

CV: Dr. Shashank Shekhar

Personal Information

Name: Dr. Shashank Shekhar

Date of Joining: May 5th, 2011

EMPLOYMENT HISTORY

Professor Department of Materials Science and Engineering, IIT Kanpur, India	August 2022-Present
Associate Professor Department of Materials Science and Engineering, IIT Kanpur, India	June 2018-August 2022
Assistant Professor Department of Materials Science and Engineering, IIT Kanpur, India	May 2011-June 2018
Visiting Research Assistant Professor Department of Industrial Engineering, University of Pittsburgh, USA	September 2010-April 2011
Postdoctoral Research Associate Department of Industrial Engineering, University of Pittsburgh, USA Mentor: Dr. M. Ravi Shankar	July 2008- August 2010

RESEARCH INTERESTS and SPECIALIZATION

Specialization: Grain boundaries and triple junctions, Thermomechanical Processing, Manufacturing, Physical Metallurgy

Areas of Interest:

- ❖ Structure, stability and mechanical properties of nanocrystalline materials obtained by Severe Plastic Deformation
- ❖ Grain boundaries, triple junctions and homo-phase interfaces in crystalline materials
- ❖ Thermomechanical processing of metals and alloys and its effect on microstructure and properties
- ❖ Modulated Machining and its effect on mechanical properties

Teaching

COURSES TAUGHT:

- Co-Instructor, Physical Metallurgy and Characterization Lab, IIT Kanpur Jan-April 2024
- Instructor, Introduction to Manufacturing TA211, IIT Kanpur Jan-April 2024
- Tutor, Nature and Properties of Materials, IIT Kanpur Aug-Nov 2023
- Tutor, Mechanics of Materials, IIT Kanpur Aug-Nov 2023
- Co-Instructor, MSE691, IIT Kanpur Jan-April 2023

- Instructor, Ethics Course, IIT Kanpur Aug-Nov 2022
- Instructor, Mechanical Behavior Lab MSE313, IIT Kanpur Aug-Nov 2022
- Instructor, Mechanical Behavior Lab MSE313, IIT Kanpur Jan-April 2022
- Instructor, Introduction to Manufacturing TA201, IIT Kanpur Aug-Nov 2021
- Tutor, Introduction to Manufacturing TA201, IIT Kanpur Summer 2021
- Instructor, Dislocations and Plasticity MSE658, IIT Kanpur Aug-Nov 2020
- Instructor, Materials Processing, MSE305, IIT Kanpur Jan-April 2020
- Instructor, Mechanical Behavior of Materials, MSE302, IIT Kanpur Aug-Nov 2019
- Instructor, Selection and Designing of Engineering Materials, MSE667, IIT Kanpur Jan-April 2019
- Instructor, Mechanical Behavior of Materials, MSE302, IIT Kanpur Aug-Nov 2018
- Instructor, Materials Processing, MSE305, IIT Kanpur Jan-April 2018
- Co-Instructor, Manufacturing Lab, MSE315, IIT Kanpur Jan-April 2018
- Instructor, Dislocations and Plasticity MSE658, IIT Kanpur Aug-Nov 2017
- Co-Instructor, Lightweight alloys for automotive applications MSE672, IIT Kanpur Aug-Nov 2017
- Co-Instructor, Mechanical Behavior Lab MSE313, IIT Kanpur Aug-Nov 2017
- Instructor, Introduction to Manufacturing TA201, IIT Kanpur Jan-April 2017
- Tutor, Introduction to Manufacturing TA201, IIT Kanpur Jan-April 2017
- Co-Instructor, Research Skills CHE600, IIT Kanpur Jan-April 2017
- Instructor, Materials Processing, MSE305, IIT Kanpur Jan-April 2016
- Instructor, Manufacturing Lab, MSE315, IIT Kanpur Jan-April 2016
- Instructor, Dislocation and Plasticity, MSE658, IIT Kanpur Aug-Nov 2015
- Co-Instructor, Manufacturing Process Lab MSE315, IIT Kanpur Jan-April 2015
- Instructor, Introduction to Manufacturing TA201, IIT Kanpur Jan-April 2015
- Instructor, Introduction to Manufacturing TA201, IIT Kanpur Aug-Nov 2014
- Co-Instructor, MSE 300, IIT Kanpur Aug-Nov 2014
- Instructor, Grain Boundary Engineering MSE680, IIT Kanpur Jan-April 2014
- Co-Instructor, Research Skills CHE600, IIT Kanpur Jan-April 2014
- Instructor, Manufacturing Processes: Selection and Design MSE470, IIT Kanpur Aug-Nov 2013
- Co-Instructor, MSE 300, IIT Kanpur Aug-Nov 2013
- Instructor, MSE691 Jan-April 2013
- Instructor, Fundamentals of Materials Processing MSE370, IIT Kanpur Jan-April 2013
- Instructor, MSE691 Aug-Nov 2012
- Instructor, Fundamentals of Materials Processing MSE370, IIT Kanpur Jan-April 2012
- Tutor, Engineering Sciences (ESO 214), IIT Kanpur Aug-Nov 2011
- Tutor, Introduction to Manufacturing Process (TA201N), IIT Kanpur Aug-Nov 2011
- Co-Instructor, Manufacture of Structural Nanomaterials (IE 2012), University of Pittsburgh Fall 2010
- Co-Instructor, Manufacture of Structural Nanomaterials (IE 2012), University of Pittsburgh Fall 2009
- Teaching Assistant, Scanning Electron Microscopy (MSE 595B), Purdue University Fall 2005
- Teaching Assistant, Materials Properties Laboratory (MSE 235), Purdue University Fall 2004
- Teaching Assistant, Structure and Properties of Materials (MSE 230), Purdue University Spr 2002

COURSES DEVELOPED:

- Lightweight Alloys for Automotive Applications (MSE672)
- Dislocations and Plasticity (MSE658)
- Deformation Processing (MSE657)
- Materials Processing (MSE305)

Supervision of Bachelor/Master thesis

M. TECH STUDENTS

Mr. Shadan Ahmad <i>"Enhancing Mechanical Properties of Copper using the Redesigned ACCRP (Asymmetric Constrained Constant Radius Pressing) Die"</i>	2024
Mr. Kamlesh Kalasariya <i>"Predicting Hot Deformation Flow Behaviour and Dynamic Recrystallization using Machine Learning Approach"</i>	2023
Mr. Sudipta Maity <i>"Use of controlled recrystallization to overcome strength-ductility limitation in severely deformed samples"</i>	2022
Mr. Swapnil Sawarkar <i>"Effect of Die Design on Microstructure and Mechanical properties of copper sheet in Constrained Groove Pressing"</i>	2021
Mr. Imroz Alam <i>"Effect of High Strain Rate on Mechanical Properties of Third Generation Advanced High Strength Steels"</i>	2021
Mr. Akash Kumar <i>"Overcoming the strength-ductility paradox of constrained groove pressing processed pure copper by defect healing"</i>	2021
Mr. Debashish Rath <i>"Evolution of coincidence site lattice boundaries in interstitial free steel"</i>	2020
Mr. Utkarsh Vishal <i>"Recrystallization as a defect annealing mechanism to obtain high strength high ductility in severely deformed alloys"</i>	2020
Mr. Arvind Shirale <i>"Analytical Modelling of Elliptical Vibration Cutting to Predict Cutting Forces"</i>	2019
Mr. Eshan Saraswat <i>"Fabrication of Al-Si controlled expansion alloys using unique combination of pressureless sintering and hot forging"</i>	2019
Mr. Asrafal Haque <i>"Al-Si controlled expansion composites fabricated via pressure-less sintering and SPS"</i>	2018
Mr. Amit Bhardwaj <i>"Pickling of Si and Cr containing Steels"</i>	2018
Mr. Ayush Anand <i>"Microstructural and Mechanical Characterization of High-Silicon Stainless Steel"</i>	2018
Mr. Ajay Soni <i>"Deformation processing maps for Al alloys for automotive applications"</i>	2018
Mr. G. Mani Ratnam, <i>"Effect of Machining on Mechanical, Tribological and Functional Properties of Mild Steel"</i>	2017
Mr. Raghvendra Tiwari, <i>"Effect of Co-deposition of Cu and Ni by Zn on alloying"</i>	2017
Mr. Pankaj Kumar, <i>"Development of Very Hard Corrosion Resistant Roll bonded Cr Coating on Mild Steel in Presence of Graphite,"</i>	2017
Mr. Vipin Nanda, <i>"Effect of Machining on the Passivation Behavior of 304 SS Steel"</i>	2016
Mr. Randhir Kumar Parashar, <i>"Effect of Machining on Electrochemical Behavior of SS316L"</i>	2016

Mr. Ravi Joham, "Effect of rolling and cross-rolling on grain boundary engineering of SS304"	2016
Mr. Sanu Kumar Gupta, "Effect of Machining on Abnormal Grain Growth during Oxidation of Mild Steel"	2016
Mr. Abir Roy, "Stress Corrosion Cracking Behavior of Severely Deformed Materials" (MNIT, Allahabad)	2015
Mr. Miral Verma, "Effect of Machining configurations on mechanical properties of SS316L"	2014
Mr. Sudharm Rathore, "Study of embrittlement behavior of Duplex Steel"	2014
Ms. Paulami Majumdar, "Effect of Machining on Corrosion Behavior of Steel"	2014
Mr. Manish Prakash, "Effect of Machining on Oxidation Behavior of Steel"	2014
Mr. Koushik Sikdar, "Fretting Wear of Mg-Li-Al based Alloys"	2013
Ms. Monalisa Mandal (as co-ordinating guide), "Effect of Micro-alloying and heat treatment on Corrosion Behavior of Cast Mg-Zn alloys"	2013

UG STUDENTS

Mr. Baivab Das (NIT Raipur)	Summer 2024
Mr. Shashank Pillai (NIT Durgapur)	Summer 2024
Mr. Aditya Chouhan	Summer 2019
Mr. Rushit Virani (IIT Ropar)	Summer 2018
Mr. Abhishek Singh	Summer 2017
Mr. Gagandeep Kalshi (COEP)	Summer 2016
Ms. Saba Ahmad (CSJM)	2015-2016
Mr. Nikhil Tripathi (CSJM)	2015-2016
Mr. Ayush Singh Thapa (CSJM)	2015-2016
Mr. Gaurav Gupta (CSJM)	2015-2016
Mr. Rajat Gupta (CSJM)	2015-2016
Mr. Osama Ansar (RuTAG)	Summer 2015
Mr. Kislay Thakur (RuTAG)	Summer 2015
Ms. Ritika Sachan (RuTAG)	Summer 2015
Mr. G. Mani Ratnam	2015-2016 Sem-I and 2015 – 2016 Sem-II
Mr. Mithilesh Vaddadi	2015-2016 Sem-I
Ms. Nirma Kumari	2015 Summer and 2015-2016 Sem-I
Ms. Saloni Singhal (NIT Jaipur)	Summer 2015
Mr. Mrinal Dwivedi (Lucknow University)	Summer 2015
Mr. Nitin Kumar	2013-2014 Sem-II and 2014 – 2015 Sem-I
Mr. Sanu Kumar Gupta	2013-2014 Sem-II and 2014 – 2015 Sem-I
Mr. Ravi Joham	2013-2014 Sem-II and 2014 – 2015 Sem-I
Mr. Ankit Himanshu	2013-2014 Sem-II and 2014 – 2015 Sem-I
Mr. Abhishek Jain	2013-2014 Sem-II and 2014 – 2015 Sem-I
Mr. Randhir Kumar Parashar	2014 – 2015 Sem-I

Mr. Aviral Vaid	2012-2013 (Sem-I and Sem-II)
Ms. Kalpi Mittal	2012-2013 (Sem-I and Sem-II)
Mr. Awadhesh Kumar	2012-2013 Sem-I
Ms. Surbhi Singhania	2012-2013 Sem-I
Mr. Suchit Sarin, CSJM	2011-2012 (Sem-I and Sem-II)
Mr. Parth Ashok Garg, CSJM	2011-2012 (Sem-I and Sem-II)
Mr. Narendra Jhirwal	2011-2012 (Sem-I and Sem-II)
Mr. Anupam Acharya	2011-2012 (Sem-I and Sem-II)
Mr. Chirag Sidana	2011-2012 (Sem-I and Sem-II)
Mr. Amritansh Frank	2011-2012 (Sem-I and Sem-II)

PhD Supervision

Mr. Nitin Kr. Sharma, *“Experimental and theoretical study of evolution of grain boundary character distribution in face centered cubic alloys”* **(Graduated March 2018)**
 Now working as Assistant Professor, IIT Jodhpur <https://sites.google.com/site/nitinksharmasite>

Mr. Prabhat Kumar Rai, (Primary Advisor: Prof. Kallol Mondal) *“Harmonic and gradient microstructures and their corrosion and wear behavior”* (Co-Advisor) **(Graduated June 2019)**
 Now working as Researcher, R&D, JSW Steel Ltd
<https://linkedin.com/in/dr-prabhat-kumar-rai-b03a6319/?originalSubdomain=in>

Mr. Sandeep Sahu, *“Use of hot rolling to modify grain boundary character distribution in Alloy 600”* **(Graduated May 2020)**
 Now working as Newton International Fellow, University of Southampton, UK

Mr. Prabhat Chand Yadav, *“Microstructural evolution and GBCD evolution on machining of hard to deform materials”* **(Graduated July 2021)**
 Now working as Assistant Professor, Mechanical Engineering, Thapar Institute of Engineering and Technology <https://med.thapar.edu/facultydetails/MTQ0Mg==>

Mr. Durjyodhan Sethi (Primary Advisor: Prof. Barnik Saha Roy, NIT Agartala) *“Friction Stir Welding of Al alloy and Al MMCs”* **(Graduated July 2022)**

Mr. Prince Setia, *“Microstructure and mechanical characterization of High Silicon Steel”* **(Graduated December 2022)**

Mr. Nikhil Tripathi *“Optimization of parameters in CGP to overcome strength-ductility limitations of severe plastic deformation”* (Thesis Submitted) 2017 – Present

Mr. Aman Kumar *“Dynamic and post-dynamic recrystallization studies”* 2020 – Present

Mr. Sanjeev Patel “Elliptical machining to obtain textured surface”

2020 – Present

Post-doc Mentoring

Dr. Murli Kumar Manglam (PhD, IIT Patna), Working as IPDF

April 2023 - Current

Dr. Nitish Raja (PhD, IIT Roorkee), Worked as PDF and NPDF

July 2022, June 2024

Knowledge Dissemination

CONFERENCES & WORKSHOPS

- Co-Instructor, MOOC course on “*Mechanical Behavior of Materials: Part-II*”, Aug 2024, Aug 2023, Aug 2022
- Co-Instructor, MOOC course on “*Mechanical Behavior of Materials: Part-I*”, Jan 2022, Jan 2023, Jan 2024
- Talk on “*Materials Selection: Engineering and Design*” in the workshop organized by Materials Advantage Society, IIT Kanpur, Oct 2020
- Talk on “*EBSD: From theory to Applications*” in E-STC workshop organized by NIT Jalandhar, Aug 2020
- Instructor, MOOC course on “*Fundamentals of Materials Processes – Part II*” Jan 2024, Jan 2023, Jan 2022, Jan 2021, July 2017
- Instructor, MOOC course on “*Fundamentals of Materials Processes – Part I*”, Sep 2024, Sep 2023, Sep 2021, Sep 2020, July 2017, July 2016
- Instructor, MOOC course on “*Defects in Crystalline Solids – Part II*” Jan 2024, Jan 2022, Jan 2019
- Instructor, MOOC course on “*Defects in Crystalline Solids – Part I*” Sep 2021, Sep 2020, and July 2018
- Co-Organizer, QIP Workshop on “*Mechanical Behavior of Materials*” February 2021, IIT Kanpur
- Co-Organizer, QIP Workshop on “*Advanced Scanning Electron Microscopy and Microanalysis*” March 2019
- Co-organizer, Conference on “*Microstructural Engineering 2019*”, April 2019, IIT Kanpur
- Co-organizer, QIP Workshop on “*Mechanical Behavior of Materials*” Oct 2018, IIT Kanpur
- Co-organizer, Short Course for Industry “*Advanced Materials, Characterization and Manufacturing*” at Eaton India Innovation Center (Pune) 16-18 Aug 2018
- Co-organizer, TEQIP Workshop on “*Research Method and Skills*”, Feb 2016, IIT Kanpur
- Co-organizer, TEQIP Workshop on “*High resolution x-ray and electron diffraction*”, Feb 2016, IIT Kanpur
- Co-organized Open house at ACMS for Electron Microscopy Lab, Jan 2016, IIT Kanpur
- Short Workshop on “*Fundamentals of X-Ray Diffraction and its Applications*” at DMSRDE, Nov 2017.
- Talk on “*Literature Review and Research Methodology*” at HBTI Kanpur, Oct 2018
- Talk on “*Materials Science in UG Education*” at TEQIP for new faculty members, May 2018, IIT Kanpur
- Talk on “*Research Skills and Methods*”, Dec 2015, IIT BHU.

- Talk at NRCM Conference on “*Coincident Site Lattice related Boundaries and Critical Deviations*”, IISC Bangalore, Nov 2015.
- Co-organizer, TEQIP Workshop on “*Microstructure Engineering via Heat treatments*”, Oct 2015
- Participated in TEQIP workshop on “*Materials and Metallurgy Curriculum*”, Oct 2015, NIT Srinagar
- Conducted short-course on “*Structure and Characterization of Materials*” May 2015, NIT Srinagar
- Talk on “*Principles of Electron Microscopy*” and “*Principles of EBSD*” at TEQIP Workshop on “*Structure and Characterization of Materials*”, Dec 2014, IIT Kanpur
- Co-organizer for Automotive Materials and Manufacturing Conference, April 2014, Pune
- Talk on “*Effective methodology for teaching materials science*” at TEQIP Workshop on Chemical and Materials Science, Feb 2014
- Conducted Workshop on “*Principles and Applications of EDS/ EBSD*” at Kalyani Center of Technological Innovation (Bharat Forge Ltd.) (May 2013), Pune
- Talk on “*Principles and Applications of Electron Microscopy*” at the QIP CDTE workshop on “*Micro and Nano Fabrication*” February 18th -22nd 2013, IIT Kanpur
- Talk on “*Advances in Nanostructured Materials Manufacturing and Nanomanufacturing Systems*” at SVNIT, Surat (June 2011). (Organized by Prof. B. Bidanda of University of Pittsburgh on Advances in Manufacturing Systems, as part of IUCEE program)

Publications

A. Published and accepted papers in peer-reviewed journals

- A1. Nitish Raja, Aman Kumar, Shashank Shekhar, Kaustubh Kulkarni, “*Delineating the role of dynamic and static recrystallization during hot working of nickel-based superalloy (IN600)*”, *Materials Today Communications*, 40 (2024), 109577
- A2. P. Setia, N. Raja, S. S. Singh, S. Mukherjee, T. Venkateswaran, S. Shekhar, “*Exploring the hot deformation behavior of novel Si-containing austenitic stainless steel*”, *Vacuum*, 222 (2024) 113045
- A3. Nikhil Tripathi, Prince Setia, Swapnil Sawalkar, K. Mondal, Shashank Shekhar, “*Constrained Constant Radius Pressing (CCRP) process to improve mechanical properties and microstructural homogeneity of pure copper sheet*”, *Materials Today Communications*, 38 (2024) 107695
- A4. P. Setia, H. K. Mehtani, S. S. Singh, T. Venkateswaran, P.C. Yadav, S. Shekhar, “*Micro-mechanical investigation of maraging steel during in-situ tensile test*”, *Philosophical Magazine*, (2024) <https://doi.org/10.1080/14786435.2024.2329984>
- A5. P. Setia, S. Mukherjee, S. S. Singh, T. Venkateswaran, S. Shekhar, “*Deformation characteristics and microstructure evolution during hot deformation of 18Cr–12Ni–4Si stainless steel*”, *Journal of Materials Science*, 58 (2023) 4987–5009
- A6. Prabhat Chand Yadav, Shashank Shekhar, Bhagyaraj Jayabalan, Nitin Kumar Sharma, “*Controlled precipitation and recrystallization to achieve superior mechanical properties of severely deformed Inconel 718 alloy*”, *Materials Chemistry and Physics*, 205 (2023) 127098

- A7. P. Setia, K. Viswanath, K. Mondal, T. Venkateswaran, S.S. Singh, S. Shekhar, "*Cushioning effect of austenite in silicon stainless steels (SiSS) leading to improved wear resistance*", Tribology International 173 (2022) 107678
- A8. P. Setia, T. Venkateswaran, K. Thomas Tharian, J. Jain, S.S. Singh, S. Shekhar, "*Influence of Si content on the microstructure and mechanical properties of silicon stainless steel*", Materials Science and Engineering A 829 (2022) 142141
- A9. D. Rath, P. Setia, N. Tripathi, S. Shekhar, "*Outstanding improvement in the CSL distribution in interstitial free (IF) steel via strain annealing route*", Materials Characterization 186 (2022) 111817
- A10. D. Sethi, U. Acharya, S. Kumar, S. Shekhar, B.S. Roy, "*Effect of Reinforcement Particles on Friction Stir Welded Joints with Scarf Configuration: An Approach to Achieve High Strength Joints*", Silicon (2021) <https://doi.org/10.1007/s12633-021-01430-8>
- A11. S. Sahu, S. K. Patel, S. Shekhar, "*The effect of grain boundary structure on chromium carbide precipitation in alloy 600*", Materials Chem and Phys 260 (2021) 124145
- A12. D. Sethi, U. Acharya, S. Shekhar, B.S. Roy, "*Applicability of unique scarf joint configuration in friction stir welding of AA6061-T6: Analysis of torque, force, microstructure and mechanical properties*", Defense Technology, 18 (4) (2022) 567-582.
- A13. D. Sethi, S. Kumar, S. Shekhar, B.S. Roy, "*Friction stir welding of AA7075-T6/TiB2 in situ cast composites plates using scarf joint configuration*" Advances in Materials and Processing Technologies, DOI: 10.1080/2374068X.2021.1959092
- A14. N. K. Sharma, S. Shekhar, "*New perspectives on twinning events during strain-induced grain boundary migration (SIBM) in iteratively processed 316L stainless steel*," J Mater Sci 56 (2021) 792-814.
- A15. A. Shirale, S. Sahu, S. Patel, J. Ramkumar, S. Shekhar, "*An analytical modeling of cutting forces in orthogonal elliptical vibration cutting*," Journal of Micromanufacturing 4(1) (2021) 36-49.
- A16. P. Setia, A. Anand, T. Venkateswaran, K. Thomas Tharian, S. S. Singh, K. Mondal, S. Shekhar, "*Effect of Heat Treatment on the microstructure evolution and sensitization behavior of high-silicon stainless steel*," J of Mater Engg and Per 29 (2020) 6014-6024.
- A17. Eshan Saraswat, H.S. Maharana, S.V.S. Narayana Murty, S. Shekhar, K. K. Kar, J. Ramkumar, K. Mondal, "*Fabrication of Al-Si controlled expansion alloys by unique combination of pressureless sintering and hot forging*," Accepted in Advanced Powder Technology, 31 (2020) 2820-2832.
- A18. N.K. Sharma, S. Shekhar, "*New insights into the evolution of twin boundaries during recrystallization and grain growth of low-SFE FCC alloys*," Materials Char 159 (2020) 110015.
- A19. P.K. Rai, S. Shekhar, K. Yagi, K. Ameyama, K. Mondal, "*Corrosion behavior of harmonic structured 316L stainless steel in 3.5% NaCl and Simulated Body Fluid Solution*," J Mater Eng Perf, 28 (2019) 7554-7564.
- A20. P.K. Rai, S. Shekhar, K. Yagi, K. Ameyama, K. Mondal, "*Fretting wear mechanism for harmonic, non-harmonic and conventional 316L stainless steels*" Wear 424-425 (2019) 23-32.
- A21. S. Sahu, N.K. Sharma, S.K. Patel, K. Mondal, S. Shekhar, "*The effect of grain boundary structure on sensitization behavior in a Nickel-based superalloy*" J Mater Sci 54 (2) (2019) 1797-1818.

- A22. P.C. Yadav, N.K. Sharma, S. Sahu, S. Shekhar, "Influence of short heat-treatment on microstructural and mechanical inhomogeneity of constrained groove pressed Cu-Zn alloy", *Materials Chemistry and Physics*, 238 (2019) 121912
- A23. A. Haque, S. Shekhar, S.V.S. Naryana Murty, J. Ramkumar, K. Kar, K. Mondal, "Fabrication of controlled expansion Al-Si composites by pressure-less and spark plasma sintering", *Advanced Powder Technology*, 29 (12) (2018) 3427-3439.
- A24. P.C. Yadav, S. Sahu, S. Shekhar, "Modeling and Verification of Temperature rise during Machining," *Journal of the Chinese Advanced Materials Society* 6 (4) (2018) 817-826.
- A25. P.K. Rai, S. Shekhar, K. Mondal, "Effects of grain size gradients on the fretting wear of a specially-processed low carbon steel against AISI E52100 bearing steel" *Wear* 412-413 (2018) 1-13.
- A26. S. Abolghasem, S. Basu, S. Shekhar, M.R. Shankar, "Mapping dislocation densities resulting from severe plastic deformation using large strain machining" *J Mater. Res.* 33 (22) (2018) 3762 – 3773.
- A27. S. Sahu, P.C. Yadav, S. Shekhar, "Use of hot rolling for generating low deviation twins and a disconnected random boundary network in Inconel 600 Alloy," *Met. & Mat. Trans A* 49 (2) (2018), 628-643.
- A28. N.K. Sharma, S. Shekhar, "Deconvoluting error in measurement of low angle misorientation distribution," *Micron*, 107 (2018) 28-34.
- A29. P.C. Yadav, S. Sahu, A. Subramaniam, S. Shekhar, "Effect of heat-treatment on microstructural evolution and mechanical behavior of severely deformed Inconel 718," *MSE-A*, 715 (2018) 295-306
- A30. B. Sengupta, S. Shekhar, K. Kulkarni, "A novel approach for controlling precipitation kinetics based on diffusional and thermodynamic interactions in multicomponent systems" *Philosophical Magazine Letters* 98 (2) (2018) 71-78.
- A31. P.K. Rai, S. Shekhar, K. Mondal, "Development of gradient microstructure in mild steel and grain size dependence of its electrochemical response," *Corrosion Science*, 138 (2018) 85-95.
- A32. Rama Satya Sandilya, P.K. Rai, S. Shekhar, S. Sangal, K. Mondal, "A novel method for fabricating multilayered steels," *J. Mtls. Proc. Tech.* 254 (2018) 38-51
- A33. S. Sahu, P.C. Yadav, S. Shekhar, "Fractal analysis as applied to fractography in ferritic stainless steel," *Metal, Micro. And Anal.* 6(6) (2017) 598-609.
- A34. P. Kumar, S. Khara, S. Shekhar, K. Mondal, "Very hard corrosion-resistant roll-bonded Cr coating on mild steel in presence of graphite," *J. Mtls. Engg. Perf.* 26(12) (2017) 5885-5896.
- A35. B. Sengupta, S. Shekhar, K.N. Kulkarni, "A novel ultra-high strength and low-cost as-cast titanium alloy," *MSE-A* 696 (2017) 478-481.
- A36. P.K. Rai, S. Shekhar, M. Nakatani, M. Ota, S.K. Vajpai, K. Ameyama, K. Mondal, "Wear Behavior of Harmonic Structured 304L Stainless Steel," *J. Mtls. Engg. Perf.* 26 (6) (2017), 2608-2618.
- A37. N.K. Sharma, S. Shekhar "Cut-off deviation for CSL boundaries in recrystallized face-centered cubic materials," *Phil Mag.* 97 (23) (2017) 2004-2017.
- A38. R. Joham, N.K. Sharma, K. Mondal, S. Shekhar, "Low temperature cross-rolling to modify grain boundary character distribution and its effect on sensitization of SS304," *J. Mtls. Proc. Tech.* 240 (2017) 324-331.

- A39. S. Choudhary, V. Nanda, S. Shekhar, A. Garg, K. Mondal, "Effect of Microstructural Anisotropy on the Electrochemical Behavior of Rolled Mild Steel," *J. Mtls. Engg. Perf.* 26 (1) (2017), 185-194.
- A40. N.K. Sharma, S. Shekhar, "Microstructure and Property Evolution for Hot-Rolled and Cold-Rolled Austenitic Stainless Steel 316L," *Transactions of IIM* 70 (5) (2017) 1277-1284.
- A41. N.K. Sharma, S. Shekhar, "User-independent EBSD parameters to study the progress of recovery and recrystallization in Cu-Zn alloy during in-situ heating" *J. Microscopy* 264 (3) (2016), 362-369.
- A42. P.K. Rai, S. Shekhar, M. Nakatani, M. Ota, S.K. Vajpai, K. Ameyama, K. Mondal, "Effect of Harmonic Microstructure on the Corrosion Behavior of SUS304L Austenitic Stainless Steel," *Met & Mat. Trans A* 47 (12) (2016), 6259-6269.
- A43. P.C. Yadav, A. Sinhal, A. Roy, S. Sahu, S. Shekhar, "Microstructural Inhomogeneity in Constrained Groove Pressed Cu-Zn Alloy Sheet" *J. Mtls. Engg. Perf.* 25 (7) (2016), 2604-2614.
- A44. A. Vaid, K. Mittal, S. Sahu, S. Shekhar, "Controlled Evolution of Coincidence Site Lattice Related Grain Boundaries", *Transactions of IIM* 69 (9) (2016), 1745-1753.
- A45. M. Prakash, A.P. Moon, K. Mondal, S. Shekhar, "Effect of Machining Configurations on the Electrochemical Response of Mild Steel in 3.5% NaCl Solution", *J. Mtls Engg. Perf.* 24(9) (2015) 3643-3650.
- A46. P. Majumdar, S. Shekhar, K. Mondal, "Effect of Machining Parameters on Oxidation Behavior of Mild Steel", *J. Mtls. Engg. and Perf.* 24 (2015) 484-498.
- A47. K. Sikdar, S. Shekhar, K. Balani, "Fretting Wear of Mg-Li-Al Alloys", *Wear* 318 (2014), 177-187.
- A48. M. Prakash, S. Shekhar, A.P. Moon, K. Mondal, "Effect of Machining Configuration on the Corrosion of Mild Steel", *J. Mtls. Proc. Tech.* 219 (2014) 70-83.
- A49. M.B. Perry, J.P. Kharoufeh, S. Shekhar, J. Cai, M.R. Shankar, "Statistical Characterization of Nanostructured Materials from Severe Plastic Deformation in Machining," *IIE Transactions*, 44, 7 (2012), 534-550.
- A50. S. Shekhar, J. Cai, S. Basu, S. Abolghasem, and M.R. Shankar, "Effect of Severe Plastic Deformation in Machining Elucidated via Rate-Strain-Microstructure (RSM) Mappings," *ASME Journal of Manufacturing Science and Engineering*, 134 (2012) 031008.
- A51. S. Abolghasem, S. Basu, S. Shekhar, J. Cai, M.R. Shankar "Mapping Microstructures from Severe Plastic Deformation in Machining" *Transactions of North American Manufacturing Research Institute/Society of Manufacturing Engineers (NAMRI/SME)*, 40 (2012) 406-413.
- A52. S. Abolghasem, S. Basu, S. Shekhar, J. Cai, M.R. Shankar "Mapping Subgrain Sizes Resulting from Severe Simple Shear Deformation," *Acta Met.* 60 (2012) 376-386.
- A53. S. Shekhar, S. Abolghasem, S. Basu, J. Cai, M. Ravi Shankar, "Interactive Effects of Strain, Strain-rate and Temperature on Microstructure Evolution in High-Rate Severe Plastic Deformation", *Materials Science Forum* 1517 (702-703) (2012) 139-142
- A54. S. Shekhar, J. Cai, S. Basu, S. Abolghasem, and M.R. Shankar, "Effect of Strain-rate in Severe Plastic Deformation on Microstructure Refinement and Stored Energies," *J. Mater. Res.* 26 (2011) 395-406.
- A55. S. Shekhar, S. Abolghasem, S. Basu, J. Cai and M.R. Shankar, "Generating Micro and sub-Micro Scale Surface Features using Modulated Machining in Compliant Systems," *Transactions of North American Manufacturing Research Institute/Society of Manufacturing Engineers (NAMRI/SME)*, 38 (2010) 299-306.

- A56. S. Shekhar, J. Cai, J. Wang and M. R. Shankar, "*Multimodal Ultrafine Grain Size Distributions from Severe Plastic Deformation at High Strain Rates*," Materials Science and Engineering A, 527 (2009) 187-191.
- A57. J. Cai, S. Shekhar, J. Wang and M. Ravi Shankar, "*Nanotwinned microstructures from low SFE brass by HRSPD*," Scripta Materialia, 60 (2009) 599-602.
- A58. S. Shekhar, J. Cai, S. Lee, J. Wang and M. R. Shankar, "*How Strains and Strain-Rates are Accommodated by Dislocations and Twins During Chip Formation by Machining*," Transactions of North American Manufacturing Research Institute/Society of Manufacturing Engineers (NAMRI/SME), 37 (2009) 637-644.
- A59. S. Shekhar, Alexander H. King, "*Strain Fields and Energies of Grain Boundary Triple Junction*," Acta Materialia, 56 (2008) 5728-5736.
- A60. Alexander H. King, S. Shekhar, "*What Does it Mean to be Special? The Significance and Application of the Brandon Criterion*", Journal of Materials Science, 41 (2006) 7625-7682.
- A61. R. Kremer, R. Narayanan, S. Shekhar and Alexander H. King, "*On the Design of Controlled Tricrystal Specimens for the Systematic Investigation of Static Grain Boundary Triple Junction Properties*," J. of Materials Science, 40 (2005) 2795-2802.
- B. Published and accepted in peer-reviewed conference proceedings
- B1. S Abolghasem, Luis F. H. Rivera, S. Shekhar, "Optimizing the metastability of high-strength ultrafine grained microstructure from large strain machining", Procedia Manufacturing 55 (2021) 247-252
- B2. D. Sethi, Uttam Acharya, Tanmoy Medhi, Shashank Shekhar, Barnik Saha Roy, "*Microstructural and mechanical property of friction stir welded Al7075/ TiB2 aluminium matrix composite*," Materials Today Proceedings (2020) DOI: 10.1016/j.matpr.2020.01.198
- B3. D. Sethi, Sanjeev Kumar, Smrity Choudhury, S. Shekhar, Barnik Saha Roy, "*Synthesis and characterization of AA7075/TiB2 aluminum matrix composite formed through stir cast method*", Materials Today Proceedings, 26 (2020) p. 1908-1913.
- B4. P.C. Yadav, S. Shekhar, "*Enhanced strength of Inconel 718 by high-rate severe plastic deformation*," Proceedings of 2018 Superalloy 718 & Derivatives: Energy, Aerospace, and Industrial Applications. ISBN 978-319-89480-5. (DOI 10.1007/978-3-319-89480-5_35) p. 541-552.
- B5. G. Mani Ratnam, Manish Prakash, K. Mondal, S. Shekhar, "*Machining as a Thermomechanical process to Modulate functional and Mechanical Behavior of Steel*", SimPro 2016, RDCIS, Ranchi.
- B6. P K Ajeet Babu, M R Saraf, Suraj Mani Chaurasiya, Suhail M Mulla, S. Shekhar, K. Kulkarni, "*Forging of Lightweight shaft and the assessment of Residual Stresses on the Forged Parts*", SimPro 2016, RDCIS, Ranchi.
- B7. M. Verma, S. Shekhar, "Machining as a Thermomechanical Processing Technique and its Application for Surface Modification of Stainless Steel 316L" Proceedings of Indian Conference on Applied Mechanics (INCAM) (2016).
- B8. Sandeep Sahu, S. Shekhar, "*Evolution of CSL Boundaries in Nickel Alloy by Iterative and Non-iterative thermomechanical Processing*", MS&T 2015.

- B9. Prabhat Chand Yadav, S. Shekhar, *“Effect of heat treatment on microstructural inhomogeneity of Constrained Groove Pressed Cu-Zn alloy”*, MS&T 2015.
- B10. Nitin Kumar Sharma, S. Shekhar, *“In-situ study of Deviation of $\Sigma 3$ Coincident Site Lattice Boundaries during Recrystallization of Cu-Zn Alloy”*, MS&T 2015.
- B11. Miral Verma, S. Shekhar, *“Machining as a Thermomechanical process and its Application for Surface Modification of Stainless Steel 316L”* July 2015, INCAM, IIT Delhi.
- B12. Abir Roy, Abhishek Kumar, S. Shekhar, *“Mechanical behavior of Al 5083 processed by Constrained Groove Pressing”*, National Conference on Product Design and Manufacturing (NCPDM 2015)
- B13. Abir Roy, Abhishek Kumar, S. Shekhar, *“Corrosion behavior of severely deformed Al 5083”*, Conference on Advance Materials and Processing (CAMP-2015)
- B14. S. Shekhar, Alexander H. King, *“Read-Shockley Grain Boundaries and the Herring Equation,”* Mater. Res. Soc. Symp. Proc., 1090E (2008) 1090Z05-18.

C. Book Chapters

- C1. S. Shekhar, N. K. Sharma, S. Sahu, S. Misra, *“Electron Backscatter Diffraction Technique: Fundamentals to Applications”*, IITK Directions (2022) Vol 6

Development

Method of Producing Multi-layered Steel with variable compositions, V.R.S. Sandilya, S. Khara, S. Sangal, S. Shekhar, K. Mondal (May 2017), Patent accepted by SIIC.

Method of fabrication based on controlled microstructure with refined and coarse grains: P.K. Rai, S. Choudhary, S. Shekhar, K. Mondal (Feb 2017), Patent accepted by SIIC.

Single – axis modulated cutting tool holder: Designed and developed a modulated cutting tool holder capable of giving modulation of the order of 90 μm with frequency in the range of few Hertz to few thousands of Hertz. This work was carried out at University of Pittsburgh.

Development for two-axes modulated cutting-tool holder: This design allows modulation in two axes while cutting on lathe machine. The modulation can be obtained along cutting direction as well as feed direction. Modulated cutting in two axes can create not only two-dimensional surface feature, but also lead to microstructural variation in two axes and together these can lead to interesting functional properties. This tool has now been developed and being used for elliptical vibration machining.

Modified CGP Die Design: Conventional CGP and CGR dies lead to Limited ductility/ toughness for the processed sheets, leading to brittle and pre-mature failure; and non-homogeneous and anisotropic mechanical characteristics limiting their applications. The newly designed CGP and CGR die has been designed which alleviates both these problems. Design was devised so that strain distribution remains homogeneous throughout the sheet after full cycle of deformation.

Patents

High Strength Steel Composition and method thereof, (IMPRINT Project), Application Number 201911030090 dt. July 25, 2019.

Method of Producing Multi-layered Steel with variable compositions, Application No. 201711017031

Method of fabrication based on controlled microstructure with refined and coarse grains, Application No. 201711004918

Newly designed Constrained Groove Pressing (CGP) and Constrained Groove Rolling (CGR) Die design for obtaining improved and homogeneous microstructure and mechanical characteristics in metallic sheets, Patent Application Submitted (2022)

Funding (as PI)

Title: Dynamic and Post-Dynamic Recrystallization Studies of Nickel Alloy 600

Sponsoring Agency: DST-SERB

PI: Dr. S. Shekhar (Co-PI: Dr. Kaustubh Kulkarni)

Grant: Rs. 39.42 L

Duration: March 2022 – March 2025

Title: Material Safety in Railways

Sponsoring Agency: Wabtec (CSR Fund through DORA) Approved

PI: Dr. S. Shekhar (Co-PI: Dr. K. Mondal, Dr. S. S. Singh, Dr. S. Sangal)

Grant: (Amount to be confirmed)

Duration: Sep 2022 – Sep 2025 (Tentative duration)

Title: Microstructural and Mechanical Characterization of High -Silicon Stainless Steel

Sponsoring Agency: Indian Space Research Organization (ISRO-VSCC)

PI: Dr. S. Shekhar (Co-PI: Dr. Sudhanshu Shekhar Singh)

Grant: Rs. 25.776 L

Duration: March 2017 – March 2020 (**Completed**)

Title: Microstructural and Tribological characterization of stainless steel 316L obtained by modulated machining

Sponsoring Agency: BRNS, DAE
PI: Dr. S. Shekhar (Co-PI: Dr. Gouthama, Dr. J. Ramkumar)
Grant: Rs. 74.1 L
Duration: Aug 2016 – March 2020 **(Completed)**

Title: Effect of Heat Treatment on the Mechanical Properties of Thermomechanically Processed Russian grade 12X21H5T Duplex Steel (Phase-II)
Sponsoring Agency: Indian Space Research Organization (ISRO-VSCC)
PI: Dr. S. Shekhar
Grant: Rs. 8.4 L ;
Duration: March 2016- Aug 2017 **(Completed)**

Title: Effect of Heat Treatment on the Mechanical Properties of Thermomechanically Processed Russian grade 12X21H5T Duplex Steel (Phase-I)
Sponsoring Agency: Indian Space Research Organization (ISRO-VSCC)
PI: Dr. S. Shekhar
Grant: Rs. 14.56 L
Duration: March 2013- March 2015 **(Completed)**

Title: Microstructural Evaluation of deformation and recrystallization behavior
Sponsoring Agency: General Electric
PI: Dr. S. Shekhar
Grant: Rs. 6.0 L
Duration Sep 2015-Sep 2016 **(Completed)**

Funding (as Co-PI)

Title: Investigations Into Ternary Interdiffusion In Bond Coat Systems Of β -(Ni,Pat)Al and (Ni,Ru)Al
Sponsoring Agency: ARDB - GTMAP
PI: Dr. Kaustubh Kulkarni; Co-PI: Dr. S. Shekhar
Grant: Rs. 88.58 L
Duration: Jan 2020 – Jan 2023

Title: Synthesis and Characterization of Al-B and Al-B4C alloys as Fuel in Solid Propellant
Sponsoring Agency: Indian Space Research Organization (ISRO-VSCC)
PI: Sudhanshu S. Singh; Co-PI: Dr. S. Shekhar
Grant: Rs. 20.0 L
Duration: Jan 2020 – Jan 2023

Title: Development of Controlled Expansion Alloys
Sponsoring Agency: Indian Space Research Organization (ISRO-VSCC)
PI: Dr. K. Mondal; Co-PI: Dr. S. Shekhar

Grant: Rs. 24.74 L

Duration: Sep 2017 – Sep 2019 **(Completed)**

Title: Layered Steel for Structural Applications

Sponsoring Agency: MHRD-DIC

PI: Dr. K. Mondal; Co-PI: Dr. S. Shekhar

Grant: Rs. 13.6 L

Duration: July 2017 – July 2019 **(Completed)**

Title: High Strength, wear and Corrosion resistant steel for high speed rail and elastic clip Railway applications

Sponsoring Agency: MHRD-IMPRINT

PI: Dr. K. Mondal Co-PI: Dr. S. Shekhar, Dr. S. Sangal, Dr. C.S. Upadhyaya, Dr. S. Sankaran, Dr. S. Bhattacharyya, Dr. S. Suwas, Dr. C. Srivastava

Grant: Rs. 3.96 Crores

Duration: Feb 2017 – Feb 2022 **(Completed)**

Consultancy

Title: High Resolution Characterization of Ni Superalloys

Sponsoring Agency: GE India Technology Centre Pvt. Ltd

PI: Dr. S. Shekhar

Grant: Rs. 64,468

Duration: 2016 – 2017 **(Completed)** (Registered In 2019)

Title: Investigating cause of Intergranular fracture

Sponsoring Agency: BHEL, Hardwar

PI: Dr. S. Shekhar

Grant: Rs. 50,313

Duration: July 2016 – Sep 2016 **(Completed)**

Title: Intergranular fracture determination using Fractal Method

Sponsoring Agency: BHEL, Hardwar

PI: Dr. S. Shekhar

Grant: Rs. 64,125

Duration: June 2015 – Sep 2015 **(Completed)**

Title: Making of cake from lead grids

Sponsoring Agency: Verdeen Chemicals, Ghaziabad, India

PI: Dr. S. Shekhar, Co-PI: Dr. K. Mondal

Grant: Rs. 2.15 L

Duration: Feb 2016 – April 2016 **(Completed)**

Title: Study and Development of Lightweight Forging Process for Automotive Components

Sponsoring Agency: Automotive Research Association of India – Forging Industry Division

PI: Dr. K. Kulkarni, Co-PI: Dr. S. Shekhar

Grant: Rs. 5.62 L

Duration: 2015-2017 **(Completed)**

Peer Recognition

1. **Mr. Prabhat Chand Yadav**, a PhD student under my supervision has been selected for India's Science and Engineering Research Board (SERB) **Overseas Visiting Doctoral Fellowship Program** at Purdue University (OVDF) for the year 2019.
2. **Best Poster Award** to student **Mr. Prabhat Kumar Rai** on "*Corrosion and wear behavior of harmonic structured SUS304L austenitic stainless steel*" in the 13th International conference on Advanced Materials and Nanotechnology, Osaka Japan 2017
3. **Student Research Award** to student **Mr. Nitin Sharma** in the 6th International conference on Recrystallization and Grain Growth (ReX&GG 2016), Pittsburgh, USA, July 2016.
4. **Invited talk on** "*Electron back-scatter diffraction (EBSD) as a tool and its limitations*" NMD-ATM 2017, Goa.
5. **Invited talk on** "*Microstructural Engineering of Inconel Alloys*" at Microstructural Engineering Conference at IIT Bombay Aug 20-21st 2017.
6. **Keynote speaker** for SimPro2016
7. **Invited talk on** "*Coincident Site Lattice related Boundaries and Critical Deviations,*" NRCM 2015, IISc Bangalore.
8. Letter of Recognition for '**Excellence in Teaching**' for the course TA201 Introduction to Manufacturing (2014-15 SemII)
9. Letter of Recognition for '**Excellence in Teaching**' for the course MSE 313 "Mechanical Behavior Lab' (2017-18 SemI).
10. **Invited talk on** "*ICME for Steel: Handshakes for Industrial Adoption*", NMD-ATM 2015.
11. **Invited talk on** "*Machining as a Route to Surface Engineering of Metals and Alloys to Enhance its Mechanical and Functional Properties*", Feb 2014, ICEMP, CSIR-IMMT Bhubaneswar.
12. **Invited talk on** "*Microstructural Engineering,*" April, 2012, Annual General Body Meeting of Indian Institute of Metals, Kanpur Chapter.
13. **Invited talk on** "*Multifunctional Nanostructured Metals by High-rate Severe Plastic Deformation (HRSPD),*" Jan 2012, General Motors Research Center, Bangalore
14. **Invited talk on** "*Machining as a route for Severe Plastic Deformation,*" UGC-NRC-M Symposium on Mechanical Behavior of Materials' Jan 2012, Indian Institute of Science, Bangalore
15. **Invited talk on** "*Minimizing Metal Working Fluid in Metal Cutting Processes by Modulated Machining Technology,*" AHMP 2009, San Diego.

16. Won “Best Poster Award” in the symposium, for the poster on “*Read-Shockley Grain Boundaries and the Herring Equation*” at MRS Spring 2008 Meetings, San Francisco, CA.
17. **Invited talk on “What does it mean to be Special?,”** 2006 TMS Annual Meeting: Brandon Symposium. (presented by A.H. King)

Contributions to the Institute

- Vice-Chairman, GATE 2023, GATE2022, GATE2021. IIT Kanpur is the organizing Institute for GATE2023 and our team is overseeing the conduct and organization of the exam for all of India in coordination with 7 other zones.
- Warden, Hall-13 (December 2019 onwards)
- Convener, Engineering Metallurgy Lab: As convener of engineering lab, overseeing the transfer to new location (Diamond Jubilee Complex) and modernization of the lab (2021- Present)
- Member, UGARC (2020-2022): As UGARC member spearheaded following changes:
 - Termination Reforms which eliminate the need of termination of student on academic ground
 - Inclusion of Exit Option for students who wish to leave the program early
- Convener, Departmental UGARC (2021-2022): As departmental UGARC convener, made following contributions:
 - Revised the lab curriculum to introduce modular labs
 - Included Capstone Project
 - Introduced Instrumentation for Materials Engineering Lab
- Member, Staff Affairs Committee: As a member of Staff Affairs Committee organized Staff Skill upgradation workshops in 2021 and 2022. It was received well by all the staff members
- Faculty Advisor for Organization of Research Scholar Day of the department, *Padarth’19*, April 2019
- MSES Coordinator 2017-2018, 2018-2019
- DPGC
 - Member, DPGC 2021-2022
 - Member, DPGC 2017-2019
- Contributed as one of the Faculty Co-Ordinator for JEE Admissions 2019
- Co-Organizer, IIM NMD-ATM, November 2016, IIT Kanpur
- Student Placement Coordinator (along with Prof. R. Shekhar) 2016-2017.
- Student Placement Coordinator (along with Prof. M. Katiyar): Organized workshop for students on “Prepping for Interview” in 2015.
- DUGC: I have been an active member of DUGC from the time I joined the Institute. I also served as Convener of DUGC for one year. As a Convener, I had an important role in ensuring smooth transition from old ARC to new ARC.
 - Member, DUGC 2020 – 2021
 - Member, DUGC 2019 – 2020
 - Member, DUGC 2014 – 2015
 - Convener, DUGC 2013 – 2014
 - Member, DUGC 2011 – 2013

- Upgraded XRD facility to include 1-D detector, with funds from Institute Plan Grant 2013. XRD analysis software were also procured to help students analyze the XRD data. XRD booking was brought online to make it convenient for the students. These upgradations have ensured that there are no more waiting lists for XRD testing, and the tests can be carried out as and when required
 - Convener, XRD Facility, MSE 2013 – 2015
 - XRD Facility Upgradation at MSE 2013 - 2014
- FIST Proposal 2012 -2014
 - Played an active role in developing the FIST proposal which resulted in getting funds for the department for buying State of the art equipment, viz. FE-SEM, HR-XRD and DMA
- ACMS rejuvenation: I have been part of ACMS rejuvenation, particularly for complete transformation of electron microscopy lab and upgradation of mechanical testing and sample preparation labs. These labs were completely transformed and several new equipment (W-SEM, FE-SEM, BiSS UTMs, Hardness tester, Charpy tester and Creep test frames) were bought as part of this effort. I have also been instrumental in rejuvenating ACMS website to make all the information about various equipment available online. I have played a major role in making online scheduling system for various equipment which has brought more transparency and democracy in terms of equipment usage at ACMS
 - Convener, Mechanical Testing Lab, ACMS 2014 – 2020
 - Convener, Sample preparation Lab, ACMS 2014 – 2020
 - Co-Convener, Electron Microscopy Lab, ACMS 2014 – Present
 - Electron Microscopy Lab development at ACMS 2014 - 2015
 - Mechanical Testing Lab Upgradation at ACMS 2014 – 2015
 - ACMS website rejuvenation and scheduling system 2014 – 2018
- Electron Microscopy lab (MSE) Upgradation: We were able to get some funding for Electron microscopy facility through Institute Plan Grant-2012 which allowed us to procure EBSD detector for electron microscope and we also procured electropolishing equipment for sample preparation for Orientation Imaging Microscopy (OIM)
- MSE Workshop Upgradation: 2013
 - We were able to get some funds for the MSE workshop through Institute Plan Grant -2013 to procure CNC lathe which allowed sample preparation faster and easier for both teaching and research purposes. We also procured power hacksaw and upgraded existing Shaper machine.
- Member, Institute Website Task Force: 2014 - Present
 - Responsible for upgrading the Institute and department website with inputs from department colleagues. New information had to be created and many more information had to be updated as part of this task.
- Member, Institute Faculty Handbook Committee: 2013 - 2014
 - We created a handbook which can serve as ready reference guide to not only the new joining faculty members, but also for the older members. It provides information and guidelines about various aspects of life of a Faculty member.
- Development of Structural Nanomaterials Lab 2011 – Present
 - Developed Structural Nanomaterials Lab to investigate the effect of thermomechanical processing on microstructure and the mechanical properties of metals and alloys. It includes

conventional processes like Lathe machining, sand blasting to non-conventional processes like Constrained Grooved Pressing. Lab hosts all the basic sample preparation facility and some microstructural characterization facilities like Optical Microscope, Hardness tester.

- Department Website Committee: 2013 – Present
 - As a sole member of this committee, I am responsible for making sure that all the contents on the website are updated. With the help of student volunteers, we created a new departmental website, even before the Institute Website Task force took over the task of rejuvenating all the IIT related sites
- Institute Representative for JEE and GATE on several occasions
- CCCC representative: 2012 - 2013
 - As a representative of Computer center coordinating committee, I was able to procure FactSage, a thermodynamic simulation package, for our department
- Seminar Coordinator: 2011 - 2012
 - Organized several seminars during my tenure as seminar coordinator
- Upgradation of Seminar Hall and Lecture room, by getting touch screen and biometric entry system installed
- SURGE Coordinator: 2013-2014 and 2014-2015
 - Served as SURGE coordinator for department for two years

Contributions outside the institute

- Participated in the workshop on “Materials and Metallurgy Curriculum” organized by Indian Academy of Sciences, March 2020. The objective of the workshop was to design a template curriculum for all the metallurgy and materials related departments in the country. As part of this workshop, contributed to the preparation of course curriculum for “Mechanics and Mechanical Behavior” related courses and for “Processing and Manufacturing” related courses. The committee submitted a comprehensive report on the course curriculum for the Metallurgy/ Materials stream. (March 2020)
- Conducted short course on “Structure and Characterization of Materials” at NIT Srinagar July 2015.
- Co-organizer for Automotive Materials and Manufacturing Conference, April 2014, Pune
- Provided consultation to Ordnance Factory, Kanpur on the problems arising in the Russian imported barrels. Several cases had been reported to Field Gun Factory where Russian imported barrels burst open from the two-thirds of the base of the T-72 and T-90 barrels. The discussions involved the Russian counterparts who had provided the parts and our role was to convince them to allow us to conduct some experiments which can help assess the core of the problem in the barrels. We also listed out the methodology of sectioning and listed the experiments which needed to be conducted at Indian side and the Russian side to transparently and fairly examine the problem.
- Provided preliminary analysis to Air-Force on the failure of a cable (2015)
- Associated with RUTAG: Bael cutting machine was developed by students under my mentorship
- Member, Technical Evaluation Committee, Global Conference on Materials Science and Engineering (CMSE 2013)
- Conducted Workshop on “Principles and Applications of EDS/EBSD” at Kalyani Center of Technological Innovation (Bharat Forge Ltd.) (May 2013), Pune

- Talk on “*Advances in Nanostructured Materials Manufacturing and Nanomanufacturing Systems*” at SVNIT, Surat (June 2011). (Organized by Prof. B. Bidanda of University of Pittsburgh on Advances in Manufacturing Systems, as part of IUCEE program)
- Coordinator (along with Prof. S. Sangal and Dr. Partha Ghosal), Metallography Contest, 67th IIM-NMD, IIT (BHU), Varanasi
- Reviewer for *Materials Characterization, Materials & Design, Journal of Alloys and Compounds, Materials Letters, Materials Today Communications, Metallurgical and Materials Transactions – A, Bulletin of Materials Science, Journal of Engineering Tribology, Journal of Materials Engineering and Performance, Current Science, Journal of Biomedical Materials Research Part A, International Journal of Nanomanufacturing.*
- PhD Thesis Reviews for various IITs and NITs
- Review of Starts through Startup Incubation and Innovation Centre
- IIM Kanpur (2011 – Present): Have been actively associated with Indian Institute of Metals, Kanpur Chapter, first as Student Advisor (2011-2012), then as treasurer (2011-2012) and also as Secretary IIM (2012- present). Actively participated in the organization of the flagship event of Batra Quiz since 2011 and several other events.

Others

Published/ Accepted Conference Abstracts

1. P. Setia, T. Venkateswaran, Tomas Tharrian, S. S. Singh, S. Shekhar, “*Micromechanical behavior of silicon stainless steel alloys using in-situ EBSD*” EuroMat 2021, Virtual
2. P. Setia, T. Venkateswaran, Tomas Tharrian, S. S. Singh, S. Shekhar, “*Hot deformation behavior of high-silicon stainless steel*” ICAMMC 2021, Hyderabad (Hybrid)
3. P. Setia, R. Sarvesha, A. Gokhale, T. Tharrian, T. Venkateswaran, S. S. Singh, S. Shekhar, “*Microstructural and mechanical characterization of cast austenitic stainless steel alloyed with Si*” TMS 2020, San Diego, CA, USA
4. S. Sahu, S. Shekhar, “*Triple junction structure and carbide precipitation in Inconel 600 alloy*” MS&T 2018, Columbus, Ohio, USA
5. P. Setia, S. Shekhar, S. S. Singh, T. Venkateswaran, Tomas Tharrian, “*Microstructural evolution of high silicon stainless steel*” NMD-ATM 2018, Kolkata
6. P. Setia, Ayush Anand, Ashwani Kumar, S. S. Singh, S. Shekhar, K. Mondal, T. Venkateswaran, Thomas Tharrian, “*Effect of heat treatment on the microstructure evolution of high silicon stainless steel*” ICAMPS 2018, Thiruvananthapuram, Kerala
7. B. Sengupta, T. Venkateswaran, S. Shekhar, “*Mechanical behavior of thermomechanically processed duplex steel,*” NMD-ATM 2017, Goa.
8. B. Sengupta, S. Shekhar, K. Kulkarni, “*A low-cost titanium alloy with excellent compressive strength and hardness,*” NMD-ATM2017, Goa.
9. S. Sahu, S. Shekhar, “*Tailoring grain boundary character and triple junction distribution in a Nickel-based superalloy to improve intergranular corrosion resistance,*” NMD-ATM2017, Goa.

10. Sanjeev K. Patel, S. Sahu, S. Shekhar, "Effect of grain boundary engineering on creep properties of Inconel 600 alloy," NMD-ATM 2017, Goa.
11. P. C. Yadav, S. Shekhar, "Modulating microstructure of severely deformed Inconel 718 by thermal treatment" NMD-ATM 2017., Goa.
12. Prabhat K. Rai, S. Shekhar, M. Nakatani, S. K. Vajpai, M. Ota, K. Ameyama, and K. Mondal (2016): "Corrosion behaviour of SUS304L austenitic stainless steel with harmonic microstructure (Poster)," NMD-ATM, Kanpur, 11-14 Nov 2016.
13. Prabhat K. Rai, S. Shekhar, M. Nakatani, S. K. Vajpai, M. Ota, K. Ameyama, and K. Mondal (2017), "Corrosion and wear behavior of harmonic structured SUS304L austenitic stainless steel (Poster)," Advanced Materials and Nanotechnology, Osaka, Japan, 26-28 Oct 2017.
14. Prabhat K. Rai, S. Shekhar and K. Mondal (2017), "A new approach to gradient and harmonic structure design and its effect on electrochemical and tribological behavior," Hetero-2018, Kusatsu, Japan, 30 Oct 2017.
15. Prabhat K. Rai, S. Shekhar and K. Mondal (2017) "Development of graded microstructure and its effect on wear behavior of mild steel (Poster)," ADMAT 2017 SkyMat, Thiruvananthapuram, 14-16 Dec 2017.
16. B. Sengupta, S. Shekhar, K. Kulkarni, "A ultrahigh strength Titanium alloy designed with low-cost alloying elements," ICME 2017, IITK.
17. S. Sahu, S. Shekhar, "Tailoring triple junctions in Inconel 600 alloy to improve intergranular corrosion resistance," ICME 2017, IITK.
18. P.K. Rai, S. Shekhar, M. Nakatani, S.K. Vajpai, M. Ota, K. Ameyama, K. Mondal, "Effect of harmonic structure design on the wear behavior of 304L stainless steel," ICME 2017, IITK.
19. N.K. Sharma, S. Shekhar, "Scaling behavior of misorientation angle distribution during recrystallization of cold rolled Cu-Zn alloy," EMSI 2017.
20. P.C. Yadav, S. Shekhar, "Thermally stable nanostructured Inconel 718 alloy prepared by high-rate severe plastic deformation process," EMSI 2017.
21. S. Sahu, S. Shekhar, "Effect of deformation temperature and strain on grain boundary engineering of Inconel 600 alloy," EMSI 2017.
22. P.K. Rai, S. Shekhar, K. Mondal, "Development of graded microstructure and effect of grain boundary fraction on corrosion behavior of mild steel," EMSI 2017.
23. S. Sahu, S. Shekhar, "Effect of Processing Temperature on Grain Boundary Character Distribution of Inconel 600 alloy," NMD-ATM2016, IITK.
24. P.C. Yadav, S. Shekhar, "Effect of Pre and Post heat-treatment on microstructural changes of nano-structured Inconel 718 alloy," NMD-ATM2016, IITK.
25. N.K. Sharma, S. Shekhar, "Scaling behavior of misorientation angle distribution during recrystallization of cold rolled Cu-Zn alloy," RexGG 2016, CMU.
26. N.K. Sharma, S. Shekhar, "Evolution of annealing twins during recrystallization and grain growth of cold rolled 316L Stainless Steel," RexGG 2016, CMU.
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- N. Sharma, S. Shekhar, "*New insights into the evolution of twin boundaries*" Talk at Microstructure Engineering 2019 Conference organized at IIT Kanpur, April 2019.
 - Gave a talk at TEQIP on course curriculum of Materials Science. It was attended by several faculty members of NITs and other regional colleges. I introduced them to the several websites and resources which are available for Materials Scientists. I also talked about my experience in helping improve the learning ability of the students, particularly in large classes (~80 students).
 - Development of Research Lab at University of Pittsburgh: Played an important role in development and set up of Research Lab for Prof. Ravi Shankar during my post-doctoral fellowship. Prof. Ravi Shankar had joined the University just a little more than a year ago, before I joined his group and contributed heavily to set up his lab which works mainly on understanding the behavior of materials over length – scales ranging from micro to nano.