

Dr. Alok Kumar Singh

PhD, IIT Kharagpur

Assistant Professor on Contract

Materials and Metallurgical Engineering

National Institute of Advanced Manufacturing Technology

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Google Scholar: <https://scholar.google.co.in/citations?user=BhnW7eMAAAAJ&hl=en>

Research Gate: <https://www.researchgate.net/profile/Alok-Singh-48>



Research Interests Microstructure-Crystallographic Texture-Mechanical Property Correlation, Deformation Behaviour, Recrystallization and Phase Transformations, Thermomechanical Controlled Processing, Severe Plastic Deformation, Sheet Metal Formability, Electrochemical Corrosion, Hydrogen Embrittlement, Dual-Phase Steels, Pipeline Steels, and Ti-Alloys.

Research Experience

- **PDF Fellow: (Mechanical Engineering)** [June 2024-Dec 2025]
University of Saskatchewan-Saskatoon-Canada-S7N5A9
Topic: “Texture engineered high toughness pipeline steel for arctic environment”
Supervisor: Prof. Jerzy A Szpunar (Research Tier I Professor, Mechanical Engineering, University of Saskatchewan)

Education

- **Ph.D. : (Metallurgical and Materials Engineering)** [June 2016- Dec 2023]
Indian Institute of Technology-Kharagpur, West Bengal
Topic: “Microstructure and Texture engineering of a low carbon microalloyed dual-phase steel sheet to optimize strength, ductility, and formability”
Supervisor: Dr. Somjeet Biswas (Associate Professor, IIT Kharagpur) and Dr. Basudev Bhattacharya (Principal Scientist, R&D, Tata Steel Ltd. India)
- **M. Tech. (Metallurgical and Materials Engineering)** [June 2014- May 2016]
Indian Institute of Technology-Kharagpur, India, CGPA 8.67/10.
Topic: “Effect of initial texture on the evolution of microstructure and texture during forging of interstitial free steels”
Supervisor: Dr. Somjeet Biswas (Associate Professor)
- **B. Tech. (Metallurgical and Materials Engineering)** [2009-2013]
National Institute of Technology-Jamshedpur, India, CGPA 8.23/10.
- **HSC:** Jharkhand Academic Council, Jharkhand India: 79.8%
- **SSC:** Central Board of Secondary Education, India: 93%

Research Experience

- University of Saskatchewan, Saskatoon, Canada
PDF Fellow, Mechanical Engineering
Topic: “Texture engineered high toughness pipeline steel for arctic environment.” (Financial Grant EVRAZ, North America)
[June 2024-Dec 2025]
Supervisor: Prof. Jerzy A. Szpunar
- Indian Institute of Technology Kharagpur, West Bengal
Light Metals and Alloys Research Lab in Department of Metallurgical and Materials Engineering
[Sept 2018 – Sept 2022]
Topic: “Understanding the evolution of crystallographic texture and how to improve the forming

property in cold rolled dual phase steels” (Financial Grant: Tata Steel)

Supervisor: Prof. Somjeet Biswas (Associate Professor, IIT Kharagpur) and Dr. Basudev Bhattacharya (Principal Scientist, R&D, Tata Steel Ltd. India)

- University of Saskatchewan, Saskatoon, Canada
Mechanical Engineering

Visiting Research Student [14th May 2018 – 14th Aug 2018]

Topic: “Role of crystallographic texture in manufacturing of line pipe steel” (Financial Grant: NSERC-Texture in Manufacturing Pipeline Steel)

Supervisor: Prof. Jerzy A. Szpunar

Software Skills

- Data Analysis Software, Simulation Designing Softwares, Origin, X’Pert High Score Plus (X-Ray line profile analysis), Image-J (Optical, SEM and TEM Image analysis), JTex (Texture Analysis), ATEX (Microstructure and Texture analysis), TSL-OIM (Microstructure and Micro-Texture analysis), HKL-Oxford instruments, MTEX, VPSC (Deformation Simulation and Mechanical Property prediction), Visio, GATAN, GIMP, Gamry and Statistical Analysis Softwares using ML algorithms.

Research Publications:

Patent Grants:

1. **A. K. Singh**, S. Biswas, B. Bhattacharya, D. K. Chouhan, Method of manufacturing cold rolled low carbon micro-alloyed steel having high strength, ductility, and formability, Indian Patent No: 567417 (2025).
2. **A. K. Singh**, S. Biswas, B. Bhattacharya, D. K. Chouhan, Low carbon micro-alloyed steel having good ductility, strength and isotropy combination and method of manufacturing thereof, Indian Patent Number 540804 (2024)
3. S. Biswas, D. K. Chouhan, **A. K. Singh**, A. J. Shukla, System and method to produce nanostructure titanium with high strength and ductility combination by adapting ambient temperature multiaxial-plane-strain forging, Indian Patent Number 537024 (2024).

Patent Applications:

1. **A. K. Singh**, S. Biswas, B. Bhattacharya, D. K. Chouhan, M. Dutta, Cold Rolled Low Carbon Microalloyed Steel and Method of Manufacturing Thereof., International Patent Application No: PCT/IB2023/050288, June, 2023.
2. **A. K. Singh**, S. Biswas, B. Bhattacharya, D. K. Chouhan, M. Dutta, Cold Rolled Low Carbon Microalloyed Steel and Method of Manufacturing Thereof, Tata Steel- India, Indian Patent Application no 202231002137, Dated Jan. 13, 2022.

Journals:

1. S. Yadav, J. F. A. Cabezas, **A. K. Singh**, R. K. Z. Dawani, J. Szpunar, Role of microstructure, crystallographic texture and different acidic environments on the electrochemical corrosion of X70 pipeline steels, *J. of Materials Engineering and Performance* (2025) 1-16, <https://doi.org/10.1007/s11665-025-12168-4>
2. T. A. Jack, D. Sidhik, **A. K. Singh**, Fateh Fazeli, Jerzy Szpunar, Influence of Microstructure on Hydrogen Uptake and Desorption in Pipeline Steels: Gaseous vs Electrochemical Charging. *Metall Mater Trans A* (2025) 1-18, <https://doi.org/10.1007/s11661-025-07968-1>.
3. E. Entezari, **A. K. Singh**, H. Mousavi, J. L. G. Velazquez, J. Szpunar, A cost-effective model for synergistic effects of microstructure and crystallographic texture on hydrogen-induced crack growth and corrosion rates in pipeline steels, *Mater. Char.* 223 (2025) 114917.
4. **A. K. Singh**, B. Bhattacharya, S. Biswas, High strength, ductility and sheet formability by normalizing & quenching of low carbon microalloyed dual-phase steel, *Materials Science and Engineering A* 890 (2024) 145848
5. **A. K. Singh**, B. Bhattacharya, D. K. Chouhan, B. Syed, S. Biswas, The Synergy between texture evolution and grain refinement in a BCC steel, *Philosophical Magazine*, 104 (2024) 273-299.
6. **A. K. Singh**, D. K. Chouhan, B. Bhattacharya, S. Biswas, High strength-ductility combination by quenching and partitioning of a low carbon micro-alloyed dual-phase steel, *Materials Science and Engineering A* 870 (2023) 144854.

7. **A. K. Singh**, B. Bhattacharya, S. Biswas, Simultaneous improvement in strength and ductility in low carbon steel via intercritical annealing and quenching treatments, *Materials Today: Proceedings* 44 (2021) 2909-2913.
8. **A. K. Singh**, B. Bhattacharya, S. Biswas, Improving Ductility in Dual-Phase Steel by Cold Rolling and Intercritical Annealing, *IOP Conference Series: Materials Science and Engineering* 1121 (2021) 1121, 012025.
9. D. K. Chouhan, **A. K. Singh**, S. Biswas, C. Mondal, On the Strain-Hardening Behavior and Twin-Induced Grain Refinement of CP-Ti Under Ambient Temperature Compression, *Metallurgical and Materials Transactions A* 50 (2019) 2169-2188.
10. D. K. Chouhan, S. Biswas, **A. K. Singh**, A. J. Shukla, High tensile strength-ductility combination in cold multiaxial plane-strain forged and rolled nanostructured Titanium, *Materialia* 11 (2020) 100698.

Book Chapters:

11. S. Biswas, S. Samanta, **A. K. Singh**, B. Bhattacharya, S. B. Singh, An Overview on the Texture Evolution of Cold Rolled IF Steels and Zn Coating During Galvanizing and Galvannealing, *Reference Module in Materials Science and Materials Engineering*, Elsevier (2019) <https://doi.org/10.1016/B978-0-12-803581-8.11526-7>.
12. S. Biswas, S. Das, S. Bhattacharya, **A. K. Singh**, On the texture and electronic properties of Cu thin-film interconnects, *Reference Module in Materials Science and Materials Engineering*, Elsevier (2019) <https://doi.org/10.1016/B978-0-12-803581-8.11581-4>.

Active Reviewer in: *Materials Science and Engineering A*, *Metallurgical and Materials Transactions A*, *Advances in Manufacturing*, and *International Journal of Plasticity*.

Conferences/Course/Workshops Attended:

- **Oral Presentation in international conference “ICOTOM¹⁹ (2021)” OSAKA University, Japan** [1st -4th March 2021]
Title: “Improving Ductility in Dual-Phase Steel by Cold Rolling and Intercritical Annealing”.
- **Oral Presentation in international conference Material TECH 2021-NIT Raipur, India** [9th-10th Jan 2021]
Title: “Simultaneous improvement in strength and ductility in low carbon steel via intercritical annealing and quenching treatments”.
- **Oral Presentation in international conference “ICFM 2020” Material Science Centre-IIT Kharagpur** [6th-8th Jan 2020]
Title: “Enhancing ductility of economic grade dual-phase steel by hot rolling and heat treatment”.
- **Oral Presentation in international conference in “ICAMMP 2016” Dept. of Metallurgical and Materials Engineering, IIT Kharagpur** [5th – 7th Nov 2016]
Title: “Microstructure and Texture evolution during compression of IF steel”
- **Teaching Assistant in NPTEL course:** Texture in Materials - 35 hrs in 2021 – Link: <https://nptel.ac.in/courses/113/105/113105103/>
- **GIAN Course- IIT Kharagpur** [4th-12th Dec 2017]
Title: Crystallography Texture & Crystal Plasticity Modeling
Faculty: Prof. Laszlo Toth (University of Lorraine) & Prof. Somjeet Biswas (IIT Kharagpur)
- **SGRIP workshop-IIT Kharagpur** [4.10.2016-15.11.2016]
Title: ‘Structure & Properties of Polycrystalline Materials’
Faculty: Prof. Jerzy A. Szipunar, Canada Research Chair (T1), University of Saskatchewan
- **SGRIP workshop-IIT Kharagpur** [2.10.2016-23.10.2016]
Title: ‘Crystal Plasticity Modeling’
Faculty: Prof. Laszlo Toth, Director, LabEx–DAMAS, Metz, France

Research Tools/Skills

- Optical microscopy imaging, SEM Imaging and EBSD, X-ray Diffraction, X-Ray Texture Measurement, Severe Plastic Deformation Processes, Mechanical Testing (ASTM E8/E9), Crystal Plasticity Simulations (Viscoplastic self-consistent modeling /VPSC), Plastic Strain Ratios measurements experimental (ASTM E517) and through VPSC

modeling, Analytical calculation approach for determining biaxial stress and biaxial strain locus, Metallographic sample preparations for advanced electron microscopy techniques and analysis such as SEM-EBSD and TEM, Electrochemical Corrosion Test, Hydrogen Permeation Test.