

INDIAN INSTITUTE OF TECHNOLOGY KANPUR, INDIA



MATERIALS SCIENCE PROGRAMME
DEPARTMENT PH.D. PLACEMENT BROCHURE 2024-25

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ABOUT US

Interdisciplinary programme in Materials Science here at IIT Kanpur is one of the initial degree programs started in Jul 1971, to make collaborative works between various streams of science and technology. It helps in development and improvements of materials properties for electronic, semiconductor, mechanical, nanotechnology, energy storage, stealth technology and sensing applications. Our students go through rigorous course works with laboratory hands on experience to characterize various materials properties using techniques like Scanning Electron Microscopy (SEM), Raman Spectroscopy, Transmission Electron Microscopy (TEM), X-Ray Diffraction (XRD), X-Ray photoelectron spectroscopy(XPS), and numerous materials characterization techniques. In past many enriching collaborations have been made with various institutions like ISRO, DRDO, DST, etc.

Various academic institutions and research organizations also make use of the department's knowledge to develop and improve the process and products. Inter-disciplinary knowledge of students from their graduating courses along with the specific in-depth domain knowledge in doctoral work make them good candidate for industrial application and academia, which is reflected in huge alumni profile.

MESSAGE FROM HoD's DESK



"It is clear that the strength of even the largest engineering structure depends in part upon chemical and physical events happening upon a molecular scale and so we shall not only have to let our ideas range freely up and down the scale of physical dimensions from the very big to the very small, but we shall also have to jump backwards and forwards from the ideas of chemistry to those of engineering. In the current phrase materials science is 'interdisciplinary'."

From "*The New Science of Strong Materials or Why You Don't Fall Through the Floor*" by J E Gordon (1963)

The interdisciplinary program on Materials Science continues to keep the spirit of the above-mentioned wise words alive. While these lines were written many decades ago, the ever-expanding inroads of materials into technology have necessitated continued rejuvenation of education and research training in materials science, engineering and technology. Every student and participating faculty of MSP aims to bring to fruition the spirit of inter-disciplinarity, wherein technical problems are viewed with more than one lens. Students with a wide range of training in their undergraduate, typically from Chemistry and Chemical Engineering, Electrical Engineering and Physics, Mechanical Engineering, and Instrumentation, are inducted into MSP, and first-year courses are designed for cross-pollination of strengths and viewpoints of different departmental ecosystems. Each course is typically taught by two faculty from two different backgrounds. Students graduate to their second phase in training by taking up research challenges at the interface of different disciplines. Such an evolution of students' technical competence makes them ideally suited to wrestle with the many facets of the contemporary industrial material ecosystem, which invariably comprises multidisciplinary teams. We have aspired to inculcate the spirit of lifelong learning in students, and we hope such an aptitude will be gainfully employed in your technical troubleshooting environment.

We look forward to your feedback on your technological needs so that we can strategize the training of the next generation of interdisciplinary interlocutors! .

Dr. R.G.S. Pala
Professor and HoD,
Inter-Disciplinary Programme on Materials Science
Indian Institute of Technology, Kanpur

ASSOCIATED FACULTIES



Dr. Rajeev Gupta

Ph.D., IISc Bangalore
Experimental Condensed Matter Physics, Raman Scattering



Dr. Y. N. Mohapatra

Ph.D., IISc Bangalore
Printable Electronics, Organic LED and Lighting, Hybrid Inorganic/Organic Devices



Dr. Jaleel Akhtar

Ph.D., University of Magdeburg
Microwave sensors & absorbers, Stealth Technology, Non-Destructive Testing.



Dr. Sri Sivakumar

Ph.D., University of Victoria
Ln-doped nanodevices, Multifunctional nanomaterials for drug delivery, Nanocatalysts, Nanomaterials for solar hydrogen generation, Photonic crystals



Dr. Kamal K. Kar

Ph.D., IIT Kharagpur
Fuel cell, Battery, Thermoelectric, Supercapacitor, Advance Polymer Composites



Dr. R.G.S. Pala

Ph.D., University of Utah
Electrochemical, Catalysis and Separations Engineering

ASSOCIATED FACULTIES



Dr. Amit Verma

Ph.D., University of Notre Dame
Materials Growth for
semiconductor device fabrication,
characterization and modeling



Dr. Siddhartha Panda

Ph.D., University of Houston
Chemical sensors, Transport and
reactions, Microfluidics, Micro/nano
fabrication, Semiconductor devices



Dr. Yogesh M Joshi

Ph.D., IIT Bombay
Structure and dynamics of Colloidal
Glasses and Gels, Soft Matter, Rheology of
Complex Fluids, Polymer Science and
Engineering



Dr. Ashutosh Sharma

Ph.D., State University of New York
Soft nanofabrication, Meso-patterning of
polymers, carbon, ceramics, MEMS, NEMS,
Carbon micro/nanostructures, Interfacial and
colloidal interactions

Structure

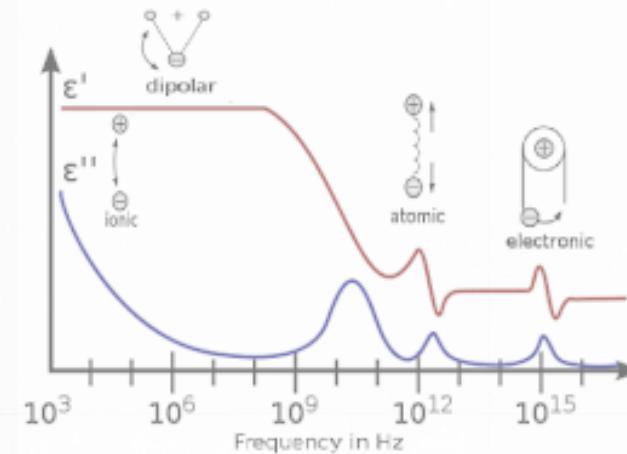
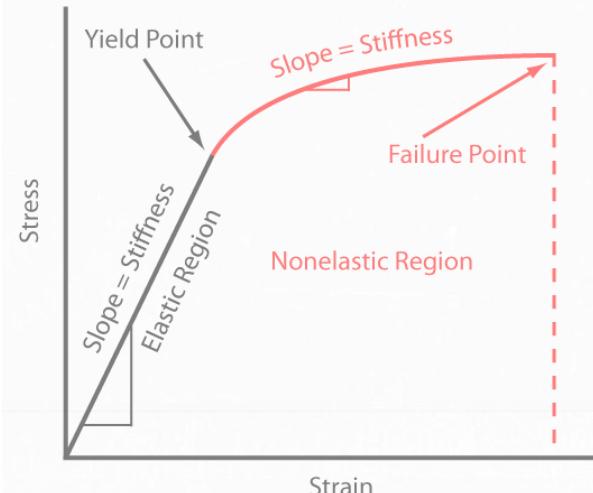
Characterization

Processing

Properties

COURSES OFFERED

- MS601A: **STRUCTURAL AND MAGNETIC PROPERTIES OF MATERIALS**
- MS602A: **ELECTRIC AND DIELECTRIC MATERIALS**
- MS603A: **MECHANICAL PROPERTIES OF MATERIALS**
- MS604A: **CHARACTERIZATION OF MATERIALS**
- MS605A: **MATERIALS ENGINEERING**



LAB FACILITIES



ADVANCED NANOENGINEERING MATERIALS LABORATORY

Carbon nanotubes, Nanostructured materials, Functionally graded materials, Fuel cell, Solar cell, Li-battery, Polymer, Thermoelectric materials, Nanocomposites

Location : ACMS 208

PHOTONIC AND ELECTRONIC MATERIALS LABORATORY

Electronic and optoelectronic materials, Physics of semiconductor devices and defects

Location : ACMS 110B

MATERIALS SCIENCE INSTRUCTIONAL LABORATORY

Nano, electronic, magnetic recording and hydrogen energy storage materials, Thin films, Electron microscopy

Location : ACMS 210

THIN FILMS LABORATORY

Nano, electronic, magnetic recording and hydrogen energy storage materials, Thin films, Electron microscopy

Location : ACMS 108B

OPTICAL SPECTROSCOPY

Experimental condensed matter physics with emphasis on using spectroscopy tools such as Raman scattering to probe the nanoscale dynamics in novel and interesting materials

Location : ACMS 107

MICROWAVE MATERIALS PROCESSING LABORATORY

Microwave absorbers, Microwave sensors, Stealth technology, Dielectric properties

Location: ACMS 207A

COLLABORATORS



Hindustan Aeronautical Limited (HAL)



Defence Research and Development Organization (DRDO)



Department of Atomic Energy (DAE)



Council of Scientific and Industrial Research (CSIR)



Indian Space Research Organization (ISRO)



Department of Science and Technology (DST)



Ministry of Human Research Development (MHRD)



The Indian National Science Congress Association

RECOGNITIONS & ACHIEVEMENTS

- Dr. Jitendra Tahalyani has received the **Best Student Paper Award** (Male Category) at the IEEE Microwave, Antennas, and Propagation Conference, held during December 12-14, 2022, at Bangalore.
- Mr. Gaurav Kumar has received the **Best Poster Presentation** Prize at SPSI-MACRO-2023 Conference held at IIT Guwahati from December 10 to December 13, 2023. The title of his paper was "Coherent fabrication of bio-based ion-conductive interpenetrating polymer network flexible organo hydrogel for physiological temperature sensing".
- Ms. Jyoti Yadav received the **Best paper award** in All India Manufacturing Technology, Design and Research (AIMTDR 2023) in international conference organized from December 8 to 10, 2023 at the IIT BHU, Varanasi. The talk was titled "Fabrication Process Development of a Three-Dimensionally Rotated FSS Unit Cell for Wide-Angle Microwave Absorbers."
- Ms. Jyoti Yadav Conducted one session on design and fabrication of meta materials for strategic applications as speaker in Hands-on training workshop (Kaaryashala) MechMicroFab-2022 organized by Department of Science and Technology, Government of India.
- Ms. Preeti Sati has received an Oral Presentation Prize in "**Young Researcher Award**" category at the European Materials Research Society Spring Meeting 2024 held in Strasbourg, France from May 27 to May 31, 2024.

RECOGNITIONS & ACHIEVEMENTS

- Mr. Arun Rajput, “**Awardee of SAKURA Exchange Program in Science (2019)**, administrated by JAPAN Science and Technology Agency.
- Ms. Moumita Mistry, “**Women Scientist award** in poster presentation in 'Nanotechnology in better living', Indian Institute of Technology Kanpur, India, April 2019 on ‘Suspension Plasma Spray: An Industrially Emerging Route to Nanometric Deposition.
- Ms. Alekha Tyagi, **1st place in the ‘Science as art’ competition** in MRS spring 2021 meeting & exhibit; Title: Separated yet connected.
- Ms. Prerna Sinha, **Best Oral Presentation award** at 7th edition of Hybrid International Conference on Nanotechnology for Better Living, NIT Srinagar, India, 2021; Title: ‘Zero value waste human hair to high value functional carbon nanosheets for superior charge storage supercapacitor.
- Ms. Alekha Tyagi; **Best presentation award** at International Conference on Soft Materials-2018 at MNIT, Jaipur, India. Title: Biowaste derived mesoporous activated carbon electrocatalyst for oxygen reduction reaction.
- Mr. Mukesh Kumar, **Best Poster Presentation award** at 7th edition of Hybrid International Conference on Nanotechnology for Better Living, NIT Srinagar, India, 2021; Title: ““Holey reduced graphene oxide for supercapacitor application”.

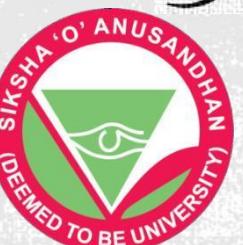
PAST RECRUITERS



Sustainable solutions
Energy & Environment



Characterization
Processing



Characterization
Processing





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