

PhD Admissions 2020

Department of Materials Science &
Metallurgical Engineering

Indian Institute of Technology Hyderabad



Apply online at www.iith.ac.in

MSME Faculty



Research Interests:

- ❖ High entropy alloys
- ❖ Thermomechanical processing of novel alloys
- ❖ Bulk ultrafine & nanostructured materials produced by severe plastic deformation processes
- ❖ Crystallographic texture
- ❖ Mechanical behavior of materials

Prof. Pinaki P. Bhattacharjee

PhD: IIT Kanpur, India

Contact: pinakib@msme.iith.ac.in, +91 (40) 2301 6069



Research Interests:

- ❖ Powder Metallurgy & Sintering Mechanisms, Nanostructures,
- ❖ High Entropy Alloys, MAX Phases and MXene,
- ❖ Advanced ceramics & composites
- ❖ Microstructure-Mechanical Properties of Steels
- ❖ Metal Additive Manufacturing,
- ❖ Electro-Spark Coating,
- ❖ Wear & Tribology

Dr. Bharat B. Panigrahi

PhD: IIT Kharagpur, India

Contact: bharat@msme.iith.ac.in, +91 (40) 2301 6032



Research Interests:

- ❖ Nanocrystalline materials,
- ❖ High entropy alloys,
- ❖ Bulk metallic glasses,
- ❖ Thermodynamics and kinetics of phase transformations,
- ❖ Transmission electron microscopy and atom probe tomography

Prof. B.S. Murty

PhD: IISc Bangalore, India

Contact: bsm@msme.iith.ac.in, +91 (40) 2301 6033



Research Interests:

- ❖ Welding
- ❖ Additive manufacturing

Prof. G.D. Janakiram

PhD: IIT Madras, India

Contact: jram@msme.iith.ac.in, +91 (40) 2301 6565



Research Interests:

- ❖ Advanced Multi-Functional Nanostructured Materials/High Entropy Alloys
- ❖ Combinatorial Alloy Design of emerging materials (Co-Cu-Fe-Ni-Zn High Entropy Alloys, CIGS & CZTS solar photovoltaics, Additive Manufactured Binary & Ternary Ti-based Biomaterials, IFHS Steel) through combined computational (DFT) and experimental techniques (electrodeposition, powder metallurgy, ink jet print)

Dr. Suhash R. Dey

PhD, Paul-Verlaine Metz, France

Contact: suhash@msme.iith.ac.in, +91 (40) 2301 6096

MSME Faculty



Dr. Ranjith Ramadurai
PhD: IISc Bangalore, India
Contact: ranjith@msme.iith.ac.in, +91 (40) 2301 7046

Research Interests:

- ❖ Multiferroic oxide thin films for fundamental science and functional device applications
- ❖ High-k dielectric thin films for CMOS technology and memory device applications
- ❖ Surfaces and Interfaces of oxide hetero structures on silicon and single crystalline oxide substrates
- ❖ Influence of process conditions, strain engineering and interface engineering on domains and domain dynamics of multiferroic thin films utilizing scanning probe microscope



Dr. Mudrika Khandelwal
PhD: Cambridge, UK
Contact: mudrika@msme.iith.ac.in, +91 (40) 2301 7118

Research Interests:

- ❖ Bacterial cellulose and other natural materials- understanding structure, mechanism and applications
- ❖ High performance green composites, liquid crystals and self-assembly of rod-like entities
- ❖ Drug Delivery, strategies for developing anti-fouling and anti-microbial materials
- ❖ Materials for tissue scaffolding.



Dr. Atul S. Deshpande
PhD: Max Planck, Potsdam, Germany
Contact: atuldeshpande@msme.iith.ac.in, +91 (40) 2301 7044

Research Interests:

- ❖ Nanoparticle synthesis and self-assembly, sol-gel processes, templating techniques
- ❖ Novel nanostructured materials for advanced applications including catalysis
- ❖ Solid oxide fuel cells (SOFC), ferroelectric materials
- ❖ Bone replacement materials and drug delivery systems



Dr. Saswata Bhattacharya
PhD: IISc Bangalore, India
Contact: saswata@msme.iith.ac.in, +91 (40) 2301 7107

Research Interests:

- ❖ Phase transformations in alloys and oxides
- ❖ Phase-field modelling of microstructural evolution
- ❖ Modelling deformation of materials using discrete dislocation dynamics and continuum crystal plasticity
- ❖ Microstructure-property correlations



Dr. Subhradeep Chatterjee
PhD: IISc Bangalore, India
Contact: subhradeep@msme.iith.ac.in, +91 (40) 2301 8442

Research Interests:

- ❖ Phase Transformations and Microstructure Development
- ❖ Laser and Electron Beam Processing
- ❖ Welding and Surface Treatment
- ❖ Modelling and Simulation, (Phase Field/FEM/CVM)

MSME Faculty



Dr. Rajesh Korla
PhD: IISc Bangalore, India
Contact: rajeshk@msme.iith.ac.in, +91 (40) 2301 6559

Research Interests:

- ❖ Deformation at room temperature
- ❖ Creep and super-plasticity
- ❖ Micro mechanical deformation
- ❖ Molecular dynamic simulations
- ❖ Nano indentation



Dr. Chandrasekhar Murapaka
PhD: NTU Singapore
Contact: mchandrasekhar@msme.iith.ac.in, +91 (40) 2301 6562

Research Interests:

- ❖ Spintronic based memory and logic devices
- ❖ Nanomagnetic materials, Domain wall dynamics in ferromagnetic networks
- ❖ Spin torque nano-oscillators for RF applications
- ❖ Spin-orbit torque induced magnetization switching and dynamics, Magnetic tunnel junctions
- ❖ Micro and Nanofabrication techniques



Dr. Sairam K. Malladi
PhD: TU Delft, Netherlands
Contact: srkm@msme.iith.ac.in, +91 (40) 2301 7003

Research Interests:

- ❖ In situ characterization and technique development using MEMS devices (lab on chip)
- ❖ Phase transformations in materials, Electrochemistry and Corrosion
- ❖ In situ Transmission Electron Microscopy
- ❖ Graphene based super capacitors, Materials for Energy Applications



Dr. Shourya Dutta Gupta
PhD: EPFL, Switzerland
Contact: shourya@msme.iith.ac.in, +91 (40) 2301 6561

Research Interests:

- ❖ Nanophotonics, Plasmonic nanostructures and nanoparticles
- ❖ Metamaterials and metasurfaces, Sensors, Alternative materials for plasmonics
- ❖ Alternative fabrication techniques, Nano-optical biosensors
- ❖ Graphene based devices, Lab-on-a-chip based optical devices, Microfluidic devices



Dr. Mayur Vaidya
PhD: IIT Madras, India
Contact: vaidyam@msme.iith.ac.in, +91 (40) 2301 6564

Research Interests:

- ❖ Diffusion-Deformation correlations in materials
- ❖ Phase growth and interdiffusion kinetics in thermoelectric materials
- ❖ Diffusion in multicomponent alloys
- ❖ Processing, characterization and stability of nanocrystalline alloys

GLIMPSE OF RESEARCH AREAS

Structural Materials

- ❖ Grain Boundary Engineering
- ❖ Mechanical Behaviour, Plastic Deformation
- ❖ Phase Transformation, solidification
- ❖ Metals and Alloys: High Entropy Alloys, Multi-Phase Alloys, Titanium Alloys, Superalloys, Steels, Dispersion Strengthened Alloys
- ❖ Bulk-Metallic Glasses, In-situ Composites
- ❖ Metallurgical Thermodynamics and kinetics
- ❖ Severe Plastic Deformation
- ❖ Thermomechanical Processing, Texture
- ❖ Nanocrystalline materials, Itra-fine microstructures
- ❖ Creep and high temperature deformation
- ❖ Powder Metallurgy, Advanced Composites, MMC
- ❖ Multicomponent Oxides, Nanoparticles, Ceramics
- ❖ Coating, Surface Science, Wear and Tribology
- ❖ Advanced microscopy
- ❖ Metal Joining, Friction Stir Welding, Additive Manufacturing
- ❖ Diffusion in pure metals and multicomponent alloys
- ❖ Mechanics of nanoporous materials
- ❖ Corrosion in bulk and nanocrystalline alloys
- ❖ Low Temperature solders

Functional

- ❖ Sensors
- ❖ Magnetic Materials, Spintronics, Magnetic Skyrmions
- ❖ Plasmonics, Nanophotonics, Micro-fluidics
- ❖ Nano synthesis, Self-assembly,
- ❖ Catalysis
- ❖ Electro-chemical deposition of functional materials
- ❖ Nature Inspired Materials
- ❖ Healthcare Materials, Drug Delivery, Tissue-scaffolds
- ❖ Implants and Biomaterials
- ❖ Energy Storage Materials, 2D Carbon Materials, MXene
- ❖ Piezoelectric hybrid nanocomposites,
- ❖ Graphene based Supercapacitors, Solar Photovoltaics

Computational

- ❖ Phase-field Modelling, Combinatorial materials science
- ❖ Modelling Deformation Behavior
- ❖ Discrete Dislocation Dynamics
- ❖ Continuum Crystal Plasticity
- ❖ Multi-scale Modelling of Functional Materials

IN-HOUSE FACILITIES AT A GLANCE

Materials Synthesis and Processing

- ❖ Pulse Laser Deposition
- ❖ E-beam deposition
- ❖ Planetary Ball mill
- ❖ Rolling mill
- ❖ Robotic welding
- ❖ Uniaxial Compaction Press
- ❖ Cold-Isostatic Press
- ❖ Induction-melting furnace
- ❖ Arc-melting furnace
- ❖ Hot press
- ❖ High Temperature Vacuum Furnace
- ❖ Infra-red heating furnace
- ❖ Muffle furnace
- ❖ Tube furnace
- ❖ Salt-bath furnace
- ❖ Autoclave Ovens
- ❖ Incubator shaker
- ❖ Freeze drier
- ❖ Bio-safety cabinet
- ❖ Glove-box
- ❖ Glass vacuum sealing
- ❖ Spin and Dip coater

Characterization

- ❖ Cold FEG-TEM
- ❖ FEG- SEM with EBSD
- ❖ Optical Microscopes
- ❖ Ion-milling, PIPS
- ❖ Thermal analysis
- ❖ DTA, DSC, TGA, Dilatometer
- ❖ Surface area and porosity analyser
- ❖ Powder & thin film XRD
- ❖ UV visible spectrophotometer
- ❖ Raman spectrometer
- ❖ AFM
- ❖ Universal testing machine (MTS, Instron)
- ❖ Creep Testing
- ❖ Hardness Tester
- ❖ Wear (Pin-on-disk)
- ❖ Nanoindentor
- ❖ Electrochemical analyzer
- ❖ Viscometer

Computational

- ❖ Thermocalc
- ❖ DICTRA
- ❖ TC-Prisma

MSME PhD Program

The Doctor of Philosophy (Ph.D.) program is for enthusiastic students, who are willing to take up challenging research problems in various areas of Materials Science and Metallurgical Engineering, as mentioned in the research profiles of the faculty members (but not limited to). New ideas, inventions and innovations are most welcome.

SELECTION PROCESS

- ❖ Selection process will take place in two steps: A written test followed by an interview.
- ❖ Verification of the relevant documents/certificates will be done for the shortlisted candidates in the written test.
- ❖ Only those candidates who meets eligibility criteria satisfactory after shortlisted in the written test, will be interviewed.
- ❖ Candidates selected in interview will be offered PhD positons.

APPLICATION PROCEDURE

- visit www.iith.ac.in for detail information and apply online
- Date of Written Test and Interview will be notified to the applicants

Contact for PhD Program:
Dr. Mudrika Khandelwal
Department of Materials Science & Metallurgical Engineering
Email: phd.admissions@msme.iith.ac.in

ELIGIBILITY & QUALIFICATIONS

Candidates interested in Institute scholarship (MHRD) and Candidates with external funding (DST-INSPIRE/ joint CSIR-UGC JRF QUALIFIED/ industry sponsorship/ external registrants from national research laboratories) with required qualifications (mentioned below) are highly encouraged to apply. Candidate should have one of the following qualification:

- M.Tech./ M.E. or equivalent degree in Materials Science and Engineering, Metallurgical Engineering, Ceramics, Mechanical Engineering, Manufacturing/ Production Engineering, Nanoscience, Polymer, Biomedical, and other relevant areas. OR
- B. Tech. / B.E. (Non- I.I.T.) in the above disciplines with CGPA of 8.5 and above, along with a valid GATE score OR B. Tech. students graduating from an I.I.T. with a CGPA of 8.0 or above are eligible to apply OR B.S (4 Year) students graduating from I.I.Sc. Bangalore or an I.I.S.E.R with CGPA 8.0 or above. The GATE criterion is not mandatory for B.Tech. or BS students graduating from an I.I.T/ IISc-B (who has CGPA 8.0 or above). OR
- MSc or equivalent in Materials Science/ Physics/ Chemistry/Life Sciences or equivalent degree with valid GATE Score in relevant area or joint CSIR-UGC JRF, Inspire, qualified or equivalent exam. OR
- Candidates holding the regular position, in the Government organization and R&D Labs, who has B.Tech/B.E. or equivalent Degree with CGPA 8.0 and above, in relevant discipline and having two years of experience are eligible to apply as external PhD student. GATE is not mandatory for them.