



## INTRODUCTION

The Department of Materials Science & Engineering, earlier Materials and Metallurgical Engineering at IIT Kanpur was established in 1960. From its inception, it has shown its strong impact in the areas of research as well as industrial exposure. The department has reinvented constantly to uphold the most novel endeavour in the IIT curriculum. The field of study encompasses the entire spectrum from extraction, processing and development of materials. In addition the department focuses heavily on a variety of engineering materials like ceramics, polymers, intermetallics, composites and electronic materials. This department has pioneered a unified approach in teaching and research, through its courses and curriculum, to develop state of the art materials and processes for specialized applications.



## NOTES



# FACILITIES



## SAMTEL CENTRE FOR DISPLAY TECHNOLOGIES

The Samtel Centre seeks to conduct basic research relevant to a globally competitive display industry. Centre is carrying out sponsored research on Organic Light Emitting Displays and Plasma Displays. In addition, there are several projects that explore the basic science and develop major technology platforms relevant to the current and future needs of display industry. Projects are funded through DST, MCIT and CSIR.



## ADVANCED CENTRE FOR MATERIAL SCIENCE

Advanced Centre for Materials Science was established in 1978 with state of the art infrastructure to facilitate 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. The centre has been serving the needs of the materials community from the institute as well as other academic and industrial establishments for about twenty five years.

# REASEARCH AREAS



## MANUFACTURING and ENGINEERING

### DEVICE MATERIALS

Thin Film Technology  
Display Technologies

### EXTRACTION and PROCESSING

Iron and Steel Making  
Process Modelling

### COMPUTATIONAL MATERIALS SCIENCE

Material Modelling

### MATERIALS DEGRADATION

Corrosion and Oxidation  
Abrasion and Wear

### STRUCTURAL MATERIALS

Ceramics  
Polymers

### BIOMATERIALS

Bioceramics  
Implant Materials

### NANO TECHNOLOGY

Nano Materials  
Nano Mechanics

### ENERGY and ENVIRONMENT

Energy Storage Devices  
Environmental Recycling

One of the very important dimensions of this department is its well equipped laboratories with sophisticated machines and latest software for computer assisted analysis of the data.

Some of the laboratories are:

- Physical Metallurgy Lab
- Material Science Lab
- Metallography Lab
- Engineering Metallurgy Lab
- Metal Forming Lab
- Electronic Materials Lab
- Powder Metallurgy Lab
- Laboratory for Biomaterials
- Particulate Materials lab
- Materials Separation Lab
- Pyro-metallurgy Lab
- Thin film Processing Lab
- Thermodynamics and Corrosion Lab
- Pulse Laser Deposition Lab
- Process & Steel Research Lab
- Materials Testing Lab



The laboratories of the department house some of the most sophisticated equipment required for pioneering research:

- High Intensity Magnetic Separator
- Crushers, Ball Mills and Jigging Facilities
- Wet Chemical Analysis Laboratory
- Set-up for Directional Solidification
- Electric and Induction Melting Furnaces
- Swaging Mill
- Cold Isostatic Press
- Microwave Sintering Furnaces
- Hot Press for Consolidating Powder Materials
- Ceramics and Powder Synthesis
- Thin Film Deposition
- Powder Characterization Facilities for Powder Materials
- Transmission and Scanning Electron Microscopes (TEM & SEM)
- Metallographic Facilities including an Image Analysis System
- X-Ray Diffraction Facility (XRD)
- Low, Ambient and High Temperature Testing Facilities for Tensile, Fatigue and Creep Tests
- Hardness, Friction and Wear Testing Facilities
- Iron and steelmaking - Process Controlled Modeling of BOF, AOD, VOD, Ladle Management, FEM, ANN
- Spark Plasma Sintering (SPS) facility
- Laser Surface Profilometer (LSP)
- High temperature DSC



## B-Tech Programme

A relatively novel undergraduate programme in Materials Science and Engineering at I.I.T. Kanpur has been designed to train engineering graduates who would be effective in meeting the emerging trends in our country in advanced materials as well as in Metallurgical Engineering. The programme is aimed at providing a basic understanding of the principles underlying materials characterization, structure- property relationship, synthesis & processing of different types materials, and extraction & refining of metals. An indepth study of the area of special interest of the student is undertaken through departmental elective courses and project work. This is supplemented by industrial training for six weeks during the summer preceding the fourth year of the programme and educational tour during the third year of the programme and guest lectures in various courses from engineers working in industries. 75 compulsory laboratory experiments form an important part of the undergraduate curriculum, which helps students in understanding the basic principles more thoroughly. Project work, both experimental and computer based, in the fourth year of the programme, enables the students to carry out independent research utilizing various skills learnt in the programme.



## M-Tech Programme

The post graduate programme leading to Master of Technology (M.Tech.) degree has been designed to help students pursue their career options in industry, research & development, as well as in academia. The 22-month program is divided into four full semesters in addition to the summer semester. The students can choose their thesis guide(s) within first semester of entering the program and can start working on their research topic leading to the M.Tech. thesis. Midway through the program, students may apply for switch-over to the Ph.D programme, subject to meeting necessary academic requirements.

## Doctor of Philosophy

The goal of Doctor of Philosophy (Ph.D.) programme of the department is to create future teachers, scientists, innovators, incubators, and engineers with strong analytical skills and in-depth training in theoretical concepts as well as experimental skills. Further to the course work, submission of a Ph.D. thesis on original research topic is an integral part of the programme.

# Some of the Basic Courses offered

- Thermodynamics of materials
- Metallurgical kinetics
- Material characterization
- Mechanical behavior of materials
- Principle of metal extraction and refining
- Phase equilibrium & transformation in materials
- Iron and Steel making
- Fundamentals of materials processing
- Electronic and magnetic properties of materials
- Manufacturing processes, selection and design
- Material degradation and prevention.
- Advances in Iron and Steel Making.
- Electrochemistry and Corrosion.
- Computing Applications in Metallurgy
- Fundamentals of Stereology & Applications to Micro-structural Analysis.
- Materials for Biomedical Applications.
- Solidification Processing.
- Thin Film: Physics and Applications.
- Modeling Of Steelmaking Processes.
- Process Plant Design for Metallurgical Engineering Operations
- Non Equilibrium Processing Of Materials
- Electrical and Magnetic Properties of Ceramic Materials
- Nanostructures and Nanomaterials: Characterization and properties
- Selection and Designing with Engineering Materials
- Surface Phenomena and Characterization

# Professional Bodies

## Materials Science and Engineering Society

'Materials Science and Engineering Society' is an autonomous body constituted by the students of the Department of Materials Science and Engineering, IIT Kanpur. It functions under the supervision and guidance of the faculty of the department and aims at contributing to the activities and programmes organized by the department through the year.



## Indian Institute of Metals (Kanpur Chapter)

IIM Kanpur chapter activities include organizing workshops and conferences, involving student-faculty interaction, and understanding lecture series for clearing the flaws in the conceptual understanding.

## Material Advantage (IIT Kanpur Chapter)

Material Advantage is a window providing access to the materials science and engineering professional's most eminent societies:  
ACerS - The American Ceramic Society  
AIST - Association for Iron & Steel Technology  
ASM International  
TMS - The Minerals, Metals and Materials Society



## The Electronic Materials Group MSE-IITK



The Electronic Materials Group is active in the areas of Organic Electronics, Oxide Electronics and Spintronics. We are tackling basic research problems as well as product development related projects on OLEDs, Organic Solar Cells, Oxide devices and Field Effect Transistors.

# Students 2013

## INTERNSHIPS

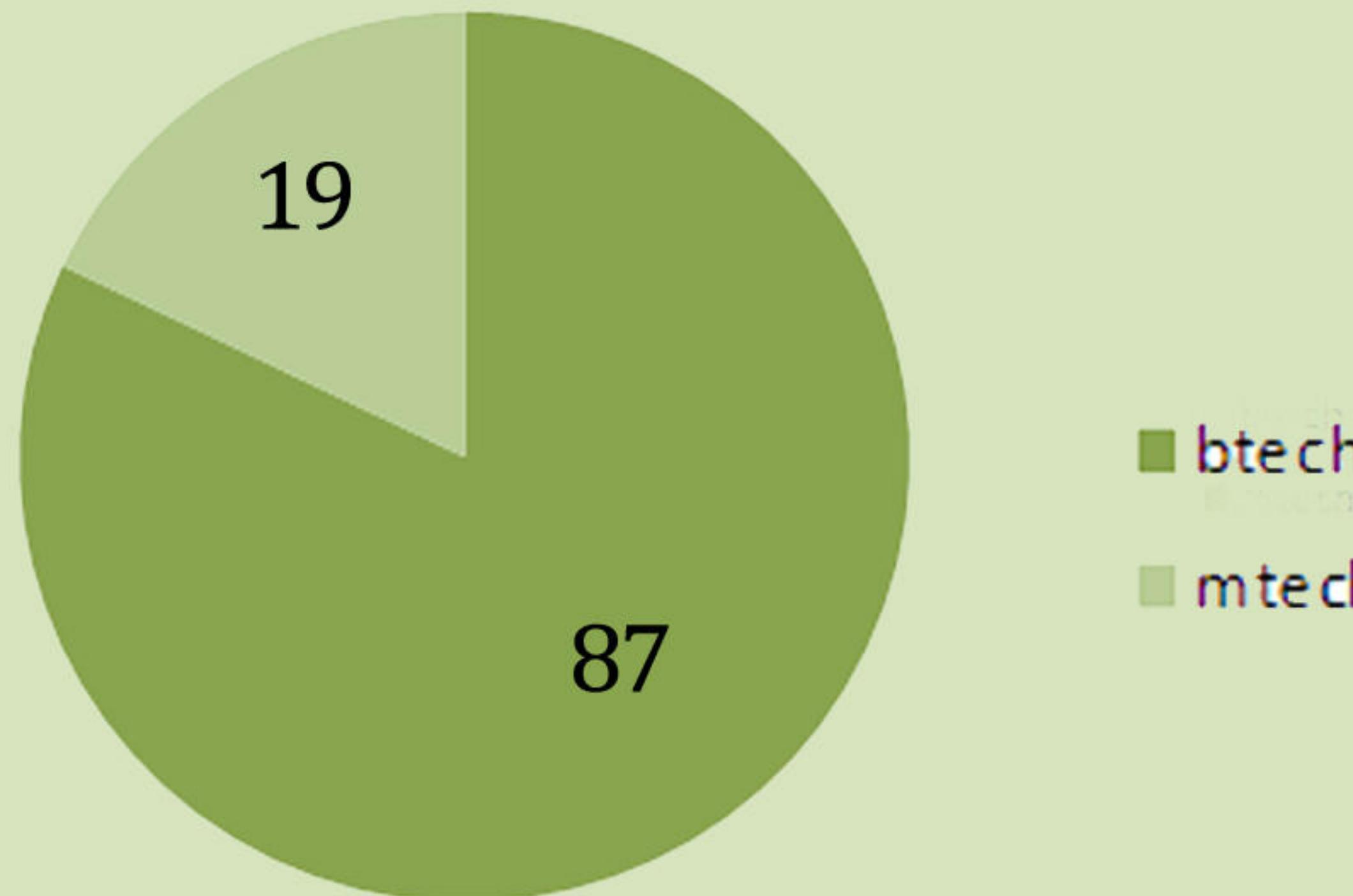
The students of the department do various kinds of internships like core, non-core as well as research. On one hand some of the students visit various universities outside India as well as inside India at NML, IISc Bangalore etc. as summer scholars and on the other hand other students do core engineering work as interns at well known companies like TATA- steel, TCS, TATA motors, Bhushan steel, Jindal steel, Transocean, Schlumberger, NLC-Nalco etc. Hence the students have a first hand experience of working in a corporate outfit.

## INDUSTRIAL VISIT

The department of material science and engineering believes in giving a real life experience to its students. To increase the practical knowledge and working experience of the students, the department arranges an industrial visit of the students (undergraduates) in Jamshedpur where the students visit NML, and TATA steel plants over the span of a week to experience a real life scenario in the engineering profession.



## Strength



## Our Past Recruiters:-

- Schlumberger Asia, Mumbai
- Transocean Incorporated, Mumbai
- Tata Steel R&D, Jamshedpur
- Sterlite Technologies Ltd.
- Reliance Industries Limited
- Rio Tinto
- TRDDC, Pune
- Evalueserve, Gurgaon
- Deutsche Bank
- Morgan Stanley
- ZS Associates India Pvt Ltd
- Futures First Info Services Pvt Ltd
- Jindal Steel and Power LTD
- Bharat Heavy Electricals Limited
- Patil Rail Infrastructure Pvt Ltd
- Surya Roshni Ltd
- TATA Consultancy Services Ltd
- Deloitte
- Indian Oil Corporation Ltd (IOCL)
- Steel Authority of India Limited (SAIL)
- Ispat Industries Ltd
- National Thermal Power Corporation Ltd
- Mishra Dhatu Nigam Ltd
- Council for Scientific and Industrial Research



## AWARDS AND ACHIEVEMENTS

1. Dr. Vivek Verma has been selected for the Shri Ram Arora Award for 2011.
2. Dr. Kantes Balani has been selected for the INAE Young Engineer Award 2010.
3. Dr. Krishanu Biswas has been chosen for INSA Young Scientist Medal 2010.
4. Dr. Ashish Garg has been awarded the Australia India Science and Technology Research Awards (2010)
5. Dr. Dipak Mazumdar has been selected to receive the GD BIRLA Gold Medal-2009
6. Dr. Anish Upadhyaya has been selected for the 2009 Metallurgist of the Year Award

## Alumni

1. R. Amritendu Roy, Presently at Virginia Tech
2. Pranav K.Suri (B.Tech, 2011) Now at University of Minnesota
3. Akash Verma (B.Tech, 2010) Now at University of Oxford
4. Ankush D. Kothalkar (B.Tech, 2010) Now at University of Texas-Austin,
5. Shekhar Nath Present affiliation: Chubu University, Japan Senior researcher
6. Department of Biomedical Sciences
7. Pavani Kami  
Present affiliation: University of North Texas, USA
8. Tufan Guha  
Present affiliation: Florida State University, USA
9. Raghunandan U.  
Present affiliation: Dresden, Germany



## Students

Students have been placed in Deutsche Bank, Schlumberger, TATA Steel, Rio Tinto, DRDO and other Multi-national & National Companies, Research Organisations in recent years.

Around 90 % students are placed in every batch, every year and the rest go for higher studies.

Most of the students are going for foreign internships, in countries like U.S.A., Japan, China, Korea, Belgium, etc. and companies like Deutsche Bank, Schlumberger, TATA Steel, I.I. Sc. Bangalore etc.

## CONTACT DETAILS



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