

# Shobhit Pratap Singh

Research Associate

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## Research Interests

Deformation mechanisms at high temperature and low stresses, creep under extreme conditions in metals, alloys, composites and ceramic, creep in bending and shear, digital image correlation for strain mapping, dislocation characterization in crystalline systems, diffusion bonding, design of experimental rigs, electron microscopy, severe plastic deformation, crack initiation in fatigue, size effects on mechanical properties

## Education

### Aug 2015-May 2021

Ph.D., Materials Engineering  
Department of Materials Engineering, Indian Institute of Science (IISc)  
Bengaluru, Karnataka, India

### Aug 2013-Jun 2015

Master of Engineering (M.E.), Materials Engineering  
Department of Materials Engineering, Indian Institute of Science  
Bengaluru, Karnataka, India

### Sept 2008-May 2012

Bachelor of Technology (B.Tech.), Metallurgical and Materials Engineering  
Department of Metallurgical and Materials Engineering  
National Institute of Technology Karnataka, Surathkal, India

## Employment and Positions

### Jan 2022-Present

 Department of Earth and Environmental Sciences, The University of Manchester, UK

Position: Postdoctoral Research Associate  
Project: Grain boundary sliding in olivine bicrystals at 1300 °C

### Jan 2022-Present

 Department of Earth, Ocean and Ecological Sciences, University of Liverpool, UK

Position: Visiting Researcher  
Project: Grain boundary sliding in olivine

### May 2021-Dec 2021

 Department of Materials Engineering, Indian Institute of Science, Bengaluru, India

Position: Postdoctoral Researcher  
Project: Uniaxial and bending creep of AlSi10Mg using digital image correlation

### Jan 2020

 INDUS 2 Beamline, Raja Ramanna Centre for Advanced Technology, Indore, India

Position: Visiting Researcher  
Project: Synchrotron imaging of dislocations in LiF single crystals

### Jan 2019-Jul 2019

 Department of Chemical Engineering and Materials Science, University of Southern California, Los Angeles, US

Position: Visiting Research Scholar  
Project: Dislocation imaging in Al single crystals using synchrotron x-ray topography

### Feb 2019, May 2019

 1-BM Beamline, Advanced Photon Source, Argonne National Laboratory, IL, US

Position: Visiting Researcher  
Project: Synchrotron x-ray topography of dislocations in Al single crystals

### Aug 2015-May 2021

 Department of Materials Engineering, Indian Institute of Science, Bengaluru, India

Position: Graduate Student Researcher, Ph.D. Candidate  
Project: Low-stress and high temperature creep in single crystals

## Awards and Recognitions

- 2021** Best metallography image in advanced techniques (Synchrotron imaging) at Indian Institute of Metals 75th Annual Technical Meet, National Metallurgists Day (NMD)
- 2020** Acta Student Award for the best full-length research manuscript
- 2020** Swarna Jayanti Endowment Fund (SJEF) by Indian Institute of Metals, travel assistance for international conference
- 2019** Travel grant from office of international relations, IISc for short term visit to University of Southern California (USC), Los Angeles, US
- 2019** Choong Hoon Cho Chair funds for visit to USC
- 2013-2020** Ministry of Human Resource Development (MHRD), India scholarship
- 2019** Best oral presentation award at 32<sup>nd</sup> Annual Students' Symposium, Dept. of Materials Engineering, IISc
- 2017** Best optical micrograph award at 30<sup>th</sup> Annual Students' Symposium, Dept. of Materials Engineering, IISc
- 2007** 17th rank, Regional Mathematics Olympiad
- 2006** National Talent Search Examination (NTSE) Scholar, India

## Professional and Teaching Activities

- 2021-Present** Member of the American Ceramic Society (ACerS), the Association for Iron and Steel Technology (AIST), the Minerals, Metals & Materials Society (TMS), and the ASM international
- 2018** Convener, 31<sup>st</sup> Annual Students' Symposium, Dept. of Materials Engineering, IISc
- 2017-2020** Laboratory teaching assistant, Mechanical behaviour undergraduate lab
- 2017-2020** Mentoring summer and winter interns, Dept. of Materials Engineering, IISc
- 2017-2019** Safety Coordinator, Thermo-Electro-Mechanical Behaviour of Materials Laboratory, Dept. of Materials Engineering, IISc
- 2016-2020** Mentoring Master of Engineering students, Dept. of Materials Engineering, IISc
- 2016-2018** Annual Student's Symposium organizing committee, Dept. of Materials Engineering, IISc
- 2016** Organizing volunteer, Asian Science Camp (ASC), Bengaluru, India
- 2016** Organizing volunteer, Structural Integrity Conference and Exhibition, Bengaluru, India (SICE-2016)
- 2015-2021** Active involvement in equipment installation and lab maintenance, Thermo-Electro-Mechanical Behaviour of Materials Laboratory, Dept. of Materials Engineering, IISc
- 2015-2019** Institute open day organizing committee, Dept. of Materials Engineering, IISc

## Publications

### Journal Articles ([Google Scholar link](#))

1. **S. P. Singh**, V. Jayaram, D. Srinivasan and P. Kumar, "High Throughput Determination of Creep Behavior of Additively Manufactured AlSi10Mg Alloy", *Additive Manufacturing* 58, 103049 (2022) [[doi](#)]
2. **S. P. Singh**, A. Rijal, T. Straub, J-K. Han, T. Kennerknecht, C. Eberl, M. Kawasaki and P. Kumar, "Effect of High-Pressure Torsion on High Cycle Fatigue of Commercially Pure Cu: Some Insights from Formation of Surface Micro-cracks", *Materials Characterization* 190, 112059 (2022) [[doi](#)]
3. **S. P. Singh**, P. Kumar and M. E. Kassner, "Frustration of the Dislocation Density in NaCl and Its Implication on "Harper-Dorn" Creep", *Materials Science and Engineering: A* 799, 140360 (2021) [[doi](#)]
4. **S. P. Singh**, P. Kumar and M. E. Kassner, The Low-Stress and High-Temperature Creep in LiF Single Crystals: An Explanation for the So-called Harper-Dorn Creep, *Materialia* 13, 100864 (2020) [[doi](#)]
5. **S. P. Singh**, X-R. Huang, P. Kumar and M. E. Kassner, "Assessment of the dislocation density using X-ray topography in Al single crystals annealed for long times near the melting temperature", *Materials Today Communications* 21, 100613 (2019) [[doi](#)]
6. **S. P. Singh**, D. Sonawane and P. Kumar, "Creep of Cu-Bi alloys with high Bi content near and above melting temperature of Bi", *Metallurgical and Materials Transactions: A* 50 (6), 2690-2701 (2019) [[doi](#)]
7. A. Rijal, **S. P. Singh**, J-K. Han, M. Kawasaki and P. Kumar, "Effect of high-pressure torsion on hardness and electrical resistivity of commercially pure Cu", *Advanced Engineering Materials* 22 (1), 1900547 (2019) [[doi](#)]
8. A. Rijal, **S. P. Singh**, J-K. Han, M. Kawasaki and P. Kumar, "Effect of HPT processing followed by long term natural ageing on mechanical and electrical properties of commercially pure Cu", *Letters on Materials* 9 (4s), 561-565 (2019) [[doi](#)]
9. **S. P. Singh**, B.K.D. Barman and P. Kumar, "Cu-Bi alloys with high volume fraction of Bi: A material potentially suitable for thermal surge protection and energy storage", *Materials Science and Engineering: A* 677, 140-152 (2016) [[doi](#)]

10. B. K. D. Barman, **S. P. Singh** and P. Kumar, "Processing and mechanical behavior of Cu-Bi alloys with high volume fraction of Bi: Suitability for high temperature soldering application", *Materials Science and Engineering: A* 666, 339-349 (2016) [[doi](#)]

### **Conference Proceedings**

1. **S. P. Singh** and P. Kumar, "Relationship between Exhaustion of Dislocation Density and Observation of Classical Harper-Dorn Creep in LiF Single Crystals", Conference proceedings, 7th International Conference on Creep, Fatigue and Creep-Fatigue Interaction (CF-7), (2016) 213

### **Conference Presentations**<sup>\*speaker in bold</sup>

1. S. P. Singh, M. E. Kassner and **P. Kumar**, "Dislocation Creep at Low Stresses and High Temperature: Harper-Dorn Creep Revisited", International Conference on Strength of Materials (ICSMA 19th), June 2022 Metz, France.
2. **S. P. Singh**, M. E. Kassner and P. Kumar, "Dislocation Creep at Low Stresses and High Temperature: Harper-Dorn Creep Revisited", TMS 2022 Annual Meeting and Exhibition, 14th March 2021 (Acta Student Award Presentation)
3. **S. P. Singh**, V. Jayaram, D. Srinivasan and P. Kumar, "Creep Behaviour of LPBF AlSi10Mg Alloys – Uniaxial (Tensile) vs Meso scale (Bending)", ASTM International Conference on Additive Manufacturing, November 1-5, 2021, Anaheim, CA
4. **S. P. Singh**, V. Jayaram, D. Srinivasan and P. Kumar, "Correlation Between Bending and Uniaxial Creep in Additively Manufactured AlSi10Mg Alloy", Indian Institute of Metals National Metallurgists Day 75th Annual Technical Meeting, India, November 2021
5. **S. P. Singh**, M. E. Kassner and P. Kumar, "Evaluation of Harper-Dorn Creep in LiF Single Crystals", 15th International Conference on Creep and Fracture of Engineering Materials and Structures (CREEP-2021), Germany, June 2021
6. **S. P. Singh**, M. E. Kassner and P. Kumar, "Dislocation Creep at Low Stresses and High Temperature: Harper-Dorn Creep Revisited", TMS 2021 Annual Meeting and Exhibition, 17th March 2021
7. S. P. Singh, M. E. Kassner and **P. Kumar**, "New Insights into Creep in the So-Called Harper-Dorn Creep Regime", Structural Integrity Conference (SICE 2020) of Indian Structural Integrity Society, IIT Bombay, December 2020 (India)
8. A. Rijal, S. P. Singh, J-K. Han, M. Kawasaki and **P. Kumar**, "Effect of High-Pressure Torsion on Mechanical and Electrical Behavior of Commercially Pure Cu", Ultrafine-grained and Heterostructured Materials (UFGH XI), TMS 2020, San Diego, 23-27 February 2020
9. **S. P. Singh**, M. E. Kassner and P. Kumar, "Harper-Dorn Creep", Conference on High Temperature Structural Materials, Indian Institute of Science, Bangalore, India, February 2020
10. A. Rijal, S. P. Singh, J-K. Han, M. Kawasaki and **P. Kumar**, "Effect of High Pressure Torsion on Hardness and Electrical Resistivity of Commercially Pure Cu", 6th Bulk Nano-Materials (BNM: 2019), Ufa, Russia 25-27 September 2019
11. **S. P. Singh**, D. Sonawane and P. Kumar, "Swelling of Cu-Bi Two-Phase Alloy Under Compression Creep Above The Melting Temperature of Bi", Indian Institute of Metals 55th National Metallurgists Day 71st Annual Technical Meeting, Goa, India, November 2017
12. **S. P. Singh**, M. E. Kassner and P. Kumar, "Harper-Dorn Creep in Lithium Fluoride Single Crystals", 14th International Conference on Creep and Fracture of Engineering Materials and Structures (CREEP-2017), St. Petersburg, Russia, June 2017
13. **S. P. Singh** and P. Kumar, "Effect of Liquefaction of Low-Melting Bi Phase on the Creep Behavior of Cu-Bi Two Phase Alloy", 14th International Conference on Creep and Fracture of Engineering Materials and Structures (CREEP-2017), St. Petersburg, Russia, June 2017
14. **S. P. Singh** and P. Kumar, "Mystery of Harper-Dorn Creep in High Purity LiF Single Crystals", First Structural Integrity Conference and Exhibition, Le Meridien, Bangalore, India (SICE-2016), July 2016
15. **S. P. Singh** and P. Kumar, "Relationship between Exhaustion of Dislocation Density and Observation of Classical Harper Dorn Creep in LiF Single Crystals", 7th International Conference on Creep, Fatigue and Creep-Fatigue Interaction, IGCAR Kalpakkam, India, January 2016
16. **S. P. Singh**, B. K. D. Barman and P. Kumar, "Mechanical Behavior of a Cu-Bi Alloy above and below Melting Temperature of Bi", Indian Institute of Metals 53rd National Metallurgists Day 69th Annual Technical Meeting, Coimbatore, India, November 2015