Vivek Kumar Sahu

Indian Institute of Technology (ISM) Dhanbad, India
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Work Experience

January 2025-Present **Indian Institute of Technology (ISM) Dhanbad, India**
Assistant Professor in Fuel, Minerals and Metallurgical Engineering

March 2024-January 2025 **University of North Texas, USA**
Post-doc in Mechanical Engineering
Advisor: Prof. Hector R. Siller & Prof. Herman Shen

July 2022-March 2024 **The University of Manchester, UK**
Post-doc in NEWAM project, EPSRC, Department of Materials
Advisor: Prof. Alec Davis & Prof. Philip Prangnell

Education

2016- Sept 2022 **Indian Institute of Technology Kanpur, India**
Doctor of Philosophy (PhD) in Materials Science and Engineering
Advisor: Prof. Nilesh Prakash Gurao

2014-2016 **Indian Institute of Technology Kharagpur, India**
Master of Technology (M.Tech) in Metallurgical and Materials Engineering
Advisor: Prof. T K Bandyopadhyay, IIT Kharagpur
Dr. Sourav Chatterjee, TATA Steel-R&D, Jamshedpur

2010-2014 **National Institute of Technology Raipur, India**
Bachelor of Technology in Metallurgical Engineering
Advisor: Dr. Akhilesh Swarnakar

Area of expertise

Characterization: Metallography, Optical microscopy, Electropolishing, Digital image correlation, W-SEM, FESEM, Large area EBSD, EDS, BSE, SE, In-situ EBSD, Bulk texture and line profile XRD, HRDIC, Fractographic analysis, Synchrotron, X-ray tomography, Diffraction contrast tomography

Mechanical testing: Tensile testing, Dwell fatigue testing, Low and High cycle fatigue testing, Fracture toughness test, Stress relaxation test, Jump test, Compression test, Micro-mechanical testing, Large area hardness mapping

Heat-treatment: Various muffle furnaces, Tube furnaces and Dilatometer for thermal simulation

Processing: Conventional cryorolling, Cold rolling and Wire arc additive manufacturing (WAAM) and Laser-powder bed fusion (L-PBF) of Ti alloys

Software used: TSL-OIM, HKL oxford, Aztec crystal, Atex, Mtex for bulk and EBSD analysis, Resmat, FIT 2d, Aztec, Origin, Excel, Matlab, DREAM 3D, NEPER, Abaqus, UMAT based Abaqus, Paraview, Image J, Thermo-Calc, DICTRA calculation

Simulations and Coding: Viscoplastic self-consistent simulation, Finite element simulations based on continuum and crystal plasticity, Fortran

Machine operating experience

1. JEOL W-SEM (SE, BSE, EDS), Jan 2017-July 2022
2. JEOL JSM-7100F, Field Emission Microscope (SE, BSE, EDS, including OIM and in-situ tensile testing), Jul 2017- July 2022
3. Rigaku XRD (Bulk texture measurement), Jul 2017- July 2022
4. CARL ZEISS EVO 50 W-SEM (SE, BSE, OIM) Jul 2017- July 2022
5. Digital Image Correlation, 2D strain, Optical setup with three-point bend, tensile, fatigue, Jan 2018- July 2022
6. Synchrotron, Beam line 7, Desy Germany March 12-18, 2020
7. Instron 3369 universal testing machine (50 kN) (tension, stress relaxation and jump test) Jul 2017- July 2022
8. Nano n'plug BISS (15 kN) (tension, fatigue, dwell fatigue, three-point bent test)
9. Vibratory Polisher, Vibromet 2, Buehler, Jul 2017- July 2022
10. Electro polisher, Struers, LectroPol-5, Jul 2017- July 2022
11. Large area optical microscopy July 2022-March 2024
12. Advanced Apero 1 and 2 FESEM (large area SE, BSE, EDS and EBSD, multiple samples at a time) Nov 2022-March 2024
13. Tescan LC FESEM (large area SE, BSE, EDS and EBSD) Sept 2022-March 2024
14. FEI Magellan FESEM ((large area SE, BSE, EDS and EBSD) Oct 2022-March 2024

Fellowship and awards

1. 3rd prize in poster presentation in Research Scholar Day 2019 IIT Kanpur, India
2. Synchrotron characterization at DESY, Germany, March 10-17, 2020
3. SPARC fellowship for advance characterization techniques at Imperial College London, UK
4. Editor's choice for free access: Metallurgical and Materials Transactions

Teaching Experience

1. Teaching Assistant, MSE 315, Manufacturing Processes, Jan-Apr' 2020
2. Teaching Assistant, TA 201A, Introduction to manufacturing Process, Jul-Dec' 2019
3. Teaching Assistant, MSE 638, Symmetry and properties of crystal, Jan-Apr' 2018
4. Teaching Assistant, MSE 313, Mechanical Behaviour Laboratory, Jul-Dec' 2018

Professional link

Google scholar: Vivek K Sahu - Google Scholar

Linkedin: https://www.linkedin.com/in/vivek-kumar-sahu-235a50128/

Publications

Accepted manuscript:

1. **V.K. Sahu**, S. Chandrakar, S. Jha, N. P. Gurao, Elucidating the fracture toughness of additively manufactured and thermo-mechanically treated Ti6Al4V, Materials Transactions (2025) MT-MC2024006. DOI: https://doi.org/10.2320/matertrans.MT-MC2024006
2. F. Zakir, A.K. Syed, X. Zhang, A.E. Davis, **V.K. Sahu**, A.E. Caballero, R. Biswal, P.B. Prangnell, S. Williams, Microstructure tailoring of a wire-arc DED processed Ti6242 alloy for high damage tolerance performance, Additive Manufacturing (2025), DOI: https://doi.org/10.1016/j.addma.2025.104785
3. **V. K. Sahu,** Romali Biswal, AE Davis, S Williams, P Prangnell, Prior β-grain refinement in WAAM Ti-6Al-4V processed by inter-pass ultrasonic peening, Materialia, 38, (2024) 102236. Ranking (Q2), Impact factor (3)
   DOI: https://doi.org/10.1016/j.mtla.2024.102236
4. A. S. Marodkar, **V. K. Sahu**, H Borkar, Enhancing Strength and Reducing Yield Asymmetry in Extruded AZ91 Alloy through Combined Ca and Sr Additions, J. Mater. Eng. Perform, (2024). Ranking (Q2), Impact factor (2.2)
   DOI: https://doi.org/10.1007/s11665-024-10059-8
5. D Hu, R Biswal, **V. K. Sahu**, JW Fellowes, A Zadehkabir, SW Williams, AE Davis, On the chemical composition, microstructure and mechanical properties of a Nitrogen-contaminated Ti-6Al-4V component built by Wire-Arc Additive Manufacturing, IOP. *Conf. Ser.: Mater. Sci. Eng.*, 1310 (2024), 012020.
   DOI: 10.1088/1757-899X/1310/1/012020
6. **V. K. Sahu**, P. Chakraborty, Manasij Yadava, N. P. Gurao, Micro-mechanisms of anisotropic deformation in the presence of notch in commercially pure titanium: an in-situ study with CPFEM simulations, International Journal of Plasticity 177 (2024) 103985. Ranking (Q1), Impact factor (9.8)
   DOI: https://doi.org/10.1016/j.ijplas.2024.103985

7. A. E. Davis, J. Wainwright, **V. K. Sahu**, D. Dreelan, X. Chen, J. Ding, T. Flint, S. Williams, P. B. Prangnell, Achieving a columnar-to-equiaxed transition through dendrite twinning in high deposition rate additively manufactured titanium alloys, Metall. Mater. Trans. A. (2024). Ranking (Q1), Impact factor (2.8)
   DOI: : https://doi.org/10.1007/s11661-024-07388-7
8. **V. K. Sahu**, M. Yadava, N.P. Gurao, Elucidating the Extreme Anisotropy in the J-Integral Value of Commercially Pure Titanium, Mater. Sci. Eng. A. 881 (2023) 145434. Ranking (Q1), Impact factor (6.4)
   DOI: https://doi.org/10.1016/j.msea.2023.145434
9. K.U. Yazar, S. Bahl, S. Mishra, **V.K. Sahu**, A. Bhattacharjee, D. Banerjee, S. Suwas, Microcrack formation under normal and dwell fatigue of IMI 834, Int. J. Fatigue. 175 (2023) 107724. Ranking (Q1), Impact factor (6)
   DOI: https://doi.org/10.1016/j.ijfatigue.2023.107724
10. S. Nagarajan, R. Jain, S. Jha, **V.K. Sahu**, N.P. Gurao, In-Situ Electron Backscatter Diffraction Study of Deformation Behavior of Fine-grained Dual Phase Steel Subjected to

Uniaxial Tension, J. Mater. Eng. Perform. (2023). Ranking (Q2), Impact factor (2.3)
DOI: https://doi.org/10.1007/s11665-023-07819-3

11. A. Chakrabarty, P. Chakraborty, R. Jain, **V.K. Sahu,** N. P. Gurao, H.N. Bar, N. Khutia, Influence of Scanning and Building Strategies on the Deformation Behavior of Additively Manufactured AlSi10Mg: CPFEM and Finite Element Studies, Met. Mater. Int., **29**, 2978–3008 (2023). Ranking (Q1), Impact factor (3.5)
DOI: https://doi.org/10.1007/s12540-023-01418-6
12. A. Ghosh, **V.K. Sahu**, N.P. Gurao, Effect of heat treatment on the ratcheting behaviour of additively manufactured and thermo-mechanically treated Ti–6Al–4V alloy, Mater. Sci. Eng. A. 833 (2022) 142345. Ranking (Q1), Impact factor (6.4)
DOI: https://doi.org/10.1016/j.msea.2021.142345
13. **V.K. Sahu**, M. Yadava, P. Chakraborty, P. Gurao, Effect of notch severity and crystallographic texture on local deformation and damage in commercially pure titanium, Int. J. Plast. 155 (2022) 103318. Ranking (Q1), Impact factor (9.8)
DOI: https://doi.org/10.1016/j.ijplas.2022.103318.
14. A. Chakrabarty, **V.K. Sahu**, A. Das, S. Mukherjee, N.P. Gurao, P. Chakraborty, H.N. Bar, N. Khutia, Study of the Effect of Two Separate Tilt Angles of Laser Scanning Lines on the Microstructure and Mechanical Properties in Direct Metal Laser Sintered AlSi10Mg Alloy, Met. Mater. Int. 28 (2022) 250–268. Ranking (Q1), Impact factor (3.5)
DOI: https://doi.org/10.1007/s12540-021-01080-w.
15. **V.K. Sahu**, R. Sonkusare, K. Biswas, N.P. Gurao, In Situ Experiments: Paving Ways for Rapid Development of Structural Metallic Materials for a Sustainable Future, J. Indian Inst. Sci. xxx (2022) 1–38. Ranking (Q2), Impact factor (2.3)
DOI: https://doi.org/10.1007/s41745-022-00292-2
16. S. Mohanty, A. Kothari, R. Raghavan, **V.K. Sahu**, N.P. Gurao, K.K. Sahu, B.K. Dhindaw, L. Zeng, M. Xia, S. Gollapudi, Microstructure and Mechanical Properties of High-Carbon-Containing Fe-Ni-Mn-Al-Cr High-Entropy Alloy: Effect of Thermomechanical Treatment, Front. Mater. 9 (2022) 1–10. Ranking (Q2), Impact factor (3.2)
DOI: https://doi.org/10.3389/fmats.2022.915278
17. S. Sinha, **V.K. Sahu**, V. Beura, R. Sonkusare, R. Kalsar, A.K.L. Das, J. Basu, N.P. Gurao, K. Biswas, Initial texture dependence of nanocrystalline omega phase formation during high pressure torsion of commercially pure titanium, Mater. Sci. Eng. A. 802 (2021) 140687. Ranking (Q1), Impact factor (6.4)
DOI: https://doi.org/10.1016/j.msea.2020.140687
18. A. Chakrabarty, P. Chakraborty, **V.K. Sahu**, N.P. Gurao, N. Khutia, Investigation of Strain Localization in Additively Manufactured AlSi10Mg Using CPFEM, in: Compos. Mater. Extrem. Load., Springer, Singapore, 2021: pp. 199–214.
DOI: https://doi.org/https://doi.org/10.1007/978-981-16-4138-1_15
19. M. V. Krishna, **V.K. Sahu**, A. Ghosh, H.G. Brokmeier, N.P. Gurao, In-situ investigation of the evolution of microstructure and texture during load reversal of commercially pure titanium using synchrotron X-ray diffraction, Mater. Charact. 159 (2020) 110039. Ranking (Q1), Impact factor (4.7)
DOI: https://doi.org/10.1016/j.matchar.2019.110039

20. K.U. Yazar, A. Karmakar, **V. Sahu**, A. Bhattacharjee, S. Suwas, Normal and dwell fatigue behavior of a near-alpha titanium alloy - IMI 834, MATEC Web Conf. 321 (2020) 04005. **DOI:** https://doi.org/10.1051/matecconf/202032104005
21. **V.K. Sahu**, S. Gupta, N.P. Gurao, Effect of Initial Texture on the Evolution of Microstructure and Texture During Rolling of Commercially Pure Titanium at Room and Cryogenic Temperature, Metall. Mater. Trans. A. (2020). Ranking (Q1), Impact factor (2.8)
DOI: https://doi.org/10.1007/s11661-020-05979-8

Manuscript under review and preparation:

1. **V.K. Sahu**, P. Chakraborty, N. P. Gurao, Micro-mechanism of damage evolution in commercially pure titanium: an in-situ study with CPFEM simulations, Submitted in Metall. Mater. Trans. A (E-ORIG-24-1111-A), Under review.
2. **V.K. Sahu**, R. Biswal, B. Karnasiewicz, D. Hu, AE Davis, P Prangnell, Auto prior β-grain refinement in wire-arc additively manufactured commercially pure titanium, under preparation for Acta Materialia.

Conference and workshops

1. **Vivek Sahu**, Alec Davis, Eleni Marshall, Phil Prangnell, Pratheek Shanthraj, Prediction of α-lath coarsening and the formation of HAZ bands in WAAM Ti-6Al-4V using a modified KWN model, Poster presentation, **The 15th World Conference on Titanium**, 12-16 June, Edinburgh, UK (2023).
2. **V. K. Sahu**, Anisotropy of J-integral Value and Damage Evolution in Commercially pure Titanium, Invited presentation, **SPARC workshop**, 29-31 March, IIT Roorkee & IIT Kanpur, India (2023).
3. **V. K. Sahu,** N. P. Gurao, Role of Multivariant Twinning on J-integral Value in Commercially Pure Titanium, Poster presentation, **ICSMA'19**, 26 June – 1 July, Metz, France (2022).
4. **V. K. Sahu,** N. P. Gurao, Micro-mechanisms of Anisotropic Deformation in the Presence of Notch in Commercially Pure Titanium: an In situ Study with CPFEM, Oral presentation, **ICSMA'19**, 26 June – 1 July, Metz, France (2022).
5. **V. K. Sahu** and N P Gurao, Damage Mechanisms and Fracture Toughness of Conventional and Additive Manufactured Ti6Al4V Alloy with Different Microstructures, Oral presentation, **EUROMAT 2021**, Virtual conference, 13-17 September 2021.
6. **V. K. Sahu** and N P Gurao, Micro-mechanism of Damage Evolution in Commercially Pure Titanium: an In-situ Study; **In-situ Electron Microscopy 2021**, IIT Kanpur, India, July 8-9, 2021.
7. **V. K. Sahu** and N. P. Gurao, Effect of Crystallographic Texture and Stress Triaxiality on Micro-mechanisms of Deformation in Commercially Pure Titanium, Oral presentation, **ICOTOM'19**(2021), Tokyo, Japan, March 01-04, 2021.
8. **V. K. Sahu** and N. P. Gurao, The Effect of Notch Acuity on Micro-mechanisms of Deformation in Ti6Al4V: an In-situ study; Poster presentation, **ICOTOM'19**(2021), Tokyo, Japan, March 01-04, 2021.

9. **V. K. Sahu** and N. P. Gurao, An In-situ Investigation on the Effect of Notch Acuity on Micro-mechanisms of Deformation in Ti6Al4V; Oral presentation, **Research Scholar Day 2020**, IIT Kanpur.
10. **V. K. Sahu,** V Beura, R Sonkusare, S Sinha and N. P. Gurao, Effect of Initial Texture on Nanocrystalline Omega Phase Formation During Severe Plastic Deformation of CP Titanium; Poster presentation, **ISMANAM 2019**, Chennai, India, July 8-12, 2019.
11. **V. K. Sahu** and N. P. Gurao, Effect of Triaxiality and Texture on Micro-mechanisms of Deformation in Commercially Pure titanium, Poster presentation, **Research Scholar Day 2019**, IIT Kanpur, India, April 6th 2019.
12. **V. K. Sahu** and N. P. Gurao, Change in Micro-mechanisms of Deformation as a Function of Triaxiality and Texture, **Microstructural Engineering 2018-19**, IIT Kanpur, India, March 30-31, 2019.
13. **V. K. Sahu** and N. P. Gurao, Effect of Crystallographic Texture on Fracture Behaviour of Commercial Pure Titanium in the Presence of Stress Triaxiality; Short oral presentation, **NMD-ATM 2017**, Goa, India, November 11-14, 2017.

Mentoring

I guided many lab colleagues and interns in Texture-microstructure-stress Lab, Indian Institute of Technology Kanpur, India and have mentored a MSc students in NEWAM project at the University of Manchester, UK.

References

1. Prof. Philip Prangnell
   Professor
   Materials engineering
   The University of Manchester, UK
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2. Prof. Pritam Chakraborty
   Associate Professor
   Aerospace Engineering
   Indian Institute of Technology Kanpur, India
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3. Prof. Nilesh Prakash Gurao
   Professor
   Materials Science and Engineering
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