

**Name**  
**Dr. Joydip Joardar**

**Designation**  
Scientist-F

**Qualification**  
B.E. (Metallurgical Engineering)  
NIT-Durgapur  
M.Tech. and Ph.D. (Metallurgical & Materials Engineering)  
IIT-Kharagpur

**Experience**  
BK21 Research Fellow,  
Department of Materials Engineering,  
Seoul National University, South Korea;  
Rhone-Alpes Fellow & Maître-Assistant Associé/Guest  
Scientist, Ecole Nationale Supérieure des Mines, France



### **Current Research Interest and Expertise**

- **Nanomaterials:** 2D-materials: transition metal sulphides, MAX/MXene; Metal/ Intermetallic (Aluminides/Ceramic-composites).
- **Rare Earths:** Metal Extraction, application development (Material designing).
- **Powder Metallurgy:** Powder processing and sintering, composites.
- **Advanced Material Characterization by X-ray diffraction** (2D-XRD, Microfocus XRD, Rietveld analysis, Stress analysis, etc.).

### **Recent Major Projects**

- Development of nanostructured transition metal sulfides (2017-2019); (**as Project Leader**); Sponsor: Hindustan Petroleum Corporation Ltd (HPCL) Project value (in Rs): ~1 Cr (USD 125K)
- Characterization of black shales of Mengampeta bayrite mines (2019-2020) **as Co-Principal Investigator** (with Dr. P.K. Jain (PI); Sponsor: AP Mineral Development Corporation (APMDC); Project value (in Rs): ~64 lacs (USD 87K)
- Estimation of retained austenite in maraging steel for space application (2020-2022) (**as Principal Investigator**): Supported by MIDHANI PO value (in Rs): ~50 lacs (USD 68K)

### **List of papers published (selected 10 in past 10 years)**

1. Anirudha Karati, Simanta Lahkar, Xinshu Zou, Ramakrishna Sahoo, Harish Kumar Adigilli, Neha Y. Hebalkar, K. Madhav Reddy, J. Joardar  
Cu-Mo-S mixed chalcogenide nanostructures for pseudocapacitive applications”  
**ACS Applied Nanomaterials 5 (2022) 10203-10212.**
2. A. Harish Kumar, K. Murugan, P.V.V. Srinivas, D. Nazeer Basha, A. Karati, A.K. Pandey, J. Joardar  
“Spark plasma sintering behavior and structural stability of 2D-WS<sub>2</sub> nanosheets”  
**Ceramics International 48 (2022) 25151-25158.**
3. Harish Kumar Adigilli, K. Madhav Reddy, Yixuan Hu, Rajamallu Karre, P.V.V. Srinivas, K. Guruvidyathri, Anirudha karati, P. Suresh babu, A.K. Pandey, J. Joardar  
“The first report on formation of Al-W-Cu grain boundary phase and its influence on mechanical behavior of 2D-WS<sub>2</sub> reinforced Al-4Cu alloy matrix composites”  
**Journal of Alloys and Compounds 883 (2021) 160792 (1-12).**
4. A. Harish Kumar, A.K. Pandey, J. Joardar  
“2D-Nanolayered Tungsten and Molybdenum Disulfide: Structure, properties, synthesis and processing for strategic applications”  
“**Handbook on Advanced Ceramics and Composites for Defense, Security, Aerospace and Energy Applications**” (Eds. Y.R. Mahajan and Roy Johnson), **Springer-Nature (2020).**

5. S.S. Sravanthi, S. Ghosh Acharyya, K.V.P. Prabhakar, J. Joardar  
"Effect of varying weld speed on corrosion resistance and mechanical behavior of Aluminium-Steel welds fabricated by cold metal transfer technique"  
**Materials and Manufacturing Processes, (2019) DOI: 10.1080/10426914.2019.1605180.**
6. G. Mettela, N. Mammen, J. Joardar, S. Narasimhan, G.U. Kulkarni  
"Non-FCC rich Au crystallites exhibiting unusual catalytic activity"  
**Nano Research, 10 (2017) 2271-2279.**
7. K. Murugan, J. Joardar, A.S. Gandhi, B.S. Murty, P.H. Borse,  
"Photo induced monomer/dimer kinetics in methylene blue degradation over doped and phase-controlled nano-TiO<sub>2</sub> films"  
**RSC Advances 6 (2016) 43563-43573.**
8. R. Kumar, J. Joardar, R.K. Singh Raman, V.S. Raja, S.V. Joshi, S. Parida  
"Effect of chromium and aluminum addition on anisotropic and microstructural characteristics of ball milled nanocrystalline iron"  
**Journal of Alloys and Compounds 671 (2016) 164-169.**
9. M.S. Archana, V.V.S.S. Srikanth, S.V. Joshi, J. Joardar  
Influence of applied pressure during field-assisted sintering of Ti(C,N)-WC-FeAl based nanocomposite  
**Ceramics International, 41 (2015) 1986-1993.**
10. M.S. Archana, R.C. Gundakaram, Y.S. Rao, V.V.S.S. Srikanth, S.V. Joshi, J. Joardar  
"Rapid consolidation of FeAl-Fe<sub>3</sub>AlC<sub>x</sub> ultrafine composites by mechanically activated field-assisted technique"  
**Materials Science and Engineering A, 611 (2014) 298-305.**

#### Book

1. **Notes on Thermodynamics of Materials**  
Joydip Joardar, Shrikant Lele and Palle Rama Rao (2016)  
ISBN: 978-93-52583-03-4; TRA-ERF Publication
2. **Materials, Materials Science and Engineering (Volume 1):  
Basics that led to Breakthroughs**  
Joydip Joardar and Palle Rama Rao (2023) (under preparation)
3. **Materials, Materials Science and Engineering (Volume 2):  
Breakthroughs to Innovations**  
Joydip Joardar and Palle Rama Rao (2023) (under preparation)

#### Patent

1. "A novel method for synthesis of tungsten disulfide nanosheets,"  
J. Joardar and M.S. Sylvester  
**Indian Patent No. 320309 (2019).**
2. "A low-cost method for bulk production of two-dimensional transition metal sulfides"  
J. Joardar and Anirudha Karati  
**Indian Patent Application (under preparation) (2023)**
3. "A high-temperature and pressure reactor design for reaction synthesis under corrosive environment"  
J. Joardar, P.V. Srinivas and A. Harish Kumar  
**Indian Patent Application (under preparation) (2023)**

#### Conference/Workshop Presentations (Selected 10 in last 10 years)

1. Joydip Joardar  
"Development of 2-Dimensional Tungsten-disulfide Reinforced Al-Cu Alloy based Self-lubricating Composites"  
**Invited Talk at International Conference on Powder Metallurgy and Particulate Materials (PMAI-PM23), March 13-15, 2023, Mumbai.**

2. A. Harish Kumar, K. Madhav Reddy, B. Bolla Reddy, P. Suresh Babu, Anirudha Karati, A.K. Pandey, Joydip Joardar  
"Microstructural Studies on Nanostructured 2-Dimensional Tungsten disulfide reinforced Al-Cu Alloy Matrix Composites"  
**76th Annual Technical Meeting (ATM-2022), November 14-17, 2022, Hyderabad.**
3. A. Harish Kumar, K. Madhav Reddy, P. Sai Karthik, B. Akhil Nayak, Anirudha Karati, A.K. Pandey, Joydip Joardar  
"Development of Next Generation Self-lubricating MMCs with 2D reinforcements"  
**Invited Talk at International Conference on Powder Metallurgy (PMAI-PM22), April 18-20, 2022, Pune (Virtual)**
4. A. Harish Kumar, R. Prathyusha, G. Sai Spandana, B. Padya, V.S.K. Chakravadhanula, A.K. Pandey, J. Joardar  
"Nano structured 2D-Tungsten disulfide based composite"  
**5th International Conference on Powder Metallurgy in Asia (APMA 2019) (February 19-21, 2019) Pune, India**
5. J. Joardar  
**Invited lecture** on "Two-dimensional X-ray diffraction: Basics and case studies"  
**Workshop on Diffraction and Microscopy (WDM 2018), VNIT-Nagpur (August 25-29, 2018) Nagpur, India**
6. A. Harish Kumar, A.K. Pandey, J. Joardar  
"Synthesis and oxidation resistance of nanostructured 2D-WS<sub>2</sub>"  
**24th Congress and General Assembly of the International Union of Crystallography (IUCr)(August 21-28, 2017), Hyderabad, India**
7. G.S. Spandana, J. Joardar  
"Development of 2D-nanolayered WS<sub>2</sub> reinforced aluminium nanocomposites"  
**3rd International Conference on Recent Challenges in Engineering and Technology (ICRCET-17) (September 12-13, 2017), Tirupati, India.**
8. J. Joardar  
"2D-Inorganic Materials"  
**Invited Lecture at GMR-IT (October 25, 2017), Rajam (AP), India.**
9. T. Puneeth, A. Harish Kumar, M.S. Sylvester, J. Joardar  
"Synthesis of 2D-nanolayered WS<sub>2</sub> and MoS<sub>2</sub>"  
**Invited Lecture at Prof. S.K. Pabi Symposium, 4th International Conference on Advances in Materials and Materials Processing (ICAMMP-IV), IIT-Kharagpur (November 5-7, 2016) Kharagpur, India.**
10. J. Joardar  
"Rietveld method in quantitative XRD"  
**Invited Lecture at ATMC-2016 Workshop, NIT-Raipur (January 22-23, 2016) Raipur, India.**

#### **Affiliation to Professional bodies**

- Member, The Minerals, Metals and Materials Society (TMS), USA
- Member, American Ceramics Society (ACerS), USA
- Life Member, Indian Institute of Metals (IIM)
- Life Member, Materials Research Society of India (MRSI)
- Life Member, Indian Crystallographic Association (ICA)
- Life Member, Powder Metallurgy Association of India (PMAI)
- Life Member, Tribology Society of India (TSI)

#### **Honors and peer-recognition**

- **Session Co-Chairman**, Session: Press and Sinter, at PMAI-PM23 International Conference on Powder Metallurgy and Particulate Materials, March 13-15, 2023, Mumbai.
- **Member, International Advisory Committee**, 2nd International Conference on Technologies, Properties and Applications of Rare Metals and Related Materials (RAREMET-2022), November 23-25, 2022 Moscow, Russia.

- **Member, Governing Council**, Powder Metallurgy Association of India (PMAI) 2022-2024.
- **Session Chairman**, Session: Development of Materials and Alloys for Emerging Applications-2, at PMAI-PM22 International Conference on Powder Metallurgy, April 18-20, 2022, Pune.
- **Invited Foreign Expert Reviewer** for European OPUS Project (2017).
- **Best paper award** at 3<sup>rd</sup> International Conference on Recent Challenges in Engineering and Technology (ICRCET-17) (Sept 12-13, 2017) Tirupati, India.
- **Reviewer for several SCI Journals** (*Philosophical Magazine and Philosophical Magazine Letters, Wear, Journal of Alloys and Compounds, Powder Technology, Ceramics International, Metallurgical and Materials Transaction A & B, Surface and Coatings Technology, Materials Chemistry and Physics, Journal of Materials Processing Technology, Journal of Nanoparticle Research, Chemical Engineering Journal, Transaction of Indian Institute of Metals, Metals and Materials International*)
- **Invited to conduct a Workshop on Rietveld refinement at Department of Metallurgical and Materials Engineering, IIT-Madras (May 26-28, 2011).**
- **Recognized as "Best Reviewer" in 2011 by Journal of Materials Processing Technology(Elsevier Journal).**
- **Recognized as PhD guide (external) in Metallurgical Engineering by Andhra University.**
- **Received 'Rhône-Alpes' Fellowship from Région Rhône-Alpes Fédération, France (2003).**
- **Received 'Brain Korea (BK21)' Fellowship from the Ministry of Education, South Korea (2000-2002, 2005-2006).**

#### **Research Thesis Guided: 02 (+1 Ongoing)**

1. M.S. Archana, **Development of Ti(C,N)-metal/intermetallic based nanocomposites** (University of Hyderabad, Hyderabad) (2015).
2. A. Harish Kumar, **Development of 2D-WS<sub>2</sub> Reinforced Al-4Cu Alloy Matrix Composites** (National Institute of Technology, Warangal) (2021).

#### **Contact information**

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