पदार्थ विज्ञान एवम् अभियांत्रिकी विभाग
भारतीय प्रौद्योगिकी संस्थान कानपुर
Department of Materials Science and Engineering
Indian Institute of Technology Kanpur

PLACEMENT BROCHURE
2024-2025

Department Highlights

- Rank 1 Innovation
- Rank 4 Engineering
- * Number of Projects: 79
- * Number of Patents: 20
- * Number of Publications: 1280
- Number of Students: 488
- Number of Faculty: 30

*last 5 years data

GET IN TOUCH

http://iitk.ac.in/mse
www.linkedin.com/in/mse-iit-kanpur-18236516b/
www.facebook.com/mse.iitkanpur.9
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Head of the Department's Open Letter

Dear Recruiter...

I am honoured to present our students, who have been equipped with the knowledge, skills, and values essential for excelling in the ever-evolving professional landscape.

Our department fosters an environment of excellence, innovation, and holistic development. We believe in equipping our students with not only the theoretical knowledge but also expose practical skills with advanced laboratory work that are crucial in today's dynamic and competitive world. Through rigorous academic curricula, hands-on projects, internships, and industry interactions, our students are well-prepared to tackle real-world challenges and contribute meaningfully to your esteemed organizations. We take pride in the fact that students from our department excel in wide spectrum of career opportunities. Students from our department are eager to step into industries, like automotive, aerospace, materials processing, iron and steel making, non-ferrous metallurgy, ceramics, health care, semiconductors, data analytics and many more.

While 309 of our undergraduates of our department are trained to acquire basic understanding of the materials and quantitative analysis so that they can take up a wide variety of challenges offered by the recruiter, our research cadre students, 52 M.Tech students, 04 BT-MT students and 123 PhDs, are provided specialized training to take up any scientific and technical challenges for the development and utilization of new processes and materials for key projects in your futuristic strive to become global leaders. With a strong foundation in mathematical and numerical methods, students of our department are also eager and capable of contributing to building software for the upliftment and knowledge creation in materials world. Beyond academics, we emphasize the importance of soft skills, leadership qualities, civic responsibility, integrity and ethical values. Our students participate in various extracurricular activities, community service initiatives, and industry interactions, which contribute to their overall personality development and prepare them to be responsible global citizens.

By recruiting from Department of Materials Science and Engineering, IITK, you will be investing in individuals who are not only technically proficient but also possess the drive and determination to make meaningful contributions to your organization. We hold sincere hopes that some of our students will soon have the privilege of becoming part of your esteemed organization. Be assured that they will be nothing short of remarkable, adding substantial value to the progress of your institution.

Finally, MSE department, extends sincere thank you for considering our students for opportunities within your esteemed organization. We look forward to establishing a mutually beneficial partnership and contributing to your success.

Prof. Kantesh Balani
Head, Materials Science and Engineering
IIT Kanpur

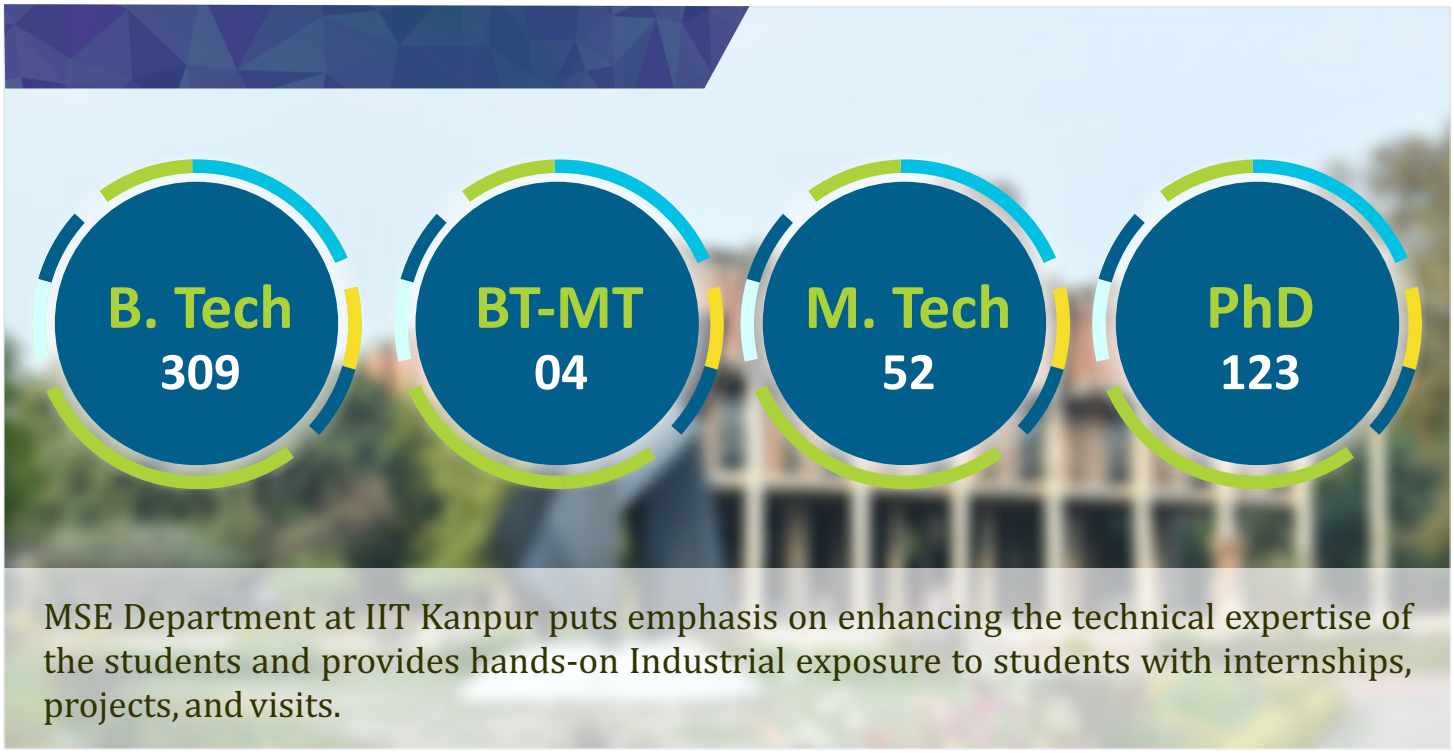
About Us

The ***Department of Materials Science and Engineering*** at IIT Kanpur with its 60 long years of legacy of excellence in undergraduate and post graduate teaching and research strives to prepare technologists and engineers to develop new materials and processes for applications in industries of metal and mining, automotive, chemical, aviation, plastic, biotechnology, semiconductor, solar and energy sectors.

The Department was established in 1960. Founded in 1960, the ***Department of Materials Science & Engineering*** at IIT Kanpur holds a prominent position among the nation's leading schools in Materials Science and Engineering. Initially named ***Metallurgical Engineering***, the department introduced its postgraduate program in 1964. Over the years, it underwent a series of adaptions as per the need of the country and society, changing from **Metallurgical Engineering** to **Materials and Metallurgical Engineering** in 1993 and eventually transitioning to the Department of Materials Science and Engineering in 2009. Since its inception, it has had a strong impact in providing knowledgeable manpower to meet the nation's demand in traditional metallurgy. The department consciously nurtures overall professional growth of the students, apart from giving quality education. The department has constantly reinvented to keep the IIT curriculum in pace with the state-of-the-art technologies.

The field of study in the department now encompasses the entire spectrum of *extractive metallurgy*, *physical metallurgy, manufacturing processes, electronics and semiconductor materials, mechanical behavior of materials, powder metallurgy, process modeling, material degradation, nanomaterials, biomaterials, ceramics, composites, recycling & material recovery and computational materials engineering (AI/ML), microstructure, materials processing, physical & mechanical metallurgy, coatings & materials for damage tolerance for fatigue, creep, fracture*, etc. This department has pioneered a unified approach for teaching and research, which has enabled us to evolve into an interdisciplinary field contributing to diverse applications and technological development.

Academic Programs



MSE Department at IIT Kanpur puts emphasis on enhancing the technical expertise of the students and provides hands-on Industrial exposure to students with internships, projects, and visits.

UG Coursework

- Basic Sciences
- Core Laboratories
- Departmental Courses
- Internship (2nd /3rd year)
- B.Tech Thesis
- Internship

PG Coursework

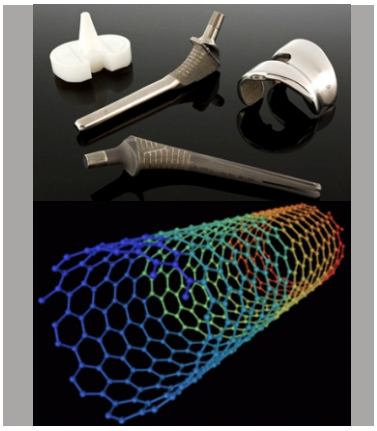
- Structure and Characterization of Materials
- Transport Phenomena
- Thermodynamics
- Mathematical and Computational Methods
- M.Tech/Ph.D Thesis
- Teaching Assistantship
- Internship

Academic Curriculum

Metallurgical Engineering

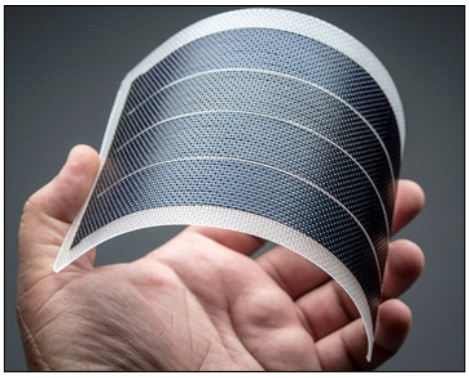
- Iron and Steel Making
- Principles of Metal Extraction and Refining
- Phase Transformations
- Thermodynamics & Phase Equilibria
- Mechanical Behaviour of Materials
- Materials Failure: Analysis and Prevention
- Structure and Characterization of Materials
- Diffusion in Solids
- Materials Recyling

Nanomaterials and Biomaterials



- Introduction to Biomaterials
- Materials Science Technologies for Applications in Life Sciences
- Transmission Electron Microscope Nano Analysis of Materials
- Nanostructures and Nanomaterials
- Characterization and Properties
- Coatings

Electronic Materials



- Electronic Devices and Characterization
- Electro-ceramic Materials and Applications
- Computer Simulations in Materials Science
- Technology of Thin Films and Device Fabrication
- Energy Materials and Technologies
- Materials for Semiconductor Industry
- Display Technology

Materials in Manufacturing

- Materials Processing
- Selection & Design of Engineering Materials
- Manufacturing Processes
- Solidification Processing
- Heat Treatment and Surface Hardening
- Powder Metallurgy
- Introduction to Lightweight Alloys

Research Facilities

MSE department at IIT Kanpur is furnished with ***world-class research facilities*** assisting students in learning vital skills and gain hands-on experience of the latest technologies used in industries and academia. Apart from the various testing and characterization laboratories, the department also houses befitting computational and modeling facilities in steelmaking, fluid dynamics, and solidification processing. We have the following labs in our department: https://iitk.ac.in/mse/MSE-Facilities/

Microstructure Characterization Facility

Scanning Electron Microscopy (SEM), Atomic Force Microscopy (AFM)
Transmission Electron Microscopy (TEM), Brunauer-Emmett-Teller (BET)
Electron Probe Micro Analyzer (EPMA), Thermogravimetric Analysis (TGA)
and Differential Scanning Calorimetry (DSC), X-Ray Diffraction (XRD),
X-Ray Photoelectron Spectroscopy (XPS)

Physical Metallurgy and Engineering Metallurgy Lab

Optical Microscopy
Microwave Sintering Furnace
Rolling Mill
Welding
Brazing

Electronic Materials and Thin Film Processing Lab

Pulse Laser Deposition
Electron-Beam Evaporation
Photolithography
Clean Room
Sputtering

Material Testing Lab

Universal Testing Machine
Fatigue Testing
Creep Testing
Impact Testing
Hardness Testing
Microhardness Testing

Research Centres

SAMTEL Centre for Display Technologies

To conduct R&D so as to nurture and support the growth of science and technology of electronic displays and to establish a tripartite relationship between industry, academia and governmental agencies.

National Centre for Flexible Electronics

It acts as a nodal point in India to bring academia, industry and public research organizations under one umbrella for research and development of large area flexible electronics.

Industry Partners: Applied Materials, Manipal Technologies, Chain Electronics, Mathura Manufacturing

Advanced Centre for Materials Science

Advanced Centre for Materials Science was created in 1978 with a view to make available major materials preparation and characterization facilities under one-roof. These state-of-the-art research facilities are regularly upgraded, and maintained by suitably trained competent staff.

Integrated Computational Materials Engineering

Integrated Computational Materials Engineering is a National Hub at IIT Kanpur - A Joint IITK-TCS Initiative

Centre for Nanosciences

The centre is aimed to provide various nanomission & nanotechnology related fabrication & characterziation tools for fundamental research support to startups and other academic & industrial partners.

Seminar/Talks (2023-2024)

Prof. Arvind Agarwal, Distinguished University Professor in the Department of Mechanical and Materials Engineering at Florida International University (FIU), Miami, FL, USA delivered a talk on "***Multifunctional Coatings and Composite Materials for Lunar and Space Missions***" on Jul. 19, 2024.

16TH PROFESSOR E C SUBBARAO LECTURE SERIES

Speaker: Dr. R. Balamuralikrishnan, Outstanding Scientist & Director Defence Metallurgical Research Laboratory, Hyderabad

Title: Materials, Sustainability, Prosperity

Date & Time: Mar. 15, 2024

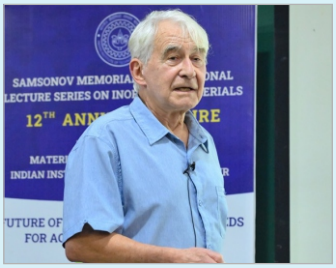
Prof. E-Wen Huang, Prof. & Senior Fellowship of the Higher Education Academy (SFHEA), National Yang Ming Chiao Tung University, delivered a talk on "***Investigating Fatigue Behavior of Metallic Systems Using Advanced Photon Source***" on Feb. 14, 2024.

Dr. Amit Datye, Associate Research Scientist, Yale University, delivered a talk on "***Nano-microscale testing of thermoplastically formed pillars and atomically smooth bulk metallic glasses***" on January 05, 2024.

Dr. James R. Doyle, Chair, Department of Physics and Astronomy Macalester College, Minnesota, delivered a talk on " ***Kinetics of magnetron sputter deposition of aluminum doped zinc oxide thin films***" on Dec. 18, 2023 .

Dr. Ranjit Kumar Ray, Fellow of INAE, IIM, IEI and ICOTOM, Former Professor, IIT Kanpur, delivered a talk on "***A Century Of Texture Research: Historical Perspective And A Personal Journey***" on Dec. 14, 2023.

12TH ANNUAL SAMSONOV MEMORIAL INTERNATIONAL LECTURE SERIES ON INORGANIC MATERIALS



Speaker: Professor Jerzy A. Szpunar, D.Sci, Ph.D., E. Eng., Birks Chair in Metallurgy, Canada Research Chair Tier I, Professor of Materials Science, Department of Mechanical Engineering, University of Saskatchewan

Title: Future Of Nuclear Energy And Needs For Accident Tolerant Fuels .

Date & Time: Dec. 4, 2023

Dr. Rao Tummala, ISM Advisor, delivered a talk on "***Next Gen, Global-level and Large-scale Device, Packaging and Systems R&D and Workforce development in India***" on Nov. 13, 2023.

Dr. Praveen C Ramamurthy, Professor, Department of Materials Engineering, Chair, Interdisciplinary Centre for Water Research, Indian Institute of Science, Bengaluru, delivered a talk on "***Organic Electronics: Molecules to Devices***" on Nov. 08, 2023.

Dr. Sudipta Pramanik, Institute of Materials Engineering, Kassel University, Sophie-Henschel-Haus, Mönchebergstr. Kassel, Germany, delivered a talk on "***Investigation of Additively Manufactured and Non-additively Manufactured Materials***" on Sep. 19, 2023.

Dr. Debdatta Ratna, DRDO Scientist 'G', Naval Materials Research Laboratory, Ambernath, delivered a talk on "***Nanomaterials based Products for Naval Applications***" on Sep. 06, 2023.

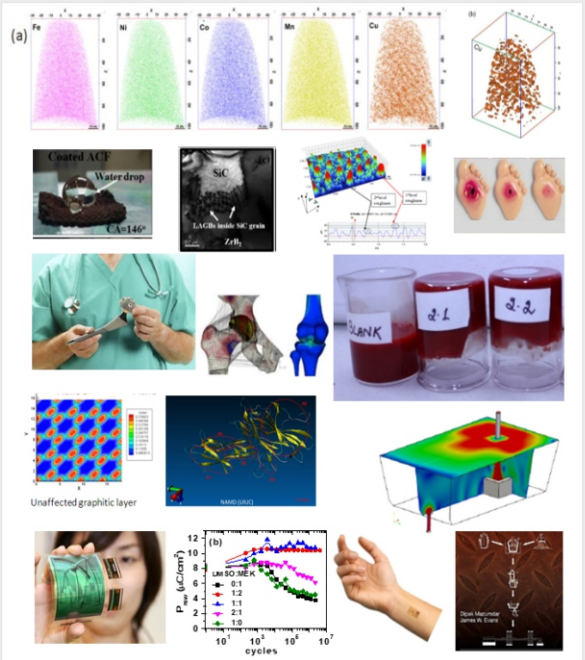
Research Themes and Areas

Research Themes

- **Health Care/Biomedical**
- **Energy and Environment**
- **Electronic Materials & Devices**
- **Railways, Automobiles, Space and Defence Technologies**
- **Iron, steel & other metals**

Research Areas

- Biomaterials
- Computational Materials Science
- Electroceramics
- Extractive Metallurgy
- Flexible and Organic Electronics
- Manufacturing Processes
- Material Degradation
- Mechanical Behavior of Materials
- Nanomaterials and Nanotechnology
- Physical Metallurgy
- Powder Metallurgy
- Process Modeling
- Recycling and Material Recovery
- Structural Ceramics



Projects and Collaborations

Areas of Ongoing Projects

- Steelmaking, Process Modelling
- Flexible electronics, materials and devices, semiconductor materials, Organic Electronics
- Computational Materials Science, Finite Element Method, Integrated Computational Materials Engineering
- Physical Metallurgy, Phase Transformation
- Environmental degradation of alloys
- Biomaterials, Protein Patterning
- Multi-component Diffusion, Thermodynamics
- Powder Metallurgy, Ceramic Processing, Sintering, Solid Oxide Fuel Cells
- Grain Boundary Engineering, Severe Deformation Processing
- Mechanical Behaviour of Materials
- Stereology, Crystallography
- Glassy Alloys, Quasicrystals
- Nanomaterials/ Composites
- 3D and additive Manufacturing
- Recycling and material Recovery

Collaborations

Departmental Activities

Deparment Bodies

Indian Institute of Metals - Kanpur chapter organizes Materials Quiz workshops and conferences, involving student-faculty interaction

Materials Science and Engineering Society is an integral student body which organizes various departmental seminars, workshops, recreational activities

Material Advantage @ IIT Kanpur is a window providing access to the materials professional's most eminent societies like ASM, TMS, AIST and Acers.

Materials Camp

Material Advantage at IIT Kanpur, a student technical chapter in the Department of Materials Science and Engineering, and Advanced Centre for Materials Science (ACMS), IIT Kanpur, hosted a four-day (May 03-06, 2024) "***Materials Camp***" in collaboration with the Materials Society, The Indian Institute of Metals Kanpur Chapter, Indian National Academy of Engineering (INAE) Kanpur Chapter, BIS Student Chapter, SERB, and ASM International Kanpur Chapter.

Materials Camp has attracted the participation of 37 students and nine teachers from 9 schools of Kanpur. Various talks were held on Materials failure, materials testing, classification, and corrosion were held. Participants had the opportunity to visit advanced material testing, characterization facilities, manufacturing lab and to Defence Materials and Stores Research and Development Establishment (DMSRDE). Live lab sessions and presentations on various topics were held for enhanced understanding and hands-on-experience.

Departmental Activities

NSRS-2024

Department of Materials Science and Engineering in association with IIM, MATERIAL ADVANTAGE, MATERIALS SCIENCE SOCIETY; successfully organized a two-day ***National Symposium of Research Scholars on Metallurgy and Materials*** **(NSRS-2024)** on **March 09-10, 2024**. The symposium was sponsored by **TATA STEEL, MRAI**, Star Testing Systems, METATECH INDUSTRIES, FRONTIER ALLOY STEELS LIMITED, Chennai Metco and HHV Advanced Tech.

NSRS-2024 provided a unique platform for research scholars nationwide to enhance their analytical skills, exchange ideas, form networks and elevate the quality of their research. Sponsor talk on *Recycling of Materials* and Popular talk on *High Temperature Ceramics and CMCs for Defense Applications* by Dr. Suresh Kumar (DMSRDE Kanpur) were delivered. A series of plenary lectures were delivered by renowned experts in metallurgy and materials science. Three diverse workshops on Additive Manufacturing, AI/ML in Materials Science and CALPHAD were also organized to facilitate the participants. Technical sessions on Energy Materials, Process Metallurgy, Functional Materials, Materials Recycling & Sustainability, Mechanical Behavior of Materials, Alloy Design, Corrosion & Surface Engineering Computational Materials Science and Advanced materials were also held. Scientists from various laboratories and industries pursuing their Doctoral or Masters (by research) presented their work through oral and poster sessions and awards were given for best presentations. NSRS-2024 turned out to be a pivotal event for fostering national collaboration and knowledge sharing amidst the academic and serene surroundings of IIT Kanpur.

Department Achievements

- **Dr. Kantesh Balani** has been honored with the **Excellence in Teaching Award** by the institute on Teacher's day.
- **Dr. Kallol Mondal** has been elected for the **Gireesh Jankinath Chair** for a period of three years.
- **Dr. Krishanu Biswas** has been honored with the **IIM-ASM Lectureship 2023 award** in the **distinguished "Age > 40" category**, the prestigious fellowship of the Institute of Physics (IOP) and also has been elected as Fellow of the Institute of Materials, Minerals and Mining (IOM3), of the U.K.
- **Dr. Sudhanshu Shekhar Singh** has been elected for the **P. K. Kelkar Fellowship** for a period of three years and also been selected as a member of the Indian National Young Academy of Sciences (INYAS) for a period of 5 years.
- **Dr. Nilesh Badwe** has been appointed as an **Associate Editor** of the journal "Microelectronics Reliability".
- **Dr. Anish Upadhyaya** has been awarded '**Pandit Girish & Sushma Rani Pathak Chair**' of IIT Kanpur, for a period of three years and he also received felicitation from the Bureau of Indian Standards (BIS) for his pioneering contributions in the utilization of standards in education.
- **Dr. Shikhar Misra** has been awarded '**Scientific High Level Visiting Fellowship**' for ~10 day research trip to France.
- **Dr. Vivek Verma** and his team have developed **agarose-based dressings for chronic wounds**. The dressing helps in reducing microbial onslaught and modulates the physiology at the wound site allowing it to heal.

Faculty List

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Shivam Tripathi
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Dipak Mazumdar
(Emeritus Faculty)
Website: https://home.iitk.ac.in/~dipak/

Pulickel M Ajayan
(Distinguished Honorary Professor)
Professor of Materials Science and
Nano Engineering, Rice University
https://ajayan.rice.edu/pulickel-ajayan.html

Distinguished Alumni

Mr. Suresh Pandey
(BT/MME/1965)
Former Director,
Bokaro Steel Plant
(Management excellence)

Prof. Raj N. Singh
(BT/MME/1967)
Regents Professor,
Oklahoma State University
(Member of the National
Academy of Engineering)

Prof. Jagdish Narayan
(BT/MME/1969)
Prof., Carolina
State University
(Academic Excellence)

Mr. B. K. Shah
(BT/MME/1974)
Exec. Director, AIA
(Entrepreneurial
Excellence)

Mr. Som Mittal
(BT/MME/1973)
Former Chairman,
NASSCOM
(Management Excellence)

Mr. Anil Bansal
(BT/MME/1977)
President, Reality National
Management, Inc.
(Distinguished
Alumnus Award 2023)

Mr. Jai Shankar Sharma
(BT/MME/1977)
Mentor of the Bangalore
Chapter, IIT Kanpur
(Distinguished
Alumnus Award 2023)

Shree Pradeep Goyal
(BT/MME/1978)
(Founder Chairman and
Managing Director of
Pradeep Metals Limited,
Mumbai)

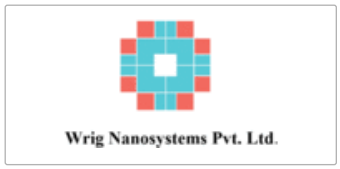
Prof. Veena Sahajwalla
(BT/MME/1986)
Scientia Professor,
UNSW
(Academic Excellence)

Dr. Pramath Raj Sinha
(BT/MME/1986)
Founder,
Ashoka University
(Service of the society
at large)

Prof. Arvind Agarwal
(BT/MT/MME/1993/1995)
(Professor, Florida
International
University (FIU), USA)

Prof. Aparna Singh
(BT/MME/2007)
Professor IIT Bombay
(Young Metallurgist
of the year)

Past Recruiters



Past Recruiters

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