

Ph.D. Admissions: July 2022

Materials Science &
Metallurgical Engineering

<https://msme.iith.ac.in/>



MSME Ph.D. Programme

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. *Specific research areas will be mentioned at the time of interview.*

Selection process



Shortlisted candidates will be called for the selection process
Selection will be conducted based on written test and/or interview

UGC-CSIR-JRF qualified candidates are directly allowed to appear for the interview



visit www.iith.ac.in for more information and apply online



Contact details

MSME Ph.D. Admissions Committee

Department of Materials Science & Metallurgical Engineering

Email: phd.admissions@msme.iith.ac.in

Structural materials

Functional materials

Advanced Materials Characterization

Computational Materials

Health care & Bio-Materials

MSME



Research areas

Nanoscience & Nanotechnology

Energy materials

Facilities at MSME

Material Synthesis and Processing

- Pulse Laser Deposition
- E-beam Deposition
- Pulse Electrodeposition
- Planetary Ball Mill
- Rolling Mill
- Robotic Welding
- Uniaxial Compaction Press
- Cold-Isostatic Press
- Induction-Melting Furnace
- Arc-Melting Furnace
- Glass Vacuum Sealing
- Spin and Dip coater
- Sputtering
- Hot Press
- High Temperature Vacuum Furnace
- Infra-red Heating Furnace
- Muffle and Tube furnaces
- Salt-bath Furnace
- Autoclave Ovens
- Incubator Shaker
- Freeze Drier
- Bio-safety Cabinet
- Glove-box

Computational

- ThermoCalc
- DICTRA
- TC-Prisma

Characterization

- Cold FEG-TEM
- FEG-SEM with EDS and EBSD
- Optical Microscopes
- FIB with EDS and EBSD
- Ion-milling, PIPS
- SPM
- Surface Area and Porosity analyser
- Powder & Thin Film XRD
- UV Visible Spectrophotometer
- Raman Spectrometer
- DTA, DSC, TGA, Dilatometer
- Universal Testing Machine (MTS, Instron)
- Creep Testing
- Hardness Tester
- Wear (Pin-on-disk)
- Nanoindentor
- Electrochemical Analyzer
- Viscometer



MSME Faculty

Prof. B. S. Murty

- Nanocrystalline materials
- Thermodynamics & kinetics of phase transformations
- High entropy alloys
- Bulk metallic glasses
- TEM and atom probe tomography

bsm@msme.iith.ac.in +91 (40) 2301 6001



Prof. Pinaki P. Bhattacharjee

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

pinakib@msme.iith.ac.in +91 (40) 2301 6551



Prof. G.D. Janakiram

- Welding
- Additive manufacturing

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



Prof. Bharat B. Panigrahi

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

bharat@msme.iith.ac.in +91 (40) 2301 6555



Prof. Suhash R. Dey

- Advanced multiFunctional-multiMorphological Nanostructured High Entropy Alloys/Compounds for Energy conversion, Sensors and Biomedical Applications
- Electrochemical Additive Manufacturing
- Combinatorial Alloy Design of Emerging Materials

suhash@msme.iith.ac.in +91 (40) 2301 6552



MSME Faculty

Dr. Saswata Bhattacharya

- 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
- saswata@msme.iith.ac.in +91 (40) 2301 6556



Dr. Atul S. Deshpande

- Nanoparticle synthesis and self-assembly, sol-gel processes, templating techniques
 - Novel nanostructured materials for advanced applications including catalysis, energy storage and superhydrophobic coatings
 - High entropy oxides
- atuldeshpande@msme.iith.ac.in +91 (40) 2301 6554



Prof. Ranjith Ramadurai

- 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
- ranjith@msme.iith.ac.in +91 (40) 2301 6553



Dr. Mudrika Khandelwal

- 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.
- mudrika@msme.iith.ac.in +91 (40) 2301 6557



MSME Faculty

Dr. Subhradeep Chatterjee

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

subhradeep@msme.iith.ac.in +91 (40) 2301 6558



Dr. Rajesh Korla

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

rajeshk@msme.iith.ac.in +91 (40) 2301 6559



Dr. Sairam K. Malladi

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

srkm@msme.iith.ac.in +91 (40) 2301 6560



Dr. Shourya Dutta Gupta

- Plasmonics and Nanophotonics
- Sensors, Lab-on-a-chip devices, Microfluidics
- Alternative materials for plasmonics
- 2D Materials based opto-electronics

shourya@msme.iith.ac.in +91 (40) 2301 6561



MSME Faculty

Dr. Chandrasekhar Murapaka

- 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

mchandrashakar@msme.iith.ac.in +91 (40) 2301 6562



Dr. Mayur Vaidya

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

vaidyam@msme.iith.ac.in +91 (40) 2301 6564



Dr. Deepu J. Babu

- Nanoporous materials
- CVD, Adsorption and Membrane based gas separation applications
- Carbon nanomaterials, MOFs
- Graphene & Graphyne and other 2D materials
- Defect Engineering, Plasma functionalization

deepu.babu@msme.iith.ac.in +91 8289995143



Dr. Suresh Kumar Garlapati

- Printed electronics (transistors and CMOS logics)
- Oxide Semiconductors
- Electrolytes
- Organic electronics (transistors and chemiresistors)
- Gas sensors
- Memristors

gsuresh@msme.iith.ac.in +91 9100930553



Dr. Ashok Kamaraj

- Process metallurgy
- Physical modeling of unit processes
- Iron and steelmaking
- Life cycle analysis of processes and products
- Development of alloy steels

ashokk@msme.iith.ac.in +91 9790504570



Eligibility & Qualifications

Candidates interested in Institute scholarship (MoE) 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. Externally funded candidates (non MoE) are encouraged to contact their preferable MSME faculty before exam/ interview schedule

Candidate should have one of the following qualifications:

- M.Tech./M.E. or equivalent degree in Materials Science and Engineering, Metallurgical Engineering, Ceramics, Mechanical Engineering, Manufacturing/ Production Engineering, Nanoscience, Polymer, Biomaterial, Chemical Engineering and other relevant areas. **OR**
- Direct Ph.D. - B. Tech. / B.E. in the above disciplines with CGPA of 8.5 (Gen) and 8.0 (for all others), along with a valid GATE score. For project Ph.D. candidates, B. Tech. / B.E. in the above disciplines with CGPA of 8.0 (Gen) and 7.5 (for all others), along with a valid GATE score. The GATE criterion is not mandatory for B.Tech. or B.S. students graduating from an IIT/ IISc-B/ NIT /IISER or any CFTI. **OR**
- M.Sc. or equivalent in Materials Science/ Physics/ Chemistry or equivalent degree with a valid GATE Score in relevant area or joint CSIR-UGC JRF, DST-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 Ph.D. student. GATE is not mandatory for them.