Mirtunjay Kumar, Ph.D.

mjay@iitk.ac.in, mjay@hotmail.com
https://mjaykr.github.io/
https://www.linkedin.com/in/mjaykr/
+91-7388 44 8881

Education

2013 – 2022 **M.Tech + Ph.D. (Dual degree), Indian Institute of Technology Kanpur**
Ph.D. Thesis title: *Experimental and Crystal Plasticity Simulation Study on the Deformation Behavior of Liquid Phase Sintered Tungsten Heavy Alloys.*
M.Tech. Thesis title: *Development of Processing-Microstructure-Mechanical Behaviour Paradigms for Tungsten Heavy Alloys.*
CGPA: 8.7 out of 10.

2009 – 2013 **B.Tech., Metallurgical and Materials Engineering, National Institute of Technology Warangal**
B.Tech Project: *Pressureless sintering behaviour of $Cu - TiB_2$ composite produced by powder metallurgical technique.*
CGPA: 8.18 out of 10.

2008 **Class XII:CBSE**
School: *Jamshedpur Public School A.I.W.C, Jamshedpur.*
Score: 73.8%

2006 **Class X:CBSE**
School: *P.T.J.M. Saraswati Vidya Mandir, Bokaro.*
Score: 82.7%

Research Publications

1. Singh, B. P., **Kumar**, **M.**, Jain, R., Singh, A., & Mishra, S. (2023). Finite element assisted self-consistent simulations to capture texture heterogeneity during hot compression. *International Journal of Materials Research*, *114*(3), 219–230. doi:10.1515/ijmr-2022-0138

2. **Kumar**, **M.**, Gurao, N., & Upadhyaya, A. (2022a). Effect of tungsten content and compression on microstructure and texture evolution in liquid phase sintered heavy alloy. *Metallurgical and Materials Transactions A*. doi:10.1007/s11661-021-06586-x

3. **Kumar**, **M.**, Gurao, N., & Upadhyaya, A. (2022b). Evolution of microstructure and crystallographic texture during cold rolling of liquid phase sintered tungsten heavy alloy. *International Journal of Refractory Metals and Hard Materials*, *105*, 105849. doi:10.1016/j.ijrmhm.2022.105849

4. **Kumar**, **M.**, Gurao, N., & Upadhyaya, A. (2022c). Implications of slip transition on the work hardening and texture evolution of nickel-tungsten-iron ternary alloy. *Materials Characterization*, 112010. doi:10.1016/j.matchar.2022.112010

5. **Kumar**, **M.**, & Mishra, S. (2022). Revisiting taylor factor using fast fourier transform based model and its implications on work hardening. *Available at SSRN 4125910*. doi:10.2139/ssrn.4125910

6. **Kumar**, **M.**, Singh, A., Beura, V. K., & Mishra, S. (2021). Incorporating latent hardening in visco-plastic self-consistent framework for performing texture simulations. *Materials Science and Technology*, 1–13. doi:10.1080/02670836.2021.1946949

7 **Kumar**, **M.**, Singh, A., & Mishra, S. (2021). Enriching mean-field self-consistent texture simulations using the full-field fft model. *Materials Science and Technology*, *37*(17), 1343–1352. doi:10.1080/02670836.2021.2007455

8 Mishra, S., **Kumar**, **M.**, & Singh, A. (2020). Evolution of rotated brass texture by cross rolling: Implications on formability. *Materials Science and Technology*, *36*(12), 1272–1281. doi:10.1080/02670836.2020.1773036

Skills

Experimental Skills

- **Scanning electron microscopy** – Scanning electron imaging, Backscattered electron imaging, Energy-dispersive X-ray spectroscopy (EDS), Electron Backscatter Diffraction (EBSD), Fractography.
- **Transmission Electron Microscopy** – Bright Field Imaging, Dark Field Imaging, EDS.
- **Optical Microscopy** – Bright field, Dark field and Differential Imaging Contrast (DIC).
- **X-ray Diffraction** – Standard measurement, Pole figure measurement, Residual stress measurement.
- **Universal Testing Machine (UTM)** – Compression testing, Tensile test, Strain Rate Jump test and Strain Relaxation test

Expertise of equipment

- TA on Transmission Electron Microscopy (FEI Tecnai T20) for two years (2016 – 2018) at MSE department
- Field Emission SEM (JEOL JSM-7100F) including Orientation Imaging Microscopy (OIM) and in-situ tensile testing for five years (Jan 2015 – Dec 2020) at Advanced Centre for Materials Science (ACMS), IIT Kanpur
- TA on Nova NanoSEM 450 (FEG-SEM) for one year equipped with Hikari EBSD camera and Octan Plus for EDS
- TA on CARL ZEISS EVO 50 W-SEM for 6 month
- TA on JEOL JSM-6010LA W-SEM for two years

Programming Skill

- MATLAB – Basics and problem-solving approaches
- Python - Basic programming and Data structure
- Programming with MATLAB
- Basics of C++

Analytical Skill

- Full-Field Crystal Plasticity (DAMASK) and viscoplastic Fast Fourier Transform (VPFFT)
- Mean-Field Crystal Plasticity simulation (VPSC)
- Synthetic microstructure generation using Dream.3D, Neper and Voronoi Tessellation
- EBSD analysis using TSL-OIM and MTEX
- X-ray data analysis using X'Pert HighScore Plus
- Image processing of microstructure using MATLAB and ImageJ

Academic Responsibility

- Teaching Assistance (TA) for two semester in Nature and property of materials
- Teaching Assistance (TA) for two semester in Introduction to Manufacturing Processes
- Teaching Assistance (TA) for one semester in Manufacturing Process Lab
- Teaching Assistance (TA) for one semester in Process metallurgy Lab
- **Tutor** for three semester in Introduction to Manufacturing Processes Lab
- Independent user for four semester in **Transmission Electron Microscopy facility** equipped with tungsten filament
- Independent user for six semesters in **Scanning Electron Microscopy facility** equipped with FEG and tungsten filament.

Presentations

Poster Presentation

- Mirtunjay Kumar, Nilesh P. Gurao, Anish Upadhyaya, "In-situ electron back scatter diffraction study of deformation behaviour of concentrated Ni-24W-22Fe alloy." In 26th International Symposium on Metastable, Amorphous and Nanostructured Materials at IIT Madras. DOI: dx.doi.org/10.5281/zenodo.4630117

- Mirtunjay Kumar, Nilesh P. Gurao, Anish Upadhyaya, "Microstructure and texture analysis of deformation of Ni-W-Fe matrix alloy." In Microstructural Engineering 2018-19 at IIT Kanpur.

- Mirtunjay Kumar, Nilesh P. Gurao, Anish Upadhyaya, "Towards a comprehensive understanding of the role of shear bands on recrystallization texture in Ni-24W-22Fe alloy." In 7th International Conference on Recrystallization and Grain Growth at University of Ghent, Belgium. DOI: dx.doi.org/10.5281/zenodo.4630023.

Oral Presentation

- Mirtunjay Kumar, Nilesh P. Gurao, Anish Upadhyaya, "Microstructure and mechanical properties of W-Ni-Fe tungsten heavy alloy." In 46th Annual Technical Meeting of PMAI (PM2020) at Mumbai, India.

- Mirtunjay Kumar, N. P. Gurao, A. Upadhyaya, "An automated methodology for assessing the microstructural attributes of liquid phase sintered microstructure." In Research Scholar Day 2020 at IIT Kanpur.

- Mirtunjay Kumar, N. P. Gurao, A. Upadhyaya, "Development of Processing-Microstructure-Mechanical behaviour Paradigms for Tungsten Heavy Alloys." In 5th International Conference on Powder Metallurgy in Asia (APMA 2019) at Pune, India.

- Mirtunjay Kumar, N. P. Gurao, A. Upadhyaya, "Understanding the role of shear bands on recrystallization texture of 54Ni-24W-22Fe alloy." In Research Scholar Day 2019 at IIT Kanpur.

- Mirtunjay Kumar, N. P. Gurao, A. Upadhyaya, "Deformation behaviour of dual phase tungsten heavy alloy." In NMD-ATM 2019 at Koavalam, Kerala.

Presentations (continued)

- Mirtunjay Kumar, N. P. Gurao*, A. Upadhyaya, "Effect of matrix volume fraction on deformation texture evolution in two phase tungsten heavy alloy." In 18th International Conference on Textures of Materials (ICOTOM-18) at St George, Utah, USA.

- Mirtunjay Kumar, N. P. Gurao, A. Upadhyaya, "Rolling of liquid phase sintered 90W-7Ni-3Fe tungsten heavy alloy." In NMD-ATM 2016 at IIT Kanpur.

- Mirtunjay Kumar, Anish Upadhyaya "Rolling of liquid phase sintered 90W-7Ni-3Fe tungsten heavy alloy." NMD-ATM 2014 – COEP, Pune, India.

Invited Speaker

- Invited speaker in SPARC Workshop 2023 on " Advanced Tools for Hierarchical Microstructure Characterization" jointly organized by IIT Roorkee and IIT Kanpur in March, 2023.

- Invited lecture at NIT Warangal Organised by MME association jointly with IIM-Students Chapter, NITW on 15 December 2022.

- Guest Speaker in Material Advantage outreach Programme on topic "Correct and Incorrect Phase Diagrams Features" at UIET - CSJM University Kanpur in September 2019.

References

Prof Anish Upadhyaya
Professor
IIT Kanpur,
Kanpur-208016.
anishu@iitk.ac.in

Dr. Nilesh Prakash Gurao
Associate Professor
IIT Kanpur,
Kanpur.
npgurao@iitk.ac.in

Declaration

I hereby declare that the information furnished above is true to the best of my knowledge and belief.

April 10, 2023

Signature
(Mirtunjay Kumar)