SUMEET MISHRA

Date of Birth: 21 April 1991
Current position: Assistant Professor, Metallurgical and Materials Engineering
Indian Institute of Technology Roorkee, India
Email: sumeet.mishra@mt.iitr.ac.in, sumeet.igit@gmail.com
Mobile Tel. No: +91-9621931122, +91-7007531323
Nationality: Indian

Work Experience

Assistant Professor in the Department of Metallurgical and Materials Engineering, IIT Roorkee (November 2020-Present)

Research Associate in the School of Materials (September 2018-October 2020) University of Manchester, Manchester, United Kingdom

1. Lab scale simulation for thermo-mechanical processing of dual phase Ti alloys using Gleeble, Dilatometer and Servotest

Project Coordinator: Prof. Joao Quinta da Fonseca

2. Warm forming of high strength Al-Zn-Mg alloys: insights from in-situ SAXS experiments

Project Coordinator: Prof. Joseph. D. Robson, Prof. Joao Quinta da Fonseca

3. Virtual material testing system to determine the forming limit curve of industrially important Al alloys:

Project Coordinator: Prof. Joao Quinta da Fonseca

Research Associate in the Department of Materials Engineering (September 2017-August 2018) Indian Institute of Science Bangalore, Bangalore, India

1. Deformation mechanism of incremental sheet forming process: Insights from crystallographic texture, microstructure and mechanical properties

Project Coordinator: Prof. Satyam Suwas

Education

PhD in Materials Science and Engineering (July 2012-August 2017)
Indian Institute of Technology Kanpur, Kanpur, India

GPA: 10/10
Thesis title: Experimental and theoretical investigations of the effect of precipitates on mechanical behavior and deformation texture of an aluminium-magnesium-silicon alloy.

Supervisors: Prof. Nilesh Prakash Gurao, Prof. Kaustubh Kulkarni

B.Tech in Metallurgical and Materials Engineering (August 2008-July 2012)

Indira Gandhi Institute of Technology, Sarang, Dhenkanal, Odisha, India
GPA: 8.5/10

Kendriya Vidyalaya Cuttack, Odisha, India

C.B.S.E (12^{th} standard) 2008: 84.6%

C.B.S.E (10^{th} standard) 2006: 86.8%

Area of Interest:

Age hardenable Al alloys, Deformation texture modelling via full field and self-consistent models, Phenomenological modelling of mechanical properties using internal variable models and mechanical threshold stress model, Deformation kinetics analysis using transient mechanical tests, Kampmann-Wagner based numerical modelling to simulate evolution of precipitates during ageing and integration with strength models, Small angle X-ray scattering studies for studying precipitate size and distribution

Skills:

Pole figure measurement, X-ray diffraction, Scanning electron microscope, Electron back scatter diffraction, Transmission Electron Microscope (TEM), Script based MATLAB coding for texture, EBSD and diffraction line profile analysis, Gleeble, Dilatometer, Tensile testing, Stress relaxation testing, Nakazima sheet metal testing, deep drawing, SAXS.

Journal Publications

1. BP Singh, JR Sahoo, **Sumeet Mishra***, Elucidating the role of combined latent hardening due to slip-slip and slip-twin interaction for modeling the evolution of crystallographic texture in high nitrogen steels, International Journal of Plasticity, 2024, Volume 185, 104215.

2. JR Sahoo, P Bharti, A Tripathi, **Sumeet Mishra***, An experimental and theoretical framework for comprehending the correlation between free vacancy concentration and natural aging susceptibility in Al-Mg-Si alloys, Journal of alloys and Compounds, 2024, Volume 1010, 177939.

3. S Samanta, JR Sahoo, **Sumeet Mishra***, *Effect of dynamic strain ageing on flow stress and critical strain for jerky flow in Al-Mg alloys*, International Journal of Plasticity, 2024, 104053.

4. K Sakthivel, **Sumeet Mishra**, S Das, Tensile deformation behavior of a thermally exposed carbide free bainitic steel, Materials Science and Technology, 2024, https://doi.org/10.1177/026708362412734.

5. M Kumar, **Sumeet Mishra**, *Implications of the micromechanical Taylor Factor on work hardening parameters: New perspectives from FFT simulations in DAMASK*, Computational Materials Science, 2024, 112892.

6. P Bharti, R Singh, JR Sahoo, **Sumeet Mishra***, *A robust dislocation line tension model considering obstacle strength distribution for yield strength prediction of an Al–Cu–Li alloy*, Materials Today Communications, 2024, 107852.

7. AK Godasu, **Sumeet Mishra**, U Prakash, A Haldar, S Mula, *Complementary Shear Banding During Warm Rolling of Alloy 625 Leads to Uncharacteristic Development of γ-Fiber Texture*, Metallurgical and Materials Transactions A, 2024, 652-673.

8. P Bharti, R Singh, JR Sahoo, A Tripathi, **Sumeet Mishra***, Yield strength modeling of an Al-Cu-Li alloy through circle rolling and flow stress superposition approach, Journal of Alloys and Compounds, 2023, 171343.

9. S Samanta, JR Sahoo, **Sumeet Mishra***, *A robust phenomenological modeling framework based on cross-slip propensity factor for capturing the effect of dynamic strain aging on work hardening behavior of an Al-Mg alloy*, Acta Materialia, 2023, 119014.

10. JR Sahoo, A Tripathi, **Sumeet Mishra***, *Low temperature interrupted quenching improves formability without compromising natural ageing stability and paint-bake strength of an Al-Mg-Si alloy*, Materials Science and Engineering: A, 2023, 145320.

11. JR Sahoo, BP Singh, **Sumeet Mishra*,** A comprehensive study on the effect of preageing temperature on formability characteristics of an Al-Mg-Si alloy, Materials Today Communications, 2023, 105175.

12. BP Singh, M Kumar, R Jain, A Singh, **Sumeet Mishra***, Finite element assisted self-consistent simulations to capture texture heterogeneity during hot compression, International Journal of Materials Research, 2023, 219-230.

13. KU Yazar, S Bahl, **Sumeet Mishra**, VK Sahu, A Bhattacharjee, D Banerjee, S Suwas, *Microcrack formation under normal and dwell fatigue of IMI 834*, International Journal of Fatigue, 2023, 107724.

14. Adam Plowman, Patryk Jedrasiak, Thomas Jailin, Peter Crowther, **Sumeet Mishra**, Pratheek Shanthraj, Joao Quinta da Fonseca, *A novel integrated framework for reproducible formability predictions using virtual materials testing*, Materials Open Research 2 (2), 2023.

15. P Jedrasiak, H Shercliff, **Sumeet Mishra**, CS Daniel, JQ da Fonseca, *Finite Element Modeling of Hot Compression Testing of Titanium Alloys*, Journal of Materials Engineering and Performance 31 (9), 2022, 7160-7175.

16. AK Godasu, **Sumeet Mishra**, U Prakash, S Mula, *Tensile Deformation Modeling of a Homogenized Cast Alloy 625: Effects of Large Grain Size*, Metallurgical and Materials Transactions A 53 (6), 2022, 2239-2258.

17. KU Yazar, **Sumeet Mishra**, L Kumar, S Bahl, TK Kumar, S Suwas, *Texture induced planar anisotropy of dwell fatigue response in titanium: Insights from experiments and crystal plasticity simulations*, International Journal of Plasticity, 2022, 103140.

18. M Kumar, A Singh, **Sumeet Mishra***, Enriching mean-field self-consistent texture simulations using the full-field FFT model, Materials Science and Technology, 2021, 1343-1352.

19. M Kumar, A Singh, VK Beura, **Sumeet Mishra***, *Incorporating latent hardening in visco-plastic self-consistent framework for performing texture simulations*, Materials Science and Technology, 2021, 752-764.

20. S Manda, **Sumeet Mishra**, NP Gurao, *Effect of Cyclic Prestrain on Tensile Behavior of Commercially Pure Copper*, Materials Performance and Characterization, 2021, 370-381.

21. W.U. Mirihanage, J. D. Robson, **Sumeet Mishra**, P. Hidalgo-Manrique, J. Quinta da Fonseca, C. S. Daniel, S. Michalik, O. V. Magdysyuk, T. Connolley, M. Drakopoulos, P. B. Prangnell, *Direct observation of the dynamic evolution of precipitates in aluminium alloy 7021 at high strain rates via high energy synchrotron X-rays*, Acta Materialia, 2021, 116532.

22. **Sumeet Mishra**, K.U. Yazar, A Kar, R Lingam, NV Reddy, O Prakash, S Suwas, *Texture and Microstructure Evolution During Single-Point Incremental Forming of Commercially Pure Titanium*, Metallurgical and Materials Transactions, 2021, 151-166.

23. **Sumeet Mishra**, M. Suresh, A.M. More, A. Bisht, N. Nayan, Satyam Suwas, *Texture control to reduce yield strength anisotropy in the third-generation aluminum-copper-lithium alloy: Experiments and modelling*, Materials Science and Engineering A, 2021, 140047.

24. K.U. Yazar, **Sumeet Mishra**, Anish Karmakar, Amit Bhattacharjee, Satyam Suwas, *On the temperature sensitivity of dwell fatigue of a near alpha titanium alloy: role of strain hardening and strain rate sensitivity*, Metallurgical and Materials Transactions, 2020, 5036-5042.

25. Abir Roy, Manish Tewari, **Sumeet Mishra**, Abhishek Kumar, *Effect of cyclic channel die compression on mechanical properties and strain hardening exponent of Al-Mg-Si alloy*, Journal of Materials Engineering and Performance, 2020, 3876-3888.

26. **Sumeet Mishra***, Amit Singh, Mirtunjay Kumar, *Evolution of rotated Brass texture by cross rolling: Implications on formability*, Materials Science and Technology, 2020, 1272-1281.

27. Srijan Acharya, **Sumeet Mishra**, K.U. Yazar, Kaushik Chatterjee, Sataym Suwas, *Evolution of deformation texture in the low modulus β titanium alloys Ti-34Nb-2Ta-(0,3)Zr-0.5O*, Metallurgical and Materials Transactions, 2020, 4045-4058.

28. **Sumeet Mishra**, K.U. Yazar, Abhishek More, Lailesh Kumar, R. Lingam, N.V. Reddy, Om Prakash, Satyam Suwas, *Elucidating the deformation modes in incremental sheet forming process: Insights from crystallographic texture, microstructure and mechanical properties*, Materials Science and Engineering A, 2020, 139311.

29. **Sumeet Mishra**, Manasij Yadava, Kaustubh Kulkarni, N.P. Gurao, *A new phenomenological approach for modeling strain hardening behavior of face centered cubic materials*, Acta Materialia 178, 99-113, (2019).

30. S Bahl, **Sumeet Mishra**, KU Yazar, IR Kola, K Chatterjee, S Suwas, *Non-equilibrium microstructure, crystallographic texture and morphological texture synergistically result in unusual mechanical properties of 3D printed 316L stainless steel*, Additive Manufacturing 28, 65-77, (2019).

31. **Sumeet Mishra***, A Singh, VK Bura, M Yadava, *A Perspective on Strain Hardening Behaviour of Materials Considering Mobile Dislocation Density and Activation Volume*, Metallurgical and Materials Transactions A, 1-6, (2019).

32. **Sumeet Mishra***, A Singh, VK Beura, M Yadava, N Nayan, *Uncharacteristic evolution of copper type texture in the presence of shearable precipitates*, Materials Chemistry and Physics 229, 61-65, (2019).

33. KU Yazar, **Sumeet Mishra**, K Narasimhan, PP Date, *Deciphering the deformation mechanism in single point incremental forming: experimental and numerical investigation*, The International Journal of Advanced Manufacturing Technology, 101, 9-12, 2355-2366, (2019).

34. **Sumeet Mishra***, VK Beura, A Singh, M Yadava, *Effect of obstacle strength and spacing on the slope of Haasen plot*, Materials Science and Technology 35 (4), 403-408, (2019).

35. Niraj Nayan, **Sumeet Mishra**, Aditya Prakash, Rajdeep Sarkar, SVSN Murty, Manasij Yadava, MJNV Prasad, I Samajdar, *Origin of through-thickness serrated tensile flow behaviour in Al–Cu–Li (AA2195) alloy: Effect of microstructure and texture*, Materialia 5, 100180, (2019).

36. N Nayan, **Sumeet Mishra**, A Prakash, S Murty, M Prasad, I Samajdar, *Effect of cross-rolling on microstructure and texture evolution and tensile behaviour of aluminium-copper-lithium (AA2195) alloy*, Materials Science and Engineering: A 740, 252-261, (2019).

37. **Sumeet Mishra***, VK Beura, A Singh, M Yadava, *Deformation behaviour of aluminum copper lithium alloy containing T1 precipitates*, Materials Science and Technology 34 (17), 2105-2113, (2018).

38. **Sumeet Mishra***, VK Beura, A Singh, M Yadava, N Nayan, *Activation volume and its relation with plastic instability*, Materials Chemistry and Physics 217, 98-101, (2018).

39. **Sumeet Mishra***, VK Beura, A Singh, M Yadava, N Nayan, *Rate sensitive behaviour of obstacles in age hardenable aluminium alloys*, Materials Science and Engineering: A 729, 102-105, (2018).

40. **Sumeet Mishra**, Manasij Yadava, Kaustubh Kulkarni, N.P. Gurao, *A theoretical investigation of the effect of precipitate habit plane on plastic anisotropy in age hardenable aluminium alloys*, Modelling and Simulation in Materials Science and Engineering 26 (5), 055011, (2018).

41. **Sumeet Mishr**a, Manasij Yadava, Kaustubh Kulkarni, N.P. Gurao, *Stress relaxation behaviour of an aluminium magnesium silicon alloy in different temper condition*, Mechanics of Materials 125, 80-93, (2018).

42. **Sumeet Mishra***, Vikrant Beura, Amit Singh, Manase Yadava, Niraj Nayan, E*ffect of temper condition on stress relaxation behaviour of an aluminium copper lithium alloy*, Metallurgical and Materials Transactions A 49 (7), 2631-2643, (2018).

43. **Sumeet Mishra**, Manasij Yadava, Kaustubh Kulkarni, N.P. Gurao, *A modified Taylor model for predicting yield strength anisotropy in age hardenable aluminium alloys*, Materials Science and Engineering A 699 (2017) 217-228.

44. Shailesh Tiwari, **Sumeet Mishra**, A. Odeshi, J.A. Szpunar, Manoj Chopkar, *Evolution of texture and microstructure during high strain rate torsion of aluminium zinc magnesium copper alloy*, Materials Science and Engineering A 683 (2017) 94-102.

45. **Sumeet Mishra**, Kaustubh Kulkarni, N.P. Gurao, Effect of crystallographic texture on precipitation induced anisotropy in an aluminium magnesium silicon alloy, Materials and Design 87 (2015) 507-519.

Conference Publications

1. L Patra, **Sumeet Mishra**, N.P Gurao, Effect of Strain Path Change on Deformation and Recrystallization Texture Evolution in Al-Mg Alloy, Proceedings of the 6th International Conference on Recrystallization and Grain Growth (ReX&GG 2016), 231-238, Springer, Cham.

2. **Sumeet Mishra**, K Kulkarni, N.P Gurao, Effect of strain path change on precipitation behaviour of Al-Cu-Mg-Si alloy, Proceedings of the 17th International Conference on Texture of Materials (ICOTOM 17), IOP Conference Series: Materials Science and Engineering, 82, 012025.

3. **Sumeet Mishra**, Piyush Priyadarshi, Kaustubh Kulkarni, N.P Gurao, Prasad Phale, Suhail Mulla, Optimizing the Strength and Ductility of Al-6061 Alloy by Various Post-Rolling Ageing Treatments, SAE Technical Paper, 2014-28-0022.

Conference Oral presentations

1. **Sumeet Mishra**, Z. Ma, Joao Quinta da Fonseca, Joseph. D. Robson, *A theoretical investigation of the dynamic interaction between dislocations and precipitates in an age hardenable Al-Zn-Mg-Cu alloy*, Light MAT 2019, Manchester, UK.

2. **Sumeet Mishra**, Manasij Yadava, Kaustubh Kulkarni, N.P. Gurao, *A modified Taylor model for predicting yield strength anisotropy in age hardenable Al-Mg-Si alloy*, NMD-ATM 2016, IIT Kanpur, India.

3. **Sumeet Mishra**, Manasij Yadava, Kaustubh Kulkarni, N.P. Gurao, *New insights for modeling strain hardening behaviour in age hardenable Al alloys,* NMD-ATM 2016, IIT Kanpur, India.

4. **Sumeet Mishra**, Manasij Yadava, Kaustubh Kulkarni, N.P. Gurao, *A modified yield strength model for predicting anisotropy in Al-Mg-Si alloy,* Workshop on interface related mechanical behaviour, IISc Bangalore, 2015.

5. **Sumeet Mishra**, Kaustubh Kulkarni, N.P. Gurao, *Effect of crystallographic texture on precipitation behaviour in an Al-Mg-Si alloy*, ICOTOM-17 2014, Dresden, Germany.

6. **Sumeet Mishra**, Kaustubh Kulkarni, N.P. Gurao, *Optimizing the Strength and Ductility of Al-6061 Alloy by Various Post-Rolling Ageing Treatments,* ARAI 2014, Pune, India.

Poster presentations

1. **Sumeet Mishra**, Manase Yadava, Kaustubh Kulkarni, N.P. Gurao, *Effect of temper condition on rolling texture development in age hardenable Al-Mg-Si alloys*, ICoTMMB 2017, IISc Bangalore.

2. **Sumeet Mishra**, Manasij Yadava, Kaustubh Kulkarni, N.P. Gurao, *New insights for modeling strain hardening behavior in age hardenable Al alloys*, ICMR 2016, IISc Bangalore.

3. **Sumeet Mishra**, Manasij Yadava, Kaustubh Kulkarni, N.P. Gurao, *Effect of crystallographic texture on precipitation induced anisotropy in an Al-Mg-Si alloy*, Microstructure and Texture-2015, IIT Bombay.

Achievements

1. Secured CPI of 10 in ten courses in IIT Kanpur during PhD.

2. Secured 2nd departmental Rank in B.Tech with CGPA 8.5/10.

3. Secured AIR 99 in GATE 2012.

4. Secured 2nd best poster award during ICoTMMB 2017 conference in IISc Bangalore.

5. Nominated by IGIT Sarang to participate in the Mineral Development Awareness Quiz (MDAQ) Programme 2011 organized by the Society of Geoscientists and Allied Technologists in association with Tata Steel, Essel Mining Industries Ltd., Rungta Mines and Tata Sponge Iron Ltd.

Professional activities

1. Reviewer for Scientific Reports, Materials and Design, Materials Science and Technology, Journal of Materials Science, Acta Metallurgica Sinica (English Letters), Journal of Physics: Condensed matter.

2. Member of the abstract review committee for research scholar day, Department of Materials Science and Engineering, IIT Kanpur 2016.

Projects

Sr. No.	Title of the project	Your role (sole PI/PI/Co-PI)	Funding agency and duration	Total outlay (in Rs.)
1	Developing pathways for simultaneous improvement in formability and paint bake response of automotive grade Al-Mg-Si alloys	Sole PI	Startup grant, SERB, 2 years Start: 23. 12. 2021 End: 22. 12. 2023	Rs. 32.56 lakhs (Completed)
2	Experimental and theoretical study of yield surface and stretch formability evaluation of Al-Cu-Li alloy	Sole PI	ISRO-STC Start: 07.02.2024 End: 06.02.2026	Rs. 22.67 lakhs (Ongoing)
3	Dislocation density based constitutive modelling of flow behavior of high nitrogen steels	Sole PI	DRDO, Materials for Armament Application (MAA) Panel	Rs. 30 lakhs Conceptual proposal submitted to Armament Application Panel, DRDO

PhD Supervision

Sl. No.	Name of the student	Month & Year of admission	Area/ Title of the thesis	Supervision (Singly/ Jointly)
1	Jyoti Ranjan Sahoo	Feb, 2021	Developing pathways for simultaneous improvement in formability and paint bake response of automotive grade Al-Mg-Si alloys	Single **Ongoing**
2	Purnima Bharti	Feb, 2021	Obstacle strength-based superposition laws for yield and work hardening modelling of 3rd generation Al-Cu-Li alloys	Single **Ongoing**
3	Surajit Samanta	July, 2021	Developing physics-based dislocation density model for understanding the effect of dynamic strain ageing on work hardening behavior of Al-Mg alloys	Single **Ongoing**
4	Bhanu Pratap Singh	July, 2022	High strain rate deformation behavior of high nitrogen steels: Experimental and modelling study	Single **Ongoing**
5	Irfan Mushtaq Wani	July, 2023	Crystallographic texture evolution in recycle grade high dispersoid content Al-Mg-Si alloys	Single **Ongoing**