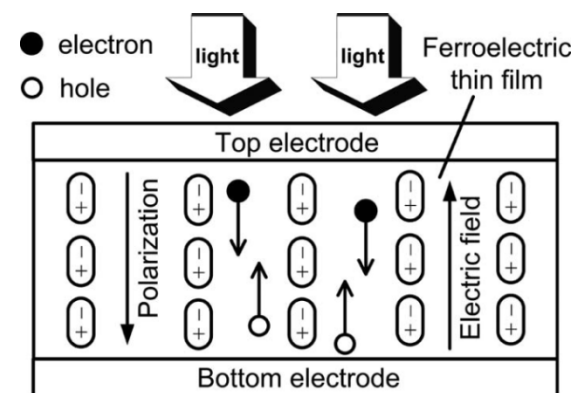
- Magnetic and dielectric studies on rare earth manganites  $\text{RMnO}_3$  (R = rare earth).
- Magnetoelectric effect in ferroelectric-ferromagnetic nanocomposites and solid solutions.
- Photoelectric effect on nonconventional oxide ferroelectrics.



M-T curve showing ordering of Mn moment at low temperatures in  $\text{RMnO}_3$



Studies revealing magnetoelectric coupling at 356 K in  $\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3$ -PVDF nanocomposite film



Photovoltaic effect in ferroelectric thin film



Dr. B. R. K. Nanda

Ph. D, IIT Bombay

Associate Professor, Physics Dept., IIT Madras

+91-44-2257-4887, nandab@iitm.ac.in

<http://www.physics.iitm.ac.in/~nandab/>



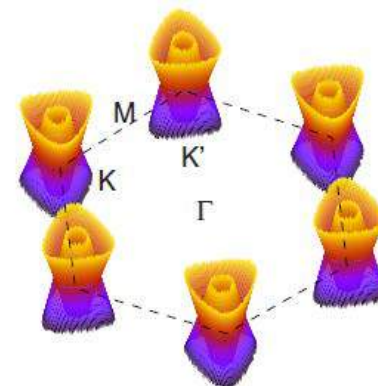
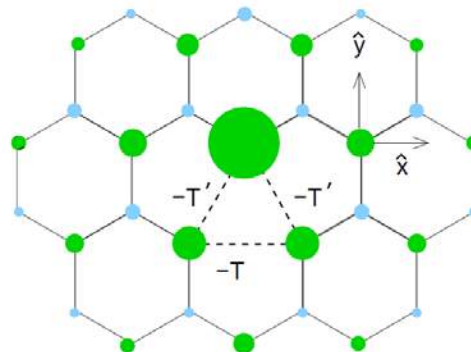
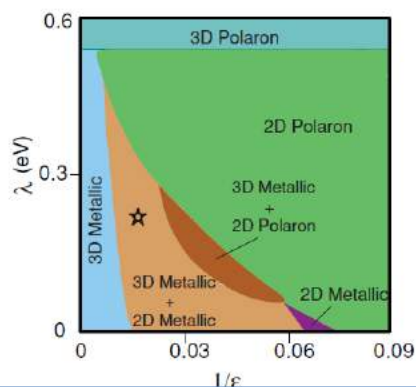
## Condensed Matter Theory & Computational

### ❑ Nanoscale Electronic and Magnetic Properties:

- Oxide Interfaces/Superlattices
- Graphene

### ❑ Energy Research:

- Lithium based Cathode Materials



Phases at the  $\text{LaAlO}_3/\text{SrTiO}_3$  interface as a function of electron-lattice coupling and dielectric constant

Scope for spintronic applications

Induced Spin density in monolayer graphene with a single vacancy

$S = n \uparrow n \downarrow$  (+ve green, -ve blue)

Scope for magnetism in graphene

Electric field induced Fermi surface in hexagonal bilayer graphene:

Scope for hole and electron doping [Back to Top](#)



Dr. Neelima M. Gupte

Professor, Physics

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<https://www.physics.iitm.ac.in/people/faculty/gupte.php>

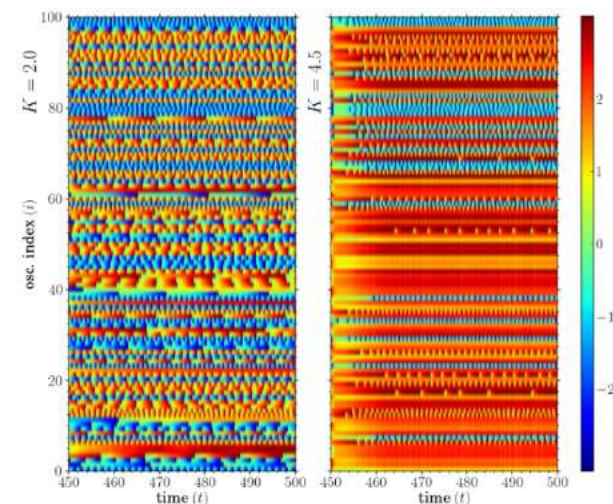


## Major Areas of Research

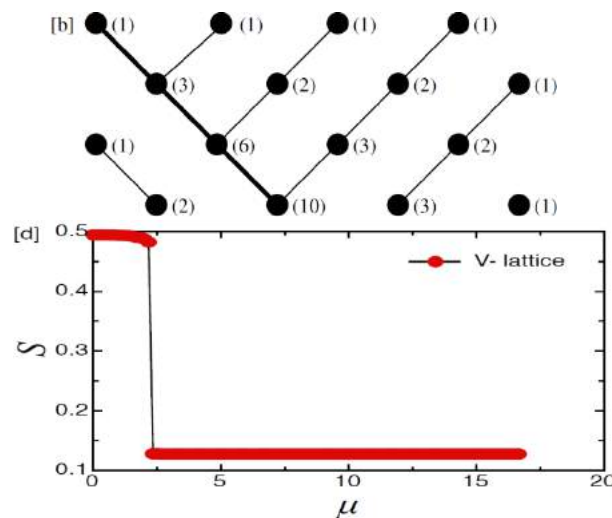
Dynamics of spatially extended systems

Explosive collective phenomena

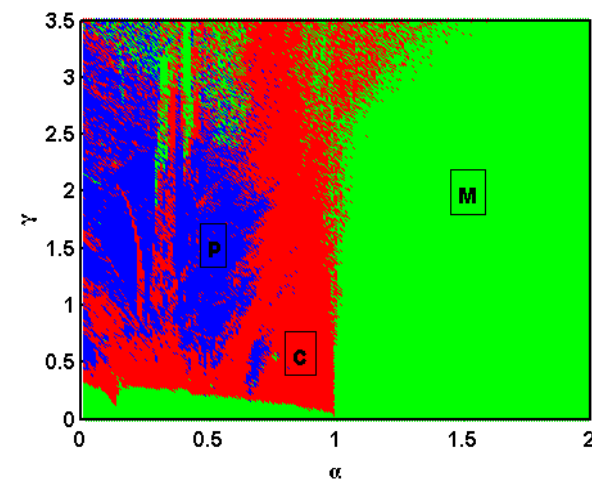
Dynamics and statistics of impurities in flows



Chimera states of oscillators



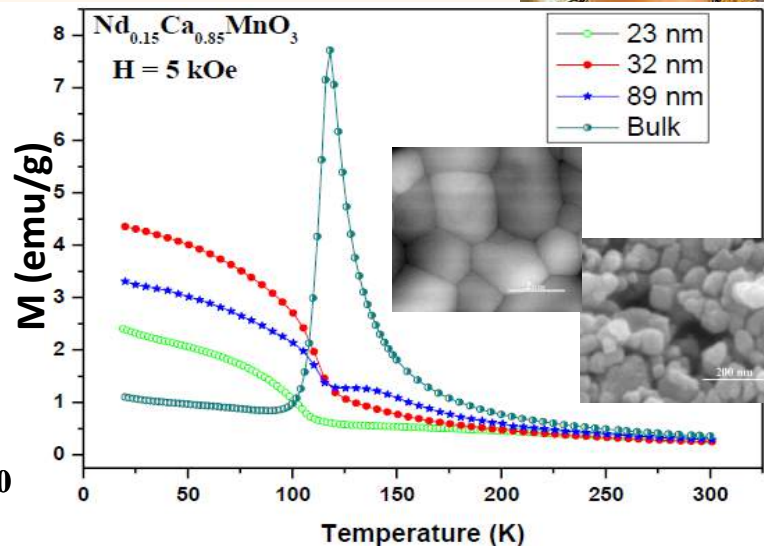
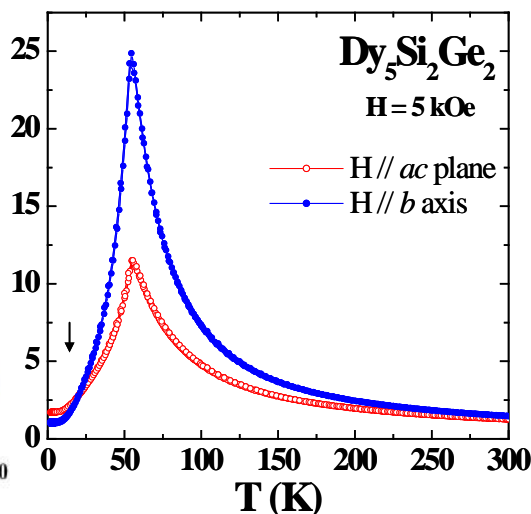
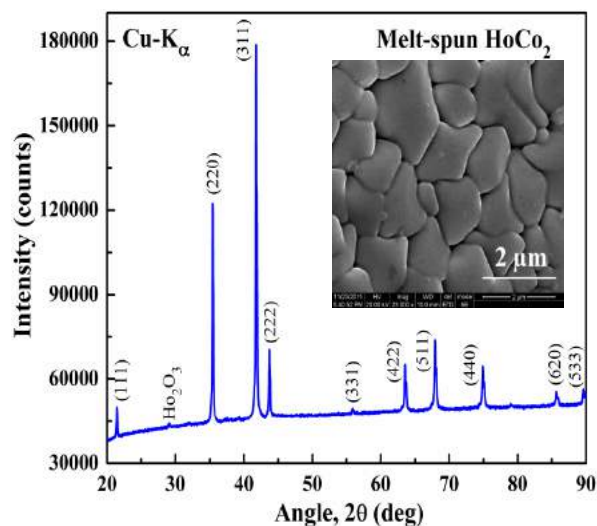
Explosive percolation



Impurity Dynamics in the ABC Map



R. Nirmala, Physics



- Structure-Property relationships in Rare earth intermetallic compounds, alloys and oxides
- Magnetic entropy changes near magneto-structural transitions – materials for Magnetic cooling/heating applications
- Microstructure and Particle size dependence of magnetic properties





# Dr. Panchanana Khuntia

Assistant Professor, Physics

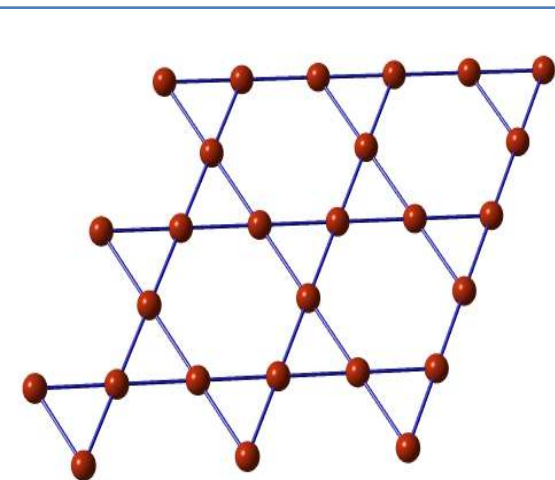
044-2257-4847; pkhuntia@iitm.ac.in

<https://physics.iitm.ac.in/pkhuntia>

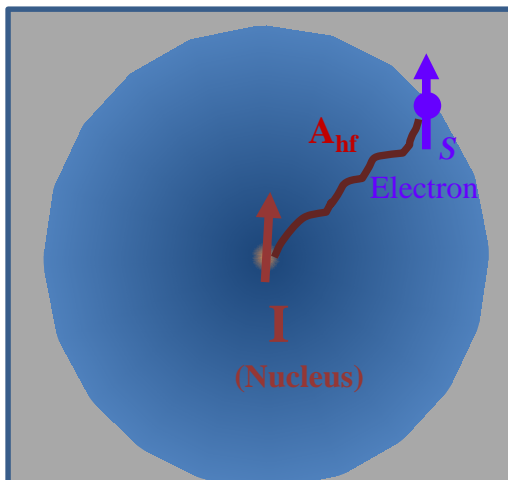


## Major Areas of Research

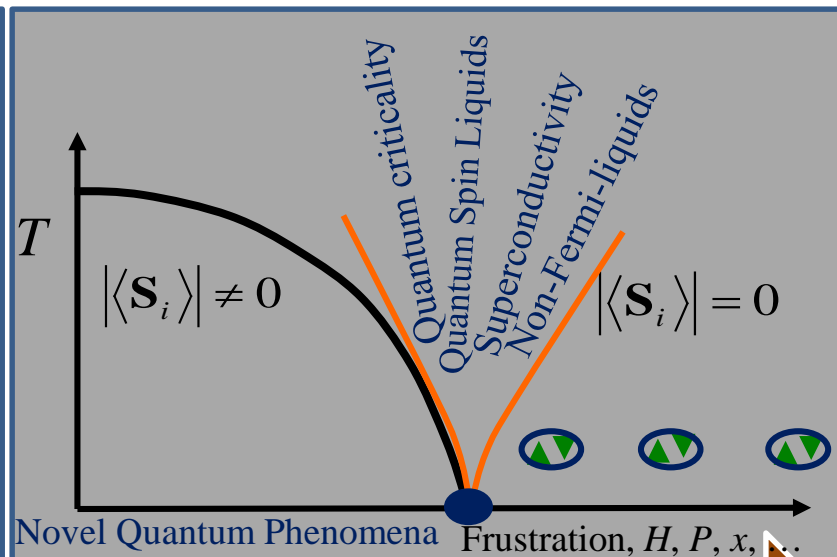
- ❖ Design, growth, characterization, and investigation of novel quantum materials
- ❖ Exploring dynamic properties of correlated electron systems by NMR,  $\mu$ SR and Neutron Scattering encompassing a wide range of energy scales and sensitive to spin, charge and orbital degrees of freedom
- ❖ Microscopic insights into topological order and elementary excitations in quantum materials



Novel Materials



Microscopic Probes



Novel Quantum Phenomena

Novel Quantum States in Condensed Matter Physics

[Back to Top](#)





**Dr. M. Pattabiraman**  
**PHD, IIT, Madras, India**

Associate Professor, Dept. of Physics

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<http://www.iitm.ac.in/component/faculty/81/pattu/>



- **Research Area:** Experimental Atomic Physics and Quantum Optics
  - We study the coherent interaction of light with atoms in order to control and manipulate their optical properties
- **Applications:**
  - Measurement of ultra-low magnetic fields
  - Low-noise frequency standards for atomic clocks



# Dr. Prabha Mandayam

## PhD, California Institute of Technology

Assistant Professor, Physics

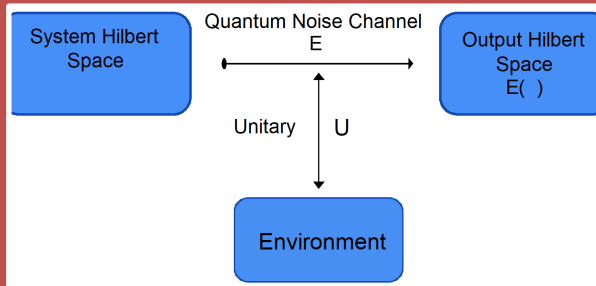
044-2257-4853; prabhamd@iitm.ac.in

<http://www.physics.iitm.ac.in/~prabhamd>



### Major Areas of Research

- **Quantum Error Correction** : Modelling decoherence in physical systems and evolving schemes to tackle such decoherence efficiently
- **Quantum Cryptography & Foundations** : Understanding the interplay between complementarity and incompatibility

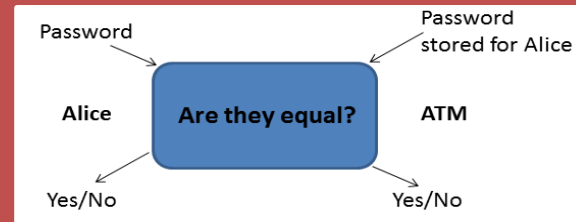


A general framework for  
**Approximate Quantum Error  
Correction**

Quantifying  
**incompatibility**

&

Identifying  
**measurement bases**  
which are most  
incompatible



Two-party protocols in  
**noisy-storage quantum  
cryptography**

**Quantum Information and Quantum Computing**

[Back to Top](#)



Dr. Prabhat Ranjan Pujahari

PhD, Indian Institute of Technology Bombay

Assistant Professor, Physics

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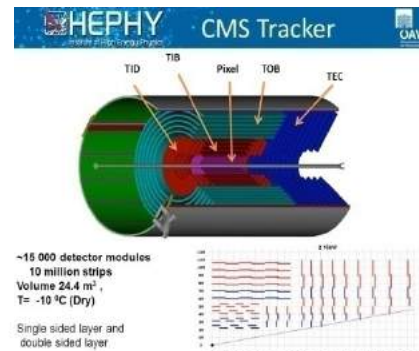
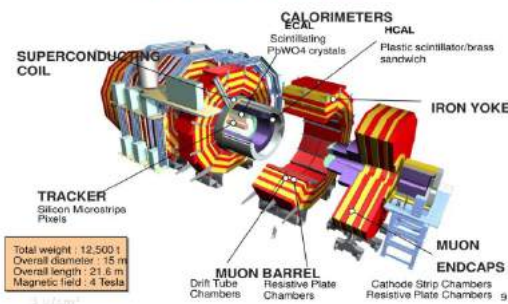
<https://physics.iitm.ac.in/p.pujahari>



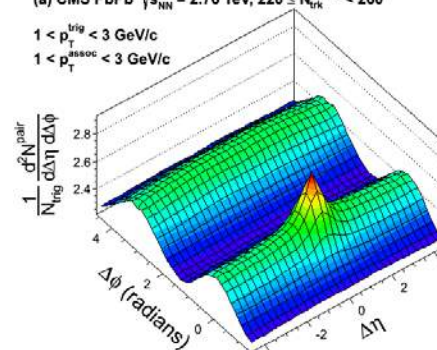
- Experimental High Energy Heavy-Ion Physics in CMS at the Large Hadron Collider, CERN, Geneva
- Study the properties of a new form of matter at extreme conditions of temperature and energy density known as Quark Gluon Plasma (QGP)
- The physics of 'Origin of Mass' and the different phases of the early Universe
- Two-particle correlation, azimuthal anisotropy, charge balance function
- CMS silicon tracker detector up gradation program at LHC

## Ridge and collective flow

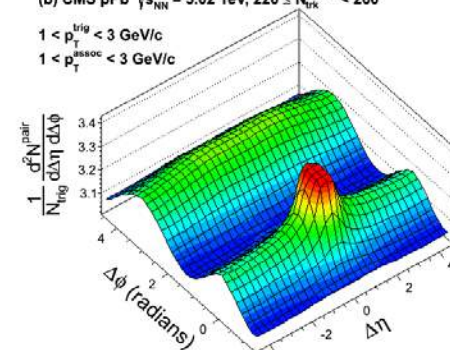
### The CMS Detector



(a) CMS PbPb  $\sqrt{s_{NN}} = 2.76$  TeV,  $220 \leq N_{trk}^{offline} < 260$   
 $1 < p_T^{trig} < 3$  GeV/c  
 $1 < p_T^{assoc} < 3$  GeV/c



(b) CMS pPb  $\sqrt{s_{NN}} = 5.02$  TeV,  $220 \leq N_{trk}^{offline} < 260$   
 $1 < p_T^{trig} < 3$  GeV/c  
 $1 < p_T^{assoc} < 3$  GeV/c



[Back to Top](#)



# Dr. Prafulla Kumar Behera

PHD, KEK supported, Japan  
Associate Professor, Dept. of Physics

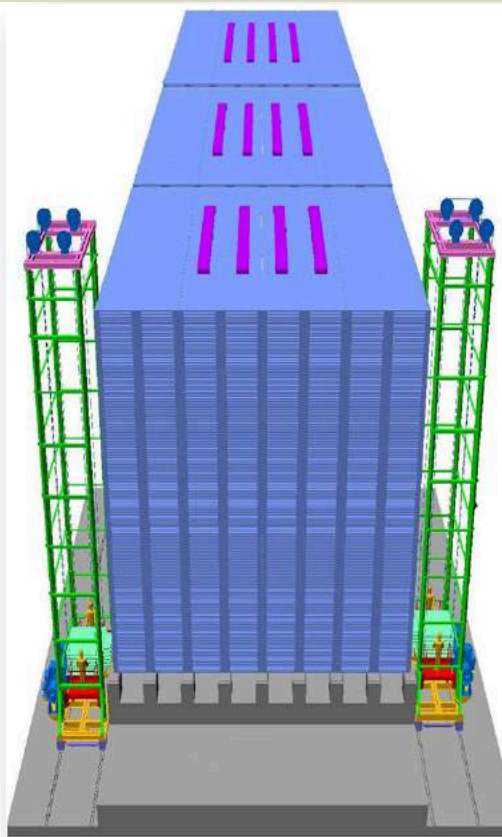
044-2257-4898; [behera@iitm.ac.in](mailto:behera@iitm.ac.in)

<http://www.physics.iitm.ac.in/~behera>



- Focus: Measuring properties of neutrinos using experimental tools. A member of India-based Neutrino Observatory (INO). Actively involved in ICAL Detector development and detector simulation.
- Understand the matter and antimatter asymmetry in the Universe and the origin of mass as part of the BELLE, KEK, Japan and ATLAS experiment, CERN, Switzerland.

Proposed ICAL Detector, India



BELLE Detector, Japan





# Dr. Prahallad Padhan

## PHD, IIT Madras, India

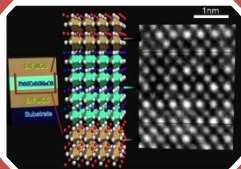
Associate Professor, Dept. of Physics

044-2257-4884; padhan@iitm.ac.in

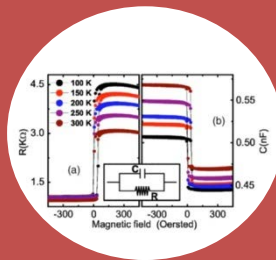
[https://www.physics.iitm.ac.in/people\\_files/faculty/padhan.html](https://www.physics.iitm.ac.in/people_files/faculty/padhan.html)



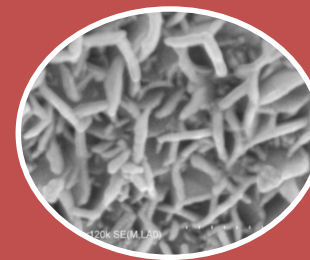
- Research Area/Focus 1 : Transition metal oxide Multilayers/Superlattices
- Research Area/Focus 2 : Thin film devices
- Research Area/Focus 3 : Transition metal oxide nanostructures



APPLICATION 1 :  
Magnetic sensing and  
storage technology



APPLICATION 2 :  
Magnetic random access  
memory



APPLICATION 3 :  
Anode of lithium-ion  
battery





# Dr. Prasanta Kumar Tripathy

## Ph.D., Utkal University, India

Associate Professor, Dept. of Physics

044-2257-4889; [prasanta@iitm.ac.in](mailto:prasanta@iitm.ac.in)

<http://www.physics.iitm.ac.in/~prasanta>



- Calabi-Yau Compactification
- Black Holes, Supergravity
- Attractor Mechanism

Moduli Stabilization String Theory,  
Flux Compactifications  
Calabi-Yau compactifications

Macroscopic Black Hole Entropy  
And Attractor Mechanism for  
Stringy Black Holes

Non-Supersymmetric Attractors  
and Their Stability  
Bianchi Attractors in Gauged  
Supergravity theory

**String Theory and Supergravity, Quantum Field Theory, High Energy Physics**



# Dr. Prem B. Bisht

## Ph.D., Kumaun University, India

Professor, Dept. of Physics  
044-2257-4866; bisht@iitm.ac.in  
<https://www.physics.iitm.ac.in/~prem/>



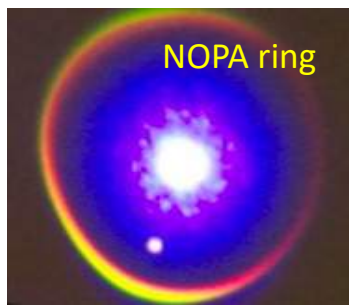
- Optical parametric amplifiers for : fabrication & characterization
- Whispering gallery modes of single microcavity; fluorescence microscopy
- Materials probed with ultrafast laser pulses for photonic applications

### I. White light continuum and Optical parametric amplification: Ultrafast lasers

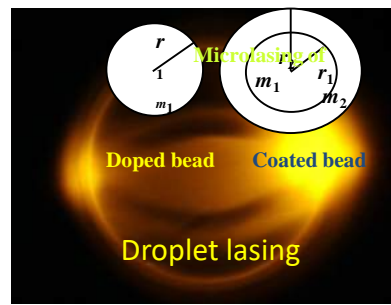


WLC

### II. Whispering Gallery Modes (WGM) of a micro-cavity: Sensing applications



NOPA ring



Doped bead Coated bead

Droplet lasing

### III. Laser Induced transient gratings: Nonlinear optics and photonic applications of nanomaterials



Phase Conjugation



# Dr. M.S. Ramachandra Rao

Professor, Department of Physics

Nano Functional Materials Technology Centre and MSRC

044-22574872; msrrao@iitm.ac.in

<http://www.physics.iitm.ac.in/~msrrao>

**Research Theme: “Oxide electronics, Thin Film Nanostructures and Energy Harvesting”**

**Research Areas:** Physics and applications of oxide electronics; ZnO nanostructures for light emission; Physics of doping in ZnO; Physics of diffusion in oxide nanoparticles; Magnetic nanoparticles; Spintronics and Tunnel junctions; Nanocrystalline diamond for mechanical applications; CIGS/CZTS nano-ink for photovoltaic applications; Topological insulators; Physics of strongly correlated systems; Quantum effects in nanosystems; Materials for energy harvesting.

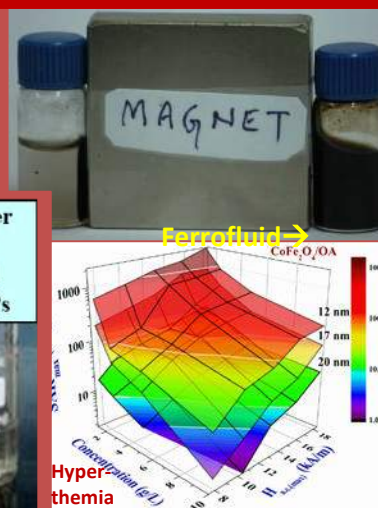
## Physics and Applications of Nanostructured Thin Films and Nanomaterials



← Coated WC tools for improved mechanical applications

Nanocrystalline diamond (NCD) coatings are known for their tribological characteristics ( $\mu < 0.1$ ) and wear resistance. They are potential coatings for mechanical and space applications.

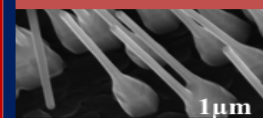
### Magnetic Nanoparticles



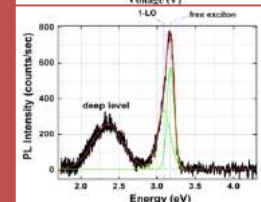
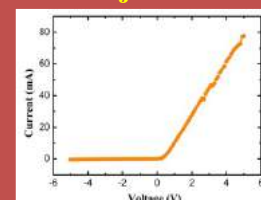
Hyperthemia

### p-ZnO/n-Si Heterojunction diode

1D ZnO nanorods and thin films can be used in UV/blue LEDs and as UV detectors.



ZnO nanorods



PL spectrum of nanorods



# Dr. S. Ramaprabhu

## Ph.D., IIT Madras, India

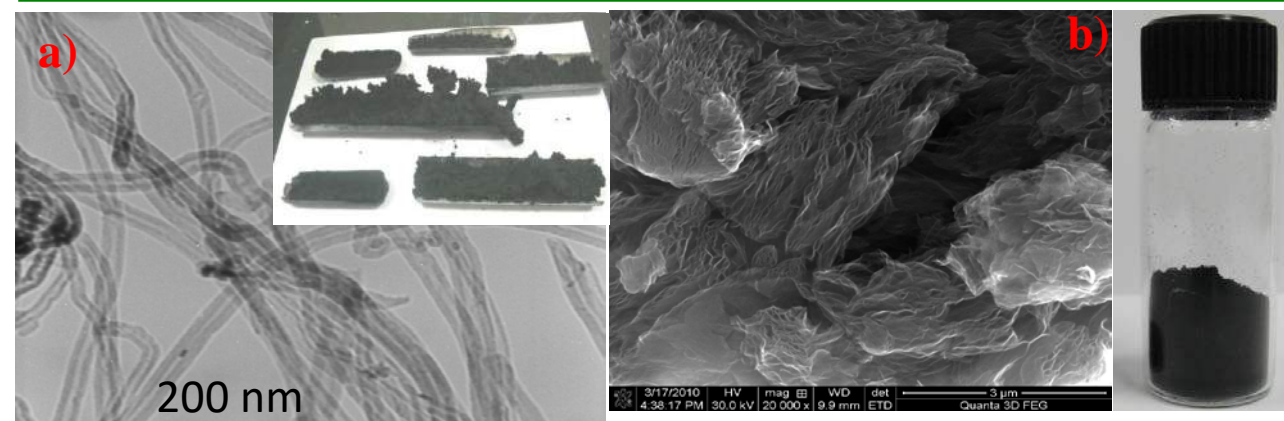
Professor, Dept. of Physics

044-22574862; [ramp@iitm.ac.in](mailto:ramp@iitm.ac.in)

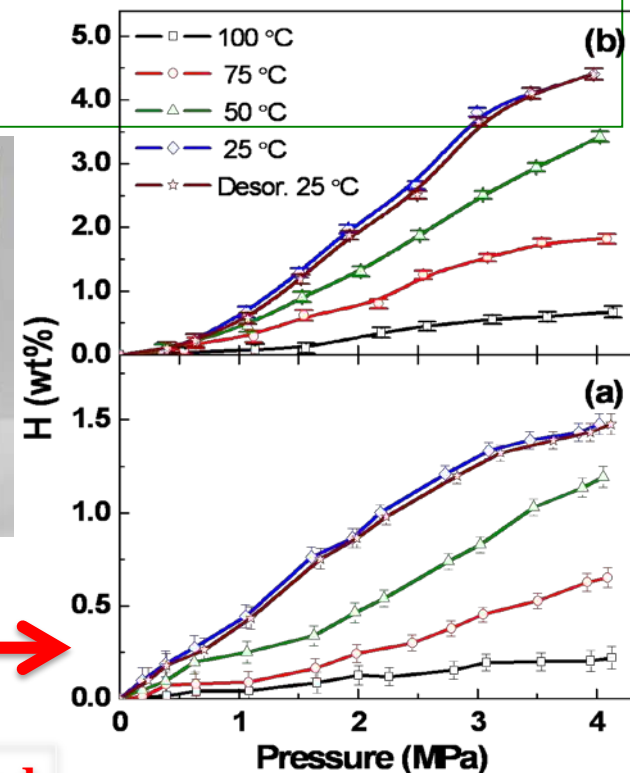
<http://www.physics.iitm.ac.in/~ramp>



- ❖ **Nanomaterials/Synthesis of Carbon NanoTubes and graphene; application to Fuel cell; PV; water purification; CO<sub>2</sub> capture; supercapacitor; biosensors**
- ❖ **Hydrogen Storage in Nanomaterials**
- ❖ **Nanofluids/synthesis; coolant applications**



- a) Carbon Nanotubes synthesized by CCVD technique**
- b) Graphene synthesized by hydrogen exfoliation method**



**Hydrogen adsorption isotherms of (a) Nitrogen doped Graphene (N-G) and (b) Pd-N-G in the ranges 25-100°C and 0.1-4 MPa.**



**Dr. V. SANKARANARAYANAN**  
**Ph.D, IIT Madras, Chennai-600036**

Professor, Dept. of Physics

044-2257-4873; [vsu@iitm.ac.in](mailto:vsu@iitm.ac.in)

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- Magnetocaloric Effects
- Studies on Colossal Magnetoresistance (CMR) materials
- Superconductivity & Cryogenics
- Solid Oxide Fuel Cells – Basic studies on materials

Study of Rare-earth intermetallics and oxides containing rare-earth for magnetic refrigeration applications a technology which is environmental friendly

Physical property studies on CMR materials and High  $T_c$  Superconductors; Design of Liquid helium cryostats for electrical and thermal property studies

Dielectric relaxation studies on Ceria doped materials for SOFC applications in the intermediate temperature range .

**Low Temperature Physics and Cryogenics**





# Dr. Santhosh P N

## PHD, University of Pune , India

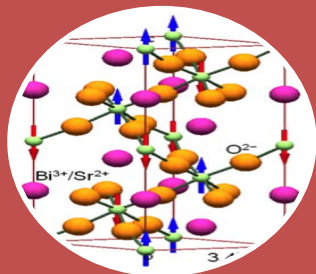
Professor, Dept. of Physics

044-2257- 4882

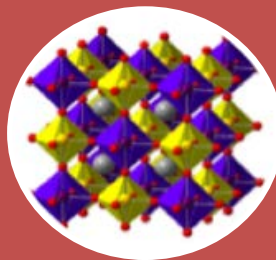
[http://www.iitm.ac.in/people\\_files/faculty/santosh.html](http://www.iitm.ac.in/people_files/faculty/santosh.html)



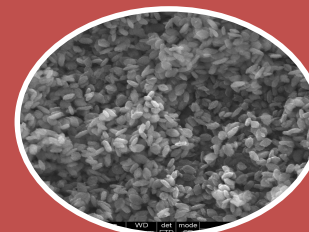
- Experimental Condensed Matter Physics:/Multiferroics
- Structure-property correlations, DFT calculations of Advanced Oxide Materials
- Magnetic and semiconducting nano particles



$\text{Bi}_{0.5}\text{Sr}_{0.5}\text{FeO}_3$  multiferroic  
Double perovskite multiferroics



Order-disorder in perovskites  
New double layered brownmillerites



Ni/NiO core-shell structure  
 $\text{CuO}$ ,  $\text{FeSe}_2$ ,  $\text{Fe}_3\text{Se}_4$  nano particles  
Gold nano particles for bio applications

**Experimental Condensed Matter Physics/ Multifunctional materials**



# Dr. M. V. Satyanarayana

PHD, Institute of Mathematical Sciences, Madras University  
India

Professor, Department of Physics

044-2257-4874; mvs@iitm.ac.in

<http://www.iitm.ac.in/...>



- Quantum Optics/ Optical Coherence, Non-classical states of radiation
- Quantum Mechanics/ Entanglement – role of squeezing and anti-bunching, atom-radiation interaction
- Fresnel Optics/ connection between squeezing and Fresnel propagation

**I am interested in non-classical states of radiation like squeezed and anti-bunched states – its generation and applications to novel sources of radiation. I am also interested in interaction of such states of radiation with atoms and molecules for the purposes of lasing. In this process I also study the role of entanglement in quantum optics. Recently, I am looking into the connection between Fresnel optics and squeezing. Essentially, my interests are in the dynamics of atom(s)-radiation interaction(s) with applications to novel sources of light.**



**Dr. K. Sethupathi**  
**PhD, Moscow State University, Russia**

Professor, Department of Physics

044-2257-4875; [ksethu@iitm.ac.in](mailto:ksethu@iitm.ac.in)

<http://www.iitm.ac.in/...>



- **Magnetism and Transport properties of Colossal Magnetoresistance Oxides at low temperatures**
- **Novel materials in the bulk, thin film and nanocrystalline forms**
- **High Temperature Superconductors and**
- **Cryogenic Insulation**

**Novel materials that exhibit large magnetoresistance for magneto resistive sensors and spintronic device applications**

**Magnetic refrigeration materials for cooling applications**  
**New materials for electronic cooling**



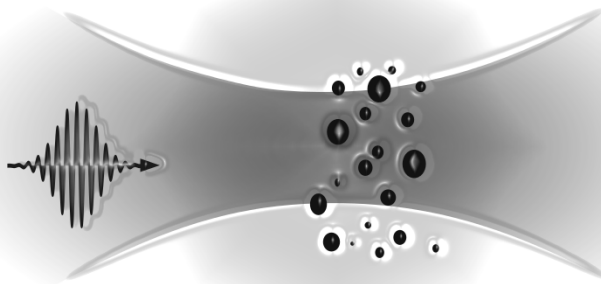
# Sivarama Krishnan, Ph.D.

## Assistant Professor - Physics

044-2257-4857; srkrishnan@iitm.ac.in

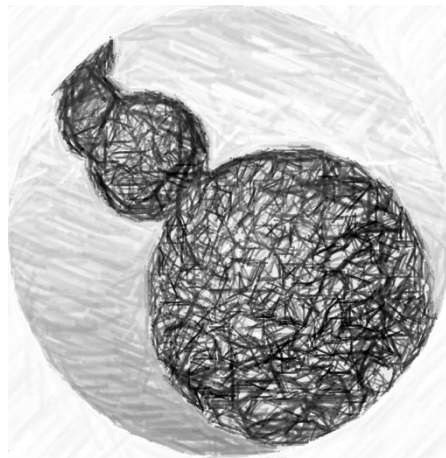


## Ultrafast meets ultrasmall

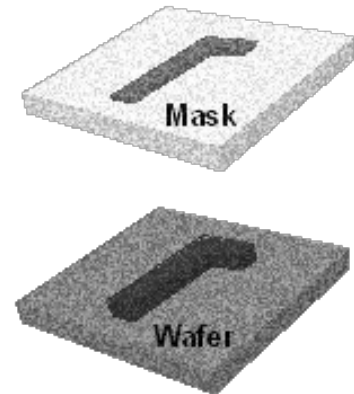


Femto- and atto-second physics  
of nanoscale atomic & molecular  
systems

Synchrotron physics  
of nanoscale systems



Dynamics in  
Nanoscale superfluids



Nanolithography  
next generation technologies

[Back to Top](#)



# Dr. Somnath Chanda Roy

## PhD, IIT Delhi, India

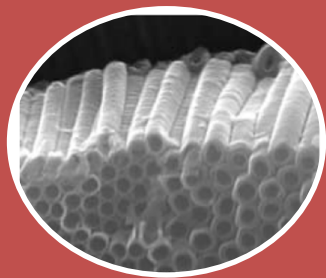
Associate Professor, Dept. of Physics

044-2257-4886; [somnath@iitm.ac.in](mailto:somnath@iitm.ac.in)

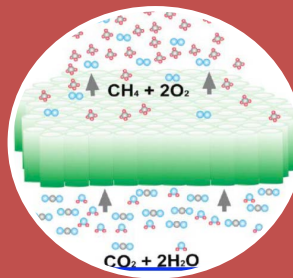
<http://www.physics.iitm.ac.in/~somnath>



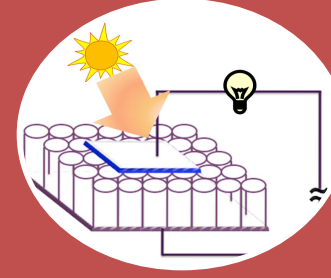
- Synthesis and characterization of metal-oxide nanostructures and thin films
- Study of Electronic conduction and Photo-catalytic properties
- Use of nano-materials for clean Energy and Environment



Metal oxide Nanotubes  
Sensors for Green-house  
Gases



Generation of  
Hydrogen/Hydrocarbons from  
water/ $\text{CO}_2$  using solar energy



Solid state, Hybrid Solar Cells  
based on nanomaterials

**The Environmental Nanotechnology Lab : Novel Nanostructures for (i) Detection of pollutants (ii) Recycling of  $\text{CO}_2$  through Photo-catalysis (iii) High efficiency Solar cells**





# Dr. V. Srinivas

## Ph.D, IIT Bombay, India

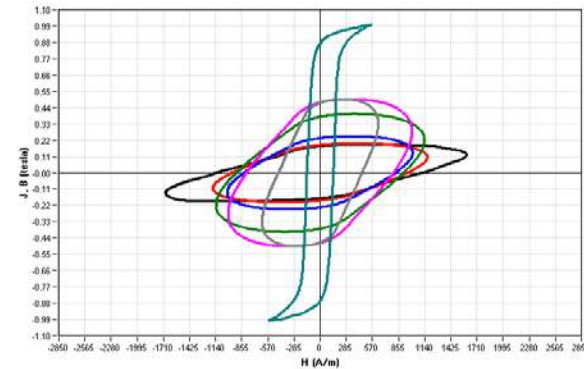
Professor, Dept. of Physics

044-2257-4896; veeturi@iitm.ac.in

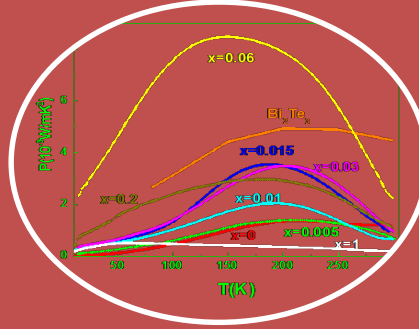
[http://www.physics.iitm.ac.in/people\\_files/faculty/veeturi.html](http://www.physics.iitm.ac.in/people_files/faculty/veeturi.html)



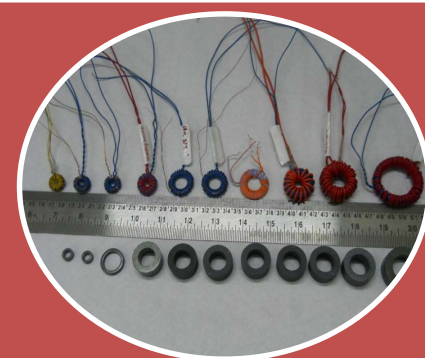
- Low temperature magnetic and electrical properties.
- Electronic properties of complex band structure materials.
- Development of soft magnetic composites for ac applications.



Synthesis & study of  
Crystalline alloys & compounds  
Disordered & nanomaterials



Magnetic & electrical transport  
Metal-Insulator transitions,  
Magnetic effects GMR, GMI



SFM composites ac applications  
Thermoelectrics/Pseudogap  
engineering

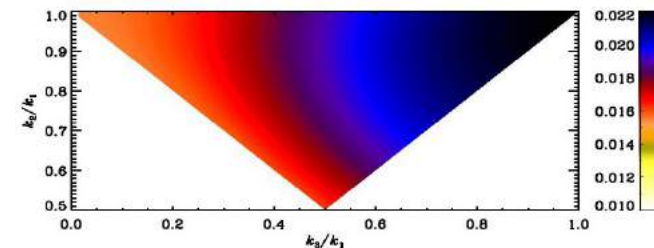
Investigation of Physical properties of materials for device applications



**Dr. L. Sriramkumar**  
**Ph.D., IUCAA, Pune**  
Professor, Department of Physics  
044-2257-4854; [sriram@iitm.ac.in](mailto:sriram@iitm.ac.in)  
<http://www.physics.iitm.ac.in/~sriram/>



- **Origin of perturbations during inflation**
- **Signatures on the Cosmic Microwave Background (CMB)**
- **Semi-classical gravity and the physics of black holes**



### Origin of perturbations during inflation

- Deviations from slow roll and features in the primordial power spectrum
- Generation of primordial non-Gaussianities
- Evolution of power and bispectra post inflation

### Signatures on the CMB

- Comparison of inflationary models with the recent WMAP and Planck data
- Efficient numerical computation of inflationary bispectra (figure above)
- Imprints of primordial bispectra on the CMB

### Semi-classical gravity and the physics of black holes

- Issues related to the origin of Hawking radiation and black hole entropy
- Possible quantum gravitational corrections
- Phenomenological models of quantum gravity



# Dr. A.Subrahmanyam

Professor, Department of Physics

044-2257-4865; manu@iitm.ac.in  
<http://www.physics.iitm.ac.in/~manu>



## Major Areas of Research

- Metal oxide thin films
- Photocatalysis
- Surface Engineering
- Coatings for biomedical applications

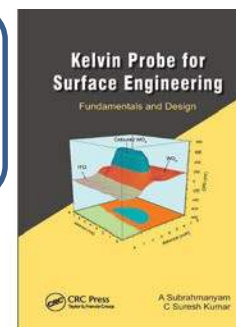
## **Present work (Doctoral Students) :**

- ❖ Silver oxide based Surface Enhanced Raman Scattering (SERS)
- ❖ Gas flow cathode design for nano mixed metal oxides
- ❖ Silver nano clusters using Micro plasmas

**For surface engineering studies:** We have designed and built a Kelvin Probe technique for non-destructive evaluation of Semiconductor and metal surfaces

## **Industrial collaboration :**

- Photovoltaics with M/s Saint Gobain
- Developing an electrochromic device with M/s Sandhar Technologies





# Dr. V. Subramanian

## Ph.D. , IIT Madras, India

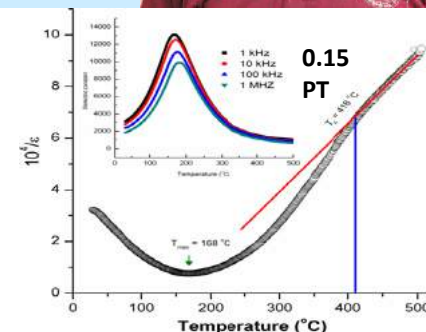
Professor, Microwave Laboratory, Dept. of Physics

044-2257-4883; manianvs@iitm.ac.in

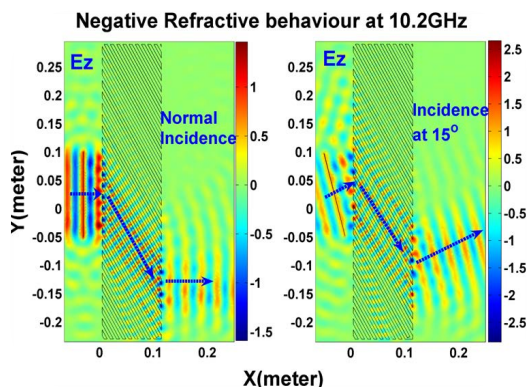
<http://www.physics.iitm.ac.in/~manianvs/index.html>



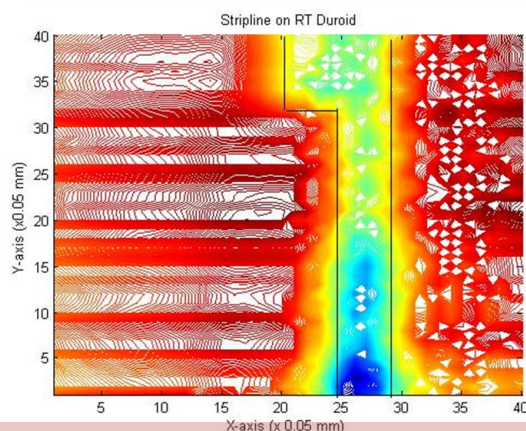
- Dielectrics, Relaxors and Multiferroics
- Photonic Crystals and Metamaterials
- Non-Destructive Evaluation at Microwave Frequencies
- Microwave Imaging
- Magneto-impedance studies at microwave frequencies



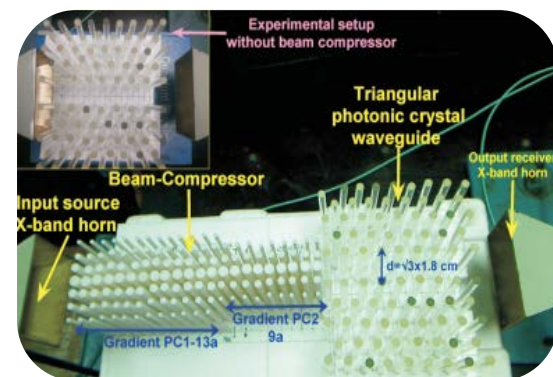
0.15 PT – 0.85 PIN Relaxor



Negative Refraction - Slabs Oriented at 60°



Microwave Near-Field Imaging of a Stripline on RT Duroid Substrate



Spatial Beam Compressor - Based on Photonic Crystal





# Dr. Sudakar Chandran

PhD, IISc Bangalore, India

Associate Professor, Department of Physics, IIT Madras 044-2257-4895;

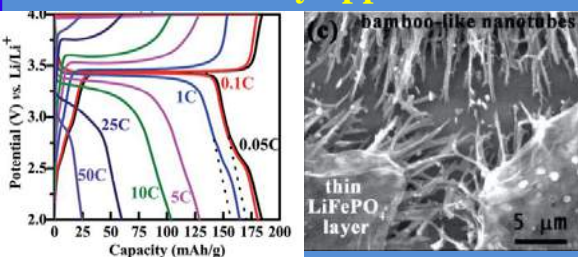
EMAIL: [CSUDAKAR@IITM.AC.IN](mailto:CSUDAKAR@IITM.AC.IN)

<https://home.iitm.ac.in/csudakar/>



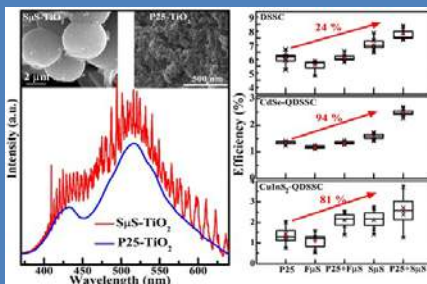
- Materials for energy generation (solar cells) and storage (Li-ion batteries) applications
- High power density cathode and anode materials for quick charge Li-ion batteries
- Novel multifunctional materials with interesting properties for advanced applications
- Defect structure property correlations on composition/microstructure tailored materials
- Nanomaterials for solar cell and LED applications

## High-rate capability materials for Li-ion Battery applications



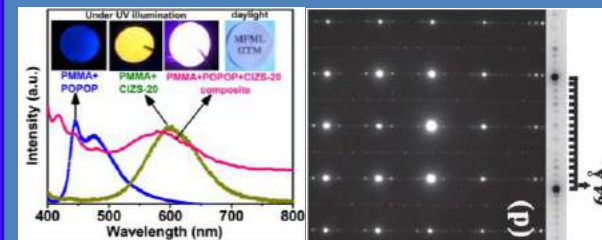
Nanostructured metal oxides for Li ion battery cathode and anode materials; controlling the crystal defect structures and the microstructure to tune the specific capacity and the power density

## High performance photoanodes and sensitizers for solar cell applications



Functional materials for DSSC, QDSSC, Perovskite solar cell applications, bandgap engineering in sensitizers, fabricating high performance photoanodes for enhancing efficiency

## Multifunctional materials and Defect-structure property correlations



Role of oxygen/nitrogen defects and surface/interface effects on the physical properties of semiconducting oxides and nitrides and multiferroics; electrical, optical and magnetic properties studies

MULTIFUNCTIONAL MATERIALS LABORATORY (MFML)

[Back to Top](#)





# Dr. Sunethra Ramanan

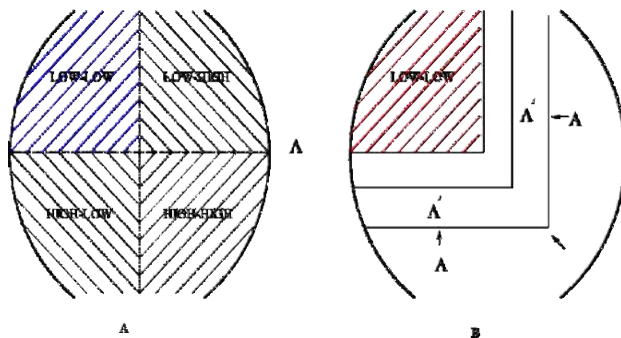
## PHD, The Ohio State University, USA

### Assistant Professor, Dept. Of Physics

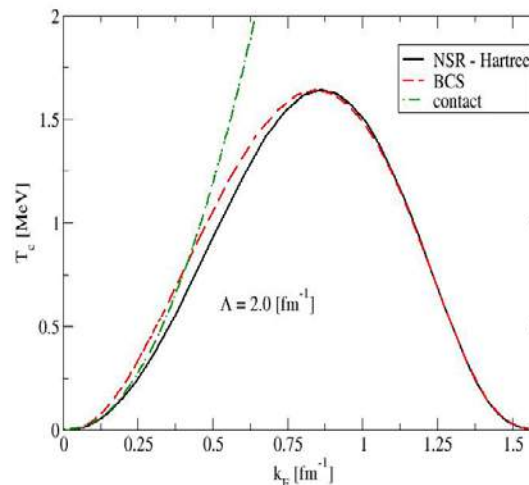
044-2257-4871; suna@iitm.ac.in, suna@physics.iitm.ac.in  
<http://www.physics.iitm.ac.in/~suna>



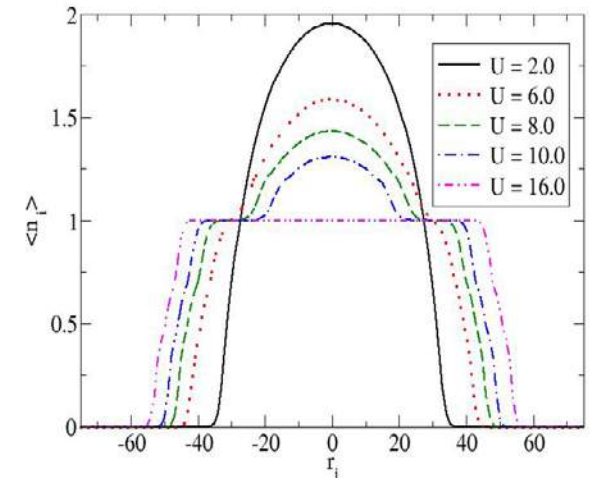
- Effective Field theories and Renormalization Groups
- Nuclear Structure
- Cold Atomic Systems



RG approach to Effective  
Nucleon-nucleon interactions



BEC-BCS crossover  
in neutron stars



Cold bosons in optical  
Lattices



# Dr. P. B. Sunil Kumar

## PHD,1995 Raman Research Institute, India

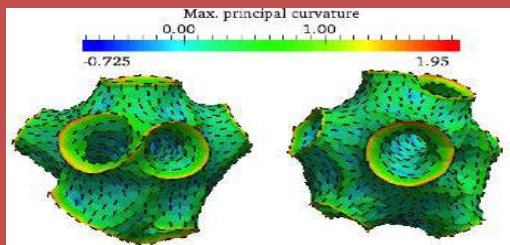
Professor, Dept. of Physics

044-2257-4876; [sunil@iitm.ac.in](mailto:sunil@iitm.ac.in)

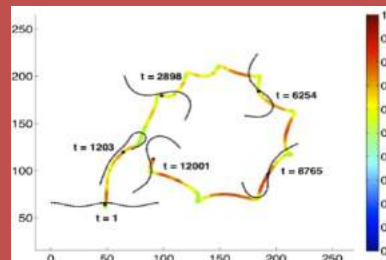
<http://www.physics.iitm.ac.in/~sunil>



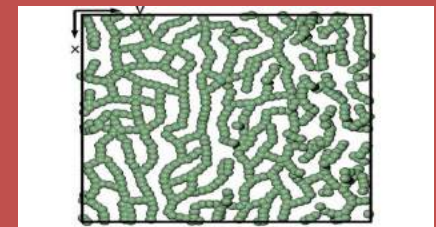
- Soft Condensed Matter Physics
- Biological Physics
- Computational Physics



Lipid Membranes: Modeling equilibrium and dynamical properties of lipid membranes and membrane-protein complexes. Response of membranes to external forces.



Active soft matter: Dynamics of molecular assemblies, that convert chemical energy to mechanical work internally.



Dynamics of polymers.: Rheology and shear induced transitions in polyelectrolytes and living polymer suspensions. Developing coarse grained models for polymers.



Dr. Suresh Govindarajan  
PhD, University of Pennsylvania, USA  
Professor, Dept. of Physics

044-2257-4867; suresh@iitm.ac.in  
<http://www.physics.iitm.ac.in/~suresh>



- String Theory and Conformal Field Theory
- Black Holes and Counting of BPS states
- Mathematical Physics (Partitions, Mathieu Moonshine, Modular Forms)

Counting of  
BPS states in  
string theory

Moonshine for  
the Mathieu  
Groups

Higher  
Dimensional  
Partitions

$p_3(72)=3464274974065172792$

**THEORETICAL HIGH ENERGY PHYSICS & MATHEMATICAL PHYSICS**



# Dr. Vaibhav Madhok

Asst. Professor, Physics

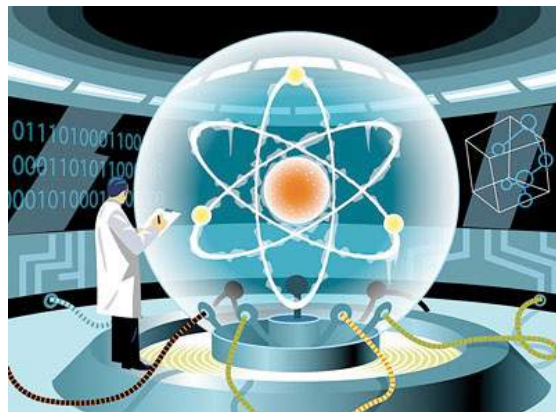
044-2257-4846; madhok@iitm.ac.in



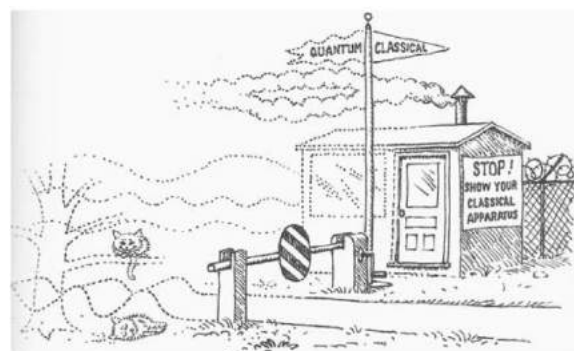
## Major Areas of Research

- Physics of Information, Quantum Information Theory
- Chaos: Quantum and Classical Chaos
- Mathematical Biology and Complex Systems

### Quantum Computation

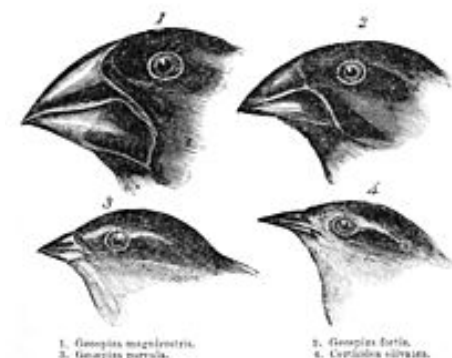


### Quantum-Classical Transition



Drawing by Michael Ramus, 1991.  
© American Institute of Physics

### How do species arise?







# Dr. C Vijayan

Professor, Department of Physics  
cvijayan@iitm.ac.in, 091-044-22574877  
[www.physics.iitm.ac.in/~cvijayan](http://www.physics.iitm.ac.in/~cvijayan)



## Research Interests

Light-Matter Interaction in Novel Nano  
Composites and Random Media, Nanophotonics and Plasmonics

