



Mid-Year Admissions 2025

Introduction

This document lists the faculty members from the department taking students in the mid-year admissions cycle 2025. Only the listed faculty members will be participating in the admissions process and other faculty members in the department will not be taking students in the mid-year cycle. In case, there is interest in other faculty members, please participate in the regular admissions cycle for the academic year 2026-2027.

It also lists representative topics from each of the participating faculty. This is however just tentative and based on mutual interests between the students and faculty members, this can potentially change. Discuss with specific faculty members for more information when participating in the interview.

Procedure

- Please go over this document
- It is expected that when you arrive for your interview, you have a list of a maximum of three faculty members (it can be a smaller number) you are interested to work with and if there are any specific projects listed for them that you are interested in. A choice list is added to this document as Page 3. A similar sheet will be provided to you when you arrive for your interview. Please fill it.

- In the interview, the focus will be primarily on what you have learnt so far, which might include questions from your previous projects, research work, basic course work. If there is reasonable comfort in answering questions on the chosen topics and related areas, that can also be asked. However, the primary focus of the interview will be background work and basics and no knowledge on research topics that would be potentially chosen is expected.
- Please contact the CeNSE office for any questions you might have about the interview process.

Choice Sheet

It is recommended not to have more than **3 choices** (**ideally 2 choices** best suited to your interests). It is expected that some **prior reading up** of research areas, background expectations etc of the chosen faculty members would be undertaken prior to the interview.

Choice Number	Faculty Name
1	
2	
3	

List of Faculty Projects

Faculty – Prof Ambarish Ghosh



Professor

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Group Webpage: <http://www.cense.iisc.ac.in/ambarish/>

Associated Departments: Department of Physics

Education

- Ph.D. Physics, 2004, Brown University, Providence, RI, USA.
- Five year Integrated MSc in Physics. 1997, Indian Institute of Technology, Kharagpur, India.

Experience

- Professor, Indian Institute of Science, Bangalore, India, December 2020 – current.
- Associate Professor, Indian Institute of Science, Bangalore, India, August 2016 – December 2020.
- Assistant Professor, Indian Institute of Science, Bangalore, India, 2009 –

2016.

- Postdoctoral Fellow, Harvard University, USA, 2005 – 2009.

Research Interests

- Magnetic nanoswimmers for nanobiotechnology and microfluidics
- Electron bubbles in quantum fluids
- Quantum sensing with NV-centres
- Driven colloids and active matter
- Plasmonics and 2D materials

Research Area

Electronics, Devices on 2D materials, Microfluidics, Artificial nanoswimmers, electron bubbles in liquid helium, nano-biotechnology, biosensors, nanoswimmers for targeted delivery and microsurgery, photonics, optical sensing, plasmonics and metamaterials

Topic 1 - Multifunctional Magnetic nanobots

This PhD project explores the emerging world of multifunctional magnetic nanobots, where advanced materials engineering meets swarm intelligence and applied physics. The research focuses on developing hybrid nanobots that combine magnetic and catalytic materials to achieve collective behavior, adaptive motion, and intelligent coordination under diverse field conditions. By uncovering how electromagnetic interactions and swarm dynamics can be harnessed for precise control, the project opens new directions in micro-robotics, active matter physics, and next-generation biomedical systems. Candidates from any background are welcome, provided they have a keen interest in physics, electronics engineering, or materials science, and are motivated to work at the forefront of nanotechnology and intelligent systems.

Topic 2 - Quantum Wigner solids

This PhD project centers on the study of quantum Wigner solids—ordered lattices of interacting electrons manifesting in two-dimensional systems supported by cryogenic liquids and solids. While grounded in the exploration of novel quantum phases and many-body correlations, the research places a strong emphasis on developing advanced spin measurement techniques within these crystalline electron arrangements. The project aims to establish precise protocols for detecting and manipulating electron spins, building on our group's past research and unique capabilities. This approach enables new possibilities for coherent control and entanglement in electronic systems, positioning Wigner solids as an emerging and scalable platform for quantum computation and information processing—a direction with growing significance for both academic research and commercial technology development.

Faculty – Prof Supradeepa V R



Associate Professor

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Group Webpage: <http://www.cense.iisc.ac.in/supradeepagroup/>

Education

- Ph.D. Electrical and Computer Engineering, 2011, Purdue University, West Lafayette, IN, USA.
- B.Tech. Engineering Physics, 2006, Indian Institute of Technology Madras, Chennai, India.

Experience

- Associate Professor, Indian Institute of Science, Bangalore, Aug 2020 – Present.
- Assistant Professor, Indian Institute of Science, Bangalore, Aug 2014 – July 2020
- Member of Technical Staff, OFS Laboratories, Somerset, NJ, USA, 2011-2014.

Research Interests

- High Power Fiber Lasers
- Nonlinear Optics and Frequency Conversion
- Integrated Photonics

- Optical Frequency Combs and Metrology
- High Bandwidth Optical Communications

Research Area

Photonics, Lasers, Optical Data/ Tele-communication

Topic – 1 – High Power, Agile Lasers enabled by Nonlinear Frequency Conversion and its Applications

Our group has over the years developed high power laser sources at varied wavelengths from visible to mid-infrared. The core technology is a fiber laser, a method to develop high power sources directly in an optical fiber platform. Such sources conventionally are limited to a few wavelength regions. Our core expertise is in converting the frequency of these lasers into arbitrarily user defined wavelength regions through the use of a number of optical nonlinearities, primary stimulated Raman Scattering and Kerr effect in optical fibers and harmonic generation in optical crystals. At this stage, we have a wide range of sources developed and one of the key lines of research in addition to improving the sources themselves, is to utilize these sources in applications which benefit from the new capabilities. Specifically

1. Medical Imaging – Photo-acoustic imaging allows for both high resolution and depth simultaneously. Using the agile lasers, we can address a wide variety of tissues with a single source.
2. Applications in Nanofabrication tools and Metrology – Agile lasers have enabled novel techniques for non-contact measurements of various process parameters in nanofabrication equipment. We are working on these aspects in collaboration with industry.

Topic – 2 - Narrow-Linewidth Lasers and Power combining

To achieve laser sources at very high powers, one needs to look at making multiple individual laser modules and then beam combine them. Such beam combinable lasers have requirements of very high coherence or narrow-linewidth. In this regime, multiple nonlinear effects will play a role, specifically a type of Photon-Phonon interaction called Stimulated Brillouin Scattering. Work in this project will involve understanding nonlinear optics at extreme power levels. Specifically, methods to control stimulated Brillouin scattering. Design and building of laser systems and collaborations with industries and govt labs

Faculty – Prof Akshay Naik



AKSHAY NAIK

Professor

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Group Webpage: <https://www.cense.iisc.ac.in/anaik/>

Education

- Ph. D. Electrical Engineering, 2006, University of Maryland, College Park, USA.
- M. Sc. (Physics), 1999, Indian Institute of Technology, Bombay, India.
- B. Sc. (Physics), 1997, Mumbai University, India.

Experience

- Associate Professor, IISc, Bangalore, Nov 2018 – present
- Assistant Professor, IISc, Bangalore, December 2011 – Oct 2018.
- Research Engineer, California Institute of Technology, Pasadena, CA, USA, August 2008 – November 2011.
- Postdoctoral Fellow, California Institute of Technology, Pasadena, CA, USA, November 2006 – August 2008.

Research Interests

- Nonlinear dynamics in 2D nanoelectromechanical systems
- Noise in nanoelectromechanical systems
- Strain engineering in 2D materials

Research Area

Nanoelectromechanical sensors, Optomechanics, nonlinear dynamics

Topic – 1 - Microwave to Optical Transduction via Optomechanical Interfaces

Optomechanical quantum transducers are devices that can coherently convert quantum signals between the microwave and optical frequency regimes using a mechanical resonator as an intermediary. This is important because superconducting qubits and circuits which operate in the microwave regime excellent candidate for quantum computing and information processing. But transferring information in microwave signal is lossy and optical signal are ideal candidates. In this research topic, you'll explore how to engineer high-Q mechanical systems and strong optomechanical and electromechanical coupling to achieve efficient, low-noise frequency conversion. The work combines nanofabrication, cryogenic measurements, quantum optics, and microwave engineering, making it an exciting and interdisciplinary area with relevance to scalable quantum networks and quantum internet technologies.

Topic – 2 - Nonlinear Mode Coupling in Atomically Thin Nanomechanical Resonators

Studying nonlinear effects in 2D nanomechanical resonators, especially mode coupling, offers a rich platform to explore how mechanical vibrations interact in the nonlinear regime. In these atomically thin systems, geometric and material nonlinearities become prominent even at moderate vibration amplitudes, allowing access to phenomena such as frequency shifts, intermodal energy transfer, and parametric amplification. This research project involves experimental measurements as well as some theoretical modeling of nonlinear dynamical systems. Understanding and controlling mode coupling is important for applications in sensing, signal processing, and fundamental studies of nonlinear mechanics at the nanoscale. They also have potential applications in hybrid quantum devices that integrate mechanical systems with optics or electronics. The work combines nanofabrication, optical/electrical measurements and microwave engineering.

Faculty – Prof Sushobhan Avasthi



SUSHOBHAN AVASTHI

Associate Professor

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Group Webpage: [Heterojunction Lab](#)

Education

- Ph.D. Electrical Engineering, 2011, Princeton University, Princeton, NJ, USA.
- B. Tech (Electrical Engineering), 2005, Indian Institute of Technology Kanpur, Kanpur, India.

Experience

- High-efficiency perovskite thin-film solar cells
- Integration of semiconducting oxides to silicon, forming oxide/silicon heterojunction devices
- Functional oxide devices for applications such as photovoltaics, sensing, and memory
- Integration of solar cell on novel substrates such as steel

Research Interests

- High-efficiency perovskite thin-film solar cells
- Integration of semiconducting oxides to silicon, forming oxide/silicon heterojunction devices
- Functional oxide devices for applications such as photovoltaics, sensing,

and memory

- Integration of solar cell on novel substrates such as steel

Research Area

Thin-film solar cells, IR photodetectors, thin-film transistors, atomic layer deposition, pulse laser deposition, large-area printable electronics, and advanced optoelectronic characterization

Topic – 1 - Photo Hall measurements of novel materials

Mobility measurements in highly resistive and defective thin-films are challenging due to high impedance, noise, ion migration, low mobility, and defects. We have recently reported a new experimental setup that addresses these challenges. We found that by using a range of illumination intensities, we can simultaneously extract hole mobility, electron mobility, and background doping even in defective films. We have demonstrated the technique on lead halide perovskite. We wish to extend this to other materials, like Ga₂O₃. We also aim to develop a V2 version of the setup that utilises double modulation to further enhance the sensitivity and accuracy of the setup. Finally, we wish to measure fully fabricated solar cells in the Hall setup. This is a characterisation-heavy project that will be attractive to students from electronics and physics backgrounds with an interest in semiconductor device physics.

Topic – 2 - Defect analysis using Photoelectromagnetic Effect

Photoelectromagnetic (PEM) is a cousin to the traditional Hall measurement. In the 1950s, it was used to measure diffusion and recombination properties, but fell out of fashion. We have recently revived this technique to study defective materials, such as perovskites. Compared to competing methods, PEM can separate the impact of bulk and surface recombination. We wish to extend this work to the range of perovskite crystals and films. We also wish to conduct PEM on solar cells to directly measure and reduce losses. This is a characterisation-heavy project that will be attractive to students from electronics and physics backgrounds with an interest in semiconductor device physics.

Faculty – Prof Srinivasan Raghavan



SRINIVASAN RAGHAVAN

Professor and Chair

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Education

- B.E. (Metallurgy) Visvesvaraya Regional Engineering College (Now VNIT), Nagpur, India
- M.E. (Metallurgy) Indian Institute of Science, Bangalore, India
- Ph.D. Materials Science and Engineering, The Pennsylvania State University, USA

Research Interests

- Growth of thin films and nanostructures
- In-situ stress-defect measurement and control
- Microstructure-electronic property correlations
- GaN, oxides and 2-D materials

Research Area

Thin Film growth, nano-structures and bulk crystals, Growth of group IIIA (Ga, In, Al) nitrides, oxides & 2d materials, Stress and defect structure evolution, Effects of stress on crystal properties and device performance.

Topic – 1 - Barium Titanate based electrooptic modulators

The so called electro-optic effect - ability to modulate light using an electric field- plays a key role in technologies involving communication using light. This effect in turn depends on a material property called the Pockels coefficient that correlates an applied electric field to a change in refractive index. Barium Titanate has one of the highest of Pockels coefficients of about 1000 pm/V in comparison to about 30 pm/V for lithium niobate the current work horse. In order to better exploit it, BTO needs to be deposited in the form of thin films on Si substrates and devices so made, need to be integrated with photonic circuits, to exploit its capabilities. Herein, lies the challenge. While BTO has a high Pockels coefficient, realizing it in thin film form, on a silicon platform is not trivial. In our group after many years of research the platform has been realized. Preliminary devices have started getting made. The student so hired would be taking this effort forward. Research will involve material synthesis, Pockels measurement and integration in photonic circuits.

Topic – 2 - Growth of MoS₂.

MoS₂ is the semiconductor of the 2D world and if ever 2D CMOS is realized, it will replace Si in this part of CMOS technology. In our group we have been growing MoS₂ by chemical vapor deposition for a few years now and have realized extremely good quality mono to multilayers. A state of the art CVD reactor is functional. The aim of this research problem would be to better understand the nucleation and growth of MoS₂ to make monolayers to multilayers with tailored grain sizes, stoichiometry and grain boundary densities. The work will involve synthesis, device fabrication and electrical characterization. I am hoping to collaborate with faculty members in chemical engineering for reactor modelling and to start using machine learnt potentials to better predict what is happening on the growth surface so that it can be better modelled.

Faculty – Prof Pavan Nukala



PAVAN NUKALA

Associate Professor

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Group Webpage: <http://ftfeml.wordpress.com/>

Education

- University of Pennsylvania, Philadelphia, PA, United States, PhD in Materials Science and Engineering, 2009-2015
- Indian Institute of Technology Madras, Chennai, TN, Bachelors and Masters in Metallurgical and Materials Engineering, 2004-2009

Experience

- Assistant Professor, Centre for Nanoscience and Engineering, IISc Bengaluru, 2020-Present
- Marie-Sklodowska-Curie Individual Fellow at Nanostructures of Functional Oxides Group, University of Groningen, 9747AG, Groningen, The Netherlands, 2018-2020
- Postdoctoral Researcher in Advanced Ferroics Group, Structures, Propriétés et Modélisation des Solides (SPMS), CentraleSupélec, University Paris Saclay, Gif-sur-Yvette, France. 2015-2018

Research Area

Correlated Systems, Ferroic Oxides, in situ electron microscopy and spectroscopy, material networks for neuromorphic materials and networks, phase change materials, thin film x-ray diffraction

Topic – 1 - In-situ electron microscopy investigations of 2D materials

Following up from our Nature paper (last year), we want to understand various aspects of 2D ferroelectrics from an atomistic structural point of view especially when various stimuli are applied. This includes light, temperature, stress and field. While we already set up the instrumentation required to observe temperature and field induced phase transitions, light and stress still elude us, and we would like to build these capabilities (in house). Also, with most of the group migrating to making oxide Moire heterostructures, understanding Moire devices via operando TEM measurements also is in the scope of the project. It must be realized is twist based engineering has eluded the oxide electronics community so far, and we have already made enough strides to transfer epitaxial oxides and twist them on the top of each other. Microscopy is an important characterization tool to understand the deep physics in these correlated oxide systems.

Faculty – Prof Manoj Varma



MANOJ VARMA

Professor

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Group Webpage: <https://sites.google.com/view/nanoporegroup>

Associated Departments: Department of Electrical Communication
Engineering

Education

- Ph.D. Physics, 2005, Purdue University, West Lafayette, IN, USA.
- BTech. (Aero), 1999, Indian Institute of Technology, Madras, India.

Experience

- Professor, IISc, Bangalore, August 2020 – Current.
- Associate Professor, IISc, Bangalore, 2014-2020.
- Asst. Professor, IISc, Bangalore, Aug 2008-2014.
- Director of Engineering, Quadraspec Inc., Purdue Research Foundation, USA, 2005 – 2007.
- Consultant, Quadraspec Inc., Purdue Research Foundation, USA, 2004 – 2005.

Research Interests

Solid-state nanopores, nanopore based single molecule DNA and protein sequencing, single molecule sensing using nanopores

Topic – 1 - Single molecule transport through nanochannels

Nanochannels with dimensions comparable to that of single molecules have several applications ranging from biosensing to DNA based memories. The transport of molecules through such ultra-confined channels is a complex interplay of geometry, electrostatics and other interactions. Existing devices are not suitable for a systematic study of how these factors determine the transport of single molecules through nanochannels. Using the nanofabrication tools available at CeNSE, this project aims to develop in-plane devices suitable to study molecular transport through nanochannels in a scalable manner. The project will involve significant use of the nanofabrication facility, microscopy and electrical measurements. The project will be most suitable for students with Physics, Electrical/Electronics backgrounds.

Faculty – Prof Sreetosh Goswami



SREETOSH GOSWAMI

Assistant Professor

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Group webpage: <https://www.sreetoshgoswami.com/>

Education

- Ph.D. from NUS Nanoscience and Nanotechnology Institute (NUSNNI), National University of Singapore (2014-2018).
- B.E. in Electrical Engineering from Bengal Engineering and Science University (BESU), Shibpur (2008-2012).

Experience

- Research Fellow at the Department of Physics, National University of Singapore (2019-2021)

Research Interests

- Design of brain inspired computing devices
- Electronic and ionic non-linear dynamics in molecular memristors
- Ultralow energy electrical switching devices
- Nano-optoelectronics using molecular thin films
- Low T transport in electronic devices
- In-situ Raman and absorption spectroscopy
- Heterostructures: oxide-molecular films, 2D-molecular films
- Magnetism in redox active transition metal complexes

Research Area

Artificial intelligence, Neuromorphic circuits, In-memory computing, Molecular electronics, Nanoelectronics, Nonlinear dynamics and chaos

Topic – 1 - Can We Build Better Devices: More Like a Brain?

For decades, circuits have followed the same blueprint: binary switches flipping between 0 and 1, pieced together for specific functionalities. This 1940s-era approach still dominates, even as AI exposes its limitations. It's time to rethink everything.

We ask bold questions:

- ◆ Why not take inspiration from natural intelligence and the human brain?
- ◆ Can we build circuits with brain-like plasticity and reconfigurability?
- ◆ Can we embed complex logic directly into nanoscale memory?
- ◆ Can we operate on the edge of chaos—where intelligence thrives?

There's plenty of hype about devices mimicking synapses, axons, and dendrites, but if you ask a biologist, we're nowhere near replicating the brain. Achieving this requires real innovation in:

- ⚡ Device fabrication
- ⚡ Circuit design
- ⚡ Physics-based & nonlinear modeling
- ⚡ Nano transport & in-operando spectroscopy
- ⚡ Bridging the gap with biology

We are looking for electrical and electronics engineers, physicists, mathematicians, and biologists who are ready to challenge the norm.

References:

Sreetosh Goswami*, Rajib Pramanick, Abhijeet Patra, T. Venkatesan*, Sreebrata Goswami* and R. Stanley Williams* "Decision Trees within a Molecular Memristor", Nature, 2021,597,51-56

<https://www.nature.com/articles/s41586-021-03748-0>

SantiPrasad Rath, Yi Suin, NavakantaBhat, SreebrataGoswami, R. Stanley Williams, & Sreetosh Goswami*Energy and Space Efficient Parallel Adder Using Molecular Memristors. Advanced Materials, 2022,2206128

<https://advanced.onlinelibrary.wiley.com/doi/full/10.1002/adma.202206128>

Topic – 2 - Structure–Function Correlation in Molecular Devices

Getting molecules to behave exactly the way we want has been the holy grail of molecular electronics for decades. Despite significant research and investment, we are still chasing that dream.

Our approach? Go back to the fundamentals and ask the tough questions:

- ◆ Can we establish design rules for molecular electronics?
- ◆ Can we achieve a one-to-one correlation between molecular structure and electron transport properties?
- ◆ What's the molecular mechanism at play, and how can we tweak it?
- ◆ Can external stimuli enhance or fine-tune functionality?

This research thread dives into:

- ⚡ Molecular design
- ⚡ Device fabrication
- ⚡ Electron transport & cryogenic measurements
- ⚡ Nano transport & in-operando spectroscopy

We are looking for electrical and electronics engineers, physicists, mathematicians, and biologists who are ready to challenge the status quo.

Reference:

Bidyabhusan Kundu, Sreetosh Goswami; Molecular mechanism enabling linearity and symmetry in neuromorphic elements. Appl. Phys. Rev. 1 September 2025; 12 (3): 031410.
<https://doi.org/10.1063/5.0256247>

Sreetosh Goswami, Adam J Matula, Santi P Rath, .. Christian A Nijhuis, Jens Martin, Sreebrata Goswami*, Victor S Batista*, T Venkatesan*. "Robust resistive memory devices using solution-processable metal-coordinated azo aromatics", Nature Materials, 2017,16, 1216–1224

<https://www.nature.com/articles/nmat5009>

Sreetosh Goswami*, Santi.P. Rath, Damien Thompson, .. Christian Nijhuis, Jens Martin*, R. Stanley Williams, Sreebrata Goswami*, T. Venkatesan* "Charge disproportionate molecular redox for discrete memristive and memcapacitive switching", Nature Nanotechnology,2020, 15,380-389<https://www.nature.com/articles/s41565-020-0653-1>

SreetoshGoswami*, Debalina Deb, Agnès Tempez, Marc Chaigneau, Santi PrasadRath, Manohar Lal, R. Stanley Williams, Sreebrata Goswami*, and Thirumalai Venkatesan*. "Nanometer-ScaleUniform Conductance Switching in Molecular Memristors", Advanced Materials, 2020, 32 (42), 2004370

<https://advanced.onlinelibrary.wiley.com/doi/full/10.1002/adma.202004370>

SantiP. Rath, Damien Thompson, Sreebrata Goswami* and Sreetosh Goswami* "Many-body molecular interactions in a memristor", Advanced Materials, 2022,2204551[IF:32.09] Asthe last and corresponding author

<https://advanced.onlinelibrary.wiley.com/doi/full/10.1002/adma.202204551>

Faculty – Prof Rudra Pratap



RUDRA PRATAP

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Associated Departments: Department of Mechanical Engineering

Education

- PhD, 1993, Cornell University, Ithaca, NY, USA.
- MS, 1987, University of Arizona, Tucson, USA.
- BTech (Hons), 1985, I.I.T. Kharagpur, India.

Experience

- Professor, IISc., Bangalore, 2008 – Present.
- Associate Professor, IISc, Bangalore, 2002 – 2008.
- Assistant Professor, IISc, Bangalore, 1996 – 2002.
- Lecturer, Cornell University, USA, 1994 – 1996.

Research Interests

- Inertial, acoustic and ultrasonic MEMS transducers
- Piezo-MEMS and energy harvesting
- Mechanobiology of micro and nanoscale natural (insect) transducers
- Nanoscale patterning and material transport using electromigration

Research Area

MEMS/NEMS, MEMS & NEMS Sensors, Vibratory Mechanobiology, Materials for MEMS/NEMS, Fundamental research in NEMS/MEMS, Transduction-targeted material development

All topics are jointly with Prof Annapoorni Rangarajan (DBG)

Topic – 1 – Resonant Sensors in Fluids

<https://pubs.aip.org/aip/apr/article-abstract/12/2/021407/3344523/Boosting-quality-factor-of-resonant-sensors-in?redirectedFrom=fulltext>

Topic – 2 – PMUTs and Nonlinearity

<https://ieeexplore.ieee.org/abstract/document/10101190>

Topic – 3 – Organ-on-Chip

Faculty – Prof Aditya Sadhanala



ADITYA SADHANALA

Assistant Professor

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Webpage: <https://scholar.google.co.in/citations?user=3aENCGEAAAAJ&hl=en>

Education

- Ph.D. Physics, 2015, University of Cambridge, Cambridge, UK
- MSc. Nanoelectronics, 2011, University of Manchester, Manchester, UK
- B.E. Electronics, 2009, University of Mumbai, Mumbai, India

Experience

- Assistant Professor, Centre for Nano Science and Engineering (CeNSE), – Indian Institute of Science (IISc), Bangalore, 2019 – Present
- PostDoctoral Research Assistant, Clarendon Laboratory (Department of Physics), University of Oxford, 2018 – 2019
- Winton Cambridge-Berkeley Fellow, KAVLI Energy and Nanoscience Institute and Department of Chemistry, University of California, Berkeley, 2018
- PostDoctoral Research Associate, Cavendish Laboratory (Department of Physics), University of Cambridge, 2015 – 2018
- Inplant Trainee, Industrial Solutions (IS) Division, Siemens Ltd., Mumbai

2008 – 2009

- Information Analyst, Novintel Department, Cheers Interactive (India) Pvt. Ltd., Mumbai, 2010

Research Area

Nanofabrication, nano-structured materials, optoelectronics, spectroscopy, device engineering, automation

Topic – 1 - Advanced in-situ Photothermal Deflection Spectroscopy for Probing Semiconductor Photophysics

This project aims to enhance our in-house Photothermal Deflection Spectroscopy (PDS) system, which already provides optical absorption measurements with 4–5 orders of magnitude sensitivity, by incorporating pressure and magnetic field modules for in-situ characterization. The extended system will be used to probe photophysical processes in thin-film semiconductors, including organic, hybrid, and perovskite materials, under external perturbations. By correlating the PDS results with synthesis, doping, and deposition conditions, the study seeks to reveal how processing influences defect states, exciton dynamics, and charge transport. These insights will guide the development of high-performance optoelectronic devices with improved efficiency and stability.

Faculty – Prof Vini Gautam



Assistant Professor

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Group Webpage: [NeuroElectronics Lab](#)

Education

- BSc. Physics University of Delhi (2007)
- M.S.-Ph.D. Jawaharlal Nehru Centre for Advanced Scientific Research (2014)

Experience

- I. Assistant Professor, Indian Institute of Science, Bangalore, India, 2022-present
- II. Lecturer (Assistant Professor), University of Melbourne, Australia, 2020 – 2022
- III. Research Fellow (Australian Research Council's DECRA fellow), Australian National University, 2017-2020
- IV. Postdoctoral Fellow, Australian National University, Australia, 2014-2017

Research Interests

- Neural interfaces
- Bionic vision
- Neuroprosthetics

- Biomaterials
- Optoelectronics

Research Area

Neuroengineering, neural interfaces, neural tissue engineering, nanobiotechnology, bioelectronics, biomaterials

Topic 1 - Investigating mechanisms of neuronal growth on micro/nano scaffolds

This project will focus on studying the mechanisms by which micro/nano patterns influence growth and function of brain cells. The project will involve micro / nano fabrication of scaffolds with desirable optical, mechanical and electrical properties, and studying the growth of neurons on them. Interested students should be motivated to work in an interdisciplinary and challenging research environment, ready for hands on experiments in the fields of materials, devices and biology.

Faculty – Prof Prosenjit Sen



PROSENJIT SEN

Associate Professor

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Group Webpage: [Microfluidic Devices & Heterogeneous Systems Lab](#)

Education

- Ph.D. Mechanical Engineering, 2007, University of California Los Angeles, CA, USA.
- BTech (Manufacturing Sc. And Engg.), 2000, Indian Institute of Technology, Kharagpur, India.

Experience

- Associate Professor, IISc, Bangalore, Mar 2019 – present.
- Asst. Professor, IISc, Bangalore, Feb 2013 – Feb 2019.
- Program Manager, Innovative Micro Technology, Santa Barbara, CA, USA, Oct 2010 – Jan 2013.
- Postdoctoral Researcher, University of California Los Angeles, CA, USA, Dec 2007 – Oct 2010.

Research Interests

- Interfacial Microfluidics for Lab-on-Chip & other applications
- Nanostructures for Self-Cleaning and Anti-Microbial Surfaces
- Using Interfaces to investigate Cells for Cytometry and Separation of CTC's

- 3D Heterogeneous Integration of Micro-Nano Scale Devices for System Scaling

Research Area

Microfluidics, Lab-on-chip, Droplets, Interfacial phenomenon in microfluidics, Fluidic sensors, Heterogeneous integration

Topic – 1 - High Temperature MEMS Vapor Cells for Quantum Sensors

Most MEMS vapor cells for quantum sensors work at the approx 100C. This limits the cells to be made of Cs or Rb. Use of Yb and Sr has been limited to large cells. Large cells allow active thermal management for allowing the vapor source to operate at > 350C. In this project we will develop a miniature MEMS cell for Yb and Sr.

Topic –2 - Organ on Chip for Drug Testing

Novel device fabrication scheme for organ on chip applications. The developed process should enable biocompatible devices and should be scalable. We will look at micro scale 3D printing techniques for development of such devices.

Faculty – Prof Dhavala Suri



Assistant Professor

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Group Webpage: <https://sites.google.com/view/qmatinlab/home>

Education

- Ph. D.: BITS Pilani, K K Birla Goa Campus: 2018
- M. Sc.: Fergusson College, University of Pune: 2013

Experience

- Postdoctoral Fellow at Technical University of Munich: 2021-2023 (with Marie Skłodowska-Curie Fellowship)
- Postdoctoral Fellow: TIFR Hyderabad, India: 2020 – 2021
- Postdoctoral Associate: Massachusetts Institute of Technology, USA: 2018-2020

Research Interests

- Synthesis of epitaxial thin films of semiconductors and superconductors via molecular beam epitaxy
- Interface engineering of superconductors and ferromagnet hybrids, topological materials etc.

Topic – 1 - Topological Materials and Superconductors

A direction of research for PhD will be to integrate topological materials with superconductors and achieve best possible proximity coupling for quantum computing material platforms.