

Professor Krishanu Biswas

Ranjit Singh Chair Professor

Department of Materials Science and Engineering

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Professional Experience

- I. Professor, Department of Materials Science & Engineering, Indian Institute of Technology, Kanpur, Uttar Pradesh, India, 2016 – present.
 - II. Associate Professor, Department of Materials Science & Engineering, Indian Institute of Technology, Kanpur, Uttar Pradesh, India, 2012 – 2016.
 - III. Assistant Professor, Department of Materials Science & Engineering, Indian Institute of Technology, Kanpur, Uttar Pradesh, India, 2008 – 2012.
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Academic Qualification

- I. Postdoctoral fellowship by the Japan Society for the Promotion of Sciences (JSPS), 2006-2007.
 - II. Ph.D., Metallurgical Engineering, Indian Institute of Science (IISc), Bangalore, India, 2006.
 - III. MTech., Metallurgical Engineering, Indian Institute of Science (IISc), Bangalore, India, 2001.
 - IV. B.Tech., Metallurgical Engineering, National Institute of Technology Durgapur, West Bengal, India, 1997
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Awards/ Recognition/ Achievements

1. **Member**, Indian National Young Academy of Science (under aegis of INSA) 2016-21
 2. **Key Reader**, Materials and Metallurgical Transactions A, 2015 onward
 3. **J S Bindra Faculty Research Fellow** from IIT Kanpur, 2015-2018
 4. **DAAD Fellowship** to visit RWTH, Aachen and DLR, Cologne, Germany, 2013
 5. **BOYSCAST fellowship** by Dept of Science and Technology, Govt. of India, 2011
 6. **Young Engineer Award** by IET, 2011
 7. **Young Scientist Medal** by Indian National Science Academy (INSA), 2010
 8. **Young Metallurgist of the Year**, Ministry of Steel, Government of India, 2008
 9. Recipient of The Shri Ram Arora Award for Materials Science & Eng., by TMS, USA, 2006
 10. Best student speaker in the International Conference on Solidification Science and Processing (ICSSP) held at Bangalore, India, November 2004
 11. Second best poster prize in International Conference on Advances in Surface Treatment: Research and Application, held at Hyderabad, India, November 2003.
 12. Obtained Indian Institute of Metals (IIM) Student Prize for securing highest marks in Master's degree, 2001
 13. Obtained Certificates from the Indian Institute of Metal for securing highest marks 3rd, 4th and 5th, 6th, 7th and 8th semesters in Bachelor's degree
 14. Obtained highest marks in thesis work in Bachelor Degree of Engineering, 1997
 15. Gold Medal in Bachelor Degree of Engineering, 1997
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Major research area: Nanostructured materials, Energy materials, Size effect of ionic nanoparticles, Solidification of multicomponent alloys, Graphene-metal hybrid and high-entropy materials.

Research Publications: 252 (for details, see <https://home.iitk.ac.in/~kbiswas/index.html>)

Patent: 4 Books: 3 Book chapters: 6 citations: 6878 h-index: 47 i10-index: 147

Number of students supervised/guided:

Ph.D.s : 16 completed (+10 ongoing) M.Tech. + dual degree: 43 completed (+3 ongoing)

Teaching: UG + PG courses for 16 years

No. of courses taught (UG + PG): 18

No. of new courses introduced: 6

(Solidification Processing; Atom Probe Tomography: Theory & Applications; Artificial Intelligence and Machine Learning for Materials; Engineering Nanomaterials and their Properties; Materials Informatics (In process). Several massive open online courses (MOOC) have been developed and taught successfully.

Sponsored/Funded Projects undertaken/ currently being supervised as Principal Investigator

1. Third-generation super omniphobic foul-release marine coating for waterborne vehicles, DRDO, 480.08 Lakhs (**Ongoing**)
2. Characterization of materials, MHRD, 12 Lakh (**Ongoing**)
3. Permanent magnetic materials for BLDC motors and their characteristics benchmarking and manufacturing/recycling process, ALPHAS, 13 Lakh (**Ongoing**)
4. Preparation of new magnets from Eol magnets, ALPHAS, 15 Lakh (**Ongoing**)
5. Multi-component (high-entropy) diborides and carbides for ultra-high-temperature applications, SERB, 64.61 Lakh (Completed in 2024)
6. Novel TiO₂-N/S- nanofiber decorated carbon bead: efficient versatile UV and Visible light photocatalyst for target pollutants, DST, 29.92 Lakh (Completed in 2023)
7. Investigation on the fundamental properties of TiZr-based high entropy alloys, SERB, 85.50 Lakh (completed in 2020)
8. Nanoparticle and nanocomposite magnetic materials, minerals and metallurgy, DST, 40 Lakh (Completed in 2020)

For a complete list of completed projects, see <https://home.iitk.ac.in/~kbiswas/completed.html>

List of selective publications (last five years)

1. Pankaj Srivastava, Syed Nasimul Alam, Akka Ghosh, Ventrapragada Bramaramba, Nityananda Sahoo, Wenbin Zhou and [Krishanu Biswas](#), Enhanced physical and mechanical properties of Cu-based nanocomposites with bundled multi-layered carbon nanotubes incorporation: fabrication and comparative analysis via conventional sintering and SPS techniques, **Advanced Composite Materials**, 34, 388–408, 2025.
2. Sumit Kumar, Anyesha Chakraborty, Juan Rafael Gomez Quispe, Rahul Mitra, Suraj Barala, Pedro Alves Da Silva Autreto, Chandra Sekhar Tiwary, [Krishanu Biswas](#), and Mahesh Kumar, AlMnPdPtAu Quasicrystal Modulated Carbon Nanotubes for H₂ Sensors: Experimental and DFT Computational Analysis, **ACS Appl. Mater. Interfaces**, 17, 21670–21681, 2025.
3. Saumya Jha, N.P. Gurao, [Krishanu Biswas](#), Micro-mechanisms of shear deformation during high-pressure torsion of equiatomic FeMnNi medium entropy alloy, **Journal of Materials Science**, 60, 6688–6714, 2025.
4. Sumit Kumar, Anyesha Chakraborty, Juan Rafael Gomez Quispe, Rahul Mitra, Suraj Barala, Pedro Alves Da Silva Autreto, Chandra Sekhar Tiwary, [Krishanu Biswas](#), Mahesh Kumar, AlMnPdPtAu Quasicrystal Modulated Carbon Nanotubes for H₂ Sensors: Experimental and DFT Computational Analysis, **ACS Applied Materials & Interfaces**, 17, 20487-22122, 2025.

5. Swati Mahato, Tirupati Dhidhi, Nilesh P Gurao, [Krishanu Biswas](#), Effect of minor addition of silicon on deformation behaviour and texture evolution in CrFeNi medium entropy alloy, **Journal of Alloys and Metallurgical Systems**, 8, 100133, 2024.
6. Suresh Chand, Shahriar Reza, [Krishanu Biswas](#), Ravi Mohan Prasad, Khushboo Rakha, Novel Mn and Si alloyed complex phase steel for automotive applications, **Materials Science and Engineering: A**, 916, 147292, 2024.
7. Sonu Kumari, Rahul Mitra, [Krishanu Biswas](#), Aditi Halder, An efficient and robust noble-metal-free self-standing bifunctional water electrolysis catalyst: $\text{Co}_3\text{S}_4@\text{Ex.NiFe-LDH}$ for alkaline water electrolysis, **International Journal of Hydrogen Energy**, 80, 1164-1173, 2024.
8. Sumit Kumar, Mirabbos Hojamberdiev, Anyesha Chakraborty, Rahul Mitra, Rajneesh Chaurasiya, Monika Kwoka, Chandra Sekhar Tiwary, [Krishanu Biswas](#), Mahesh Kumar, Quasicrystal Nanosheet/ α - Fe_2O_3 Heterostructure-Based Low Power NO_2 Sensors: Experimental and DFT Studies, **ACS Applied Materials & Interfaces**, 16, 16687-16698, 2024.
9. María Paula Salinas-Quezada, Jack K Pedersen, Paula Sebastián-Pascual, Ib Chorkendorff, [Krishanu Biswas](#), Jan Rossmeisl, María Escudero-Escribano, Toward understanding CO oxidation on high-entropy alloy electrocatalysts, **EES catalysis**, 2 (4), 941-952 2024.
10. Aditi Halder Ankita Mathur, Sonu Kumari, Arkaj Singh, Rahul Mitra, Ravinder Sharma, [Krishanu Biswas](#), Surface engineering of 2D layered MnO_2 with co-doping of Ni and Fe for rechargeable Zn-air battery, **Journal of Energy Storage, Part B**, 74, 109350, 2023.
11. Shikha Dhakar, Anjali Sharma, Nirmal Kumar Katiyar, Arko Parui, Rakesh Das, Abhishek Kumar Singh, Chandra Sekhar Tiwary, Sudhanshu Sharma, [Krishanu Biswas](#), Utilization of structural high entropy alloy for CO oxidation to CO_2 , **Materials Today Energy**, 37, 101386, 2023.
12. [Krishanu Biswas](#), and Mahesh Kumar Sumit Kumar, Mustaque A. Khan, Shashank Shekhar Mishra, Rajneesh Chaurasiya, Nipun Sharma, Meng Gang, Chandra S. Tiwary, 1T and 2H mixed phase WS_2 nanoflakes decorated with quasicrystal nanosheets for NO_2 sensors, **Journal of Materials Chemistry C**, 11, 15119-15129, 2023.
13. Saurav Goel and [Krishanu Biswas](#), Bidesh Mondal, Xiaolei Zhang, Sumit Kumar, Feng Long, Nirmal Kumar Katiyar, Mahesh Kumar, A resistance-driven H_2 gas sensor: high-entropy alloy nanoparticles decorated 2D MoS_2 , **Nanoscale**, 15, 17097-17104, 2023.
14. [Krishanu Biswas](#), and Aditi Halder Chetna Madan, Saumya R. Jha, Nirmal Kumar Katiyar, Arkaj Singh, Rahul Mitra, Chandra Sekhar Tiwary, Understanding the evolution of catalytically active multi-metal sites in a bifunctional high-entropy alloy electrocatalyst for Zn–air battery application, **Energy Advances**, 2, 2055-2068, 2023.
15. Sudhanshu Sharma, Bhanu Pratap Singh Gangwar, Rahul Mitra, Arko Parui, Pooja Gakhad, Pradeep Kumar Yadav, Abhishek Kumar Singh, Chandra Sekhar Tiwary, [Krishanu Biswas](#), Metal support interaction governs the dry reforming activity in a modified sol-gel prepared CeO_2 supported high entropy CoCuFeMnNi catalyst, **ChemRxiv**, 2023.
16. Deepak Kumar Gorai, Saikat Kumar Kuila, Akash Oraon, Anurag Kumar, Mukesh Suthar, Rahul Mitra, [Krishanu Biswas](#), PK Roy, Md Imteyaz Ahmad, Tarun Kumar Kundu, A facile and green synthesis of Mn and P functionalized graphitic carbon nitride nanosheets for spintronics devices and enhanced photocatalytic performance under visible-light, **Journal of Colloid and Interface Science**, 644, 397-414, 2023.
17. SS Mishra, Sumit Kumar, Partha Kumbhakar, Nirmal Kumar Katiyar, Raphael Tomer, Cristiano F Woellner, Douglas S Galvao, Chandra S Tiwary, Mahesh Kumar, [Krishanu Biswas](#), Utilization of two-

- dimensional multicomponent quasicrystal for NO₂ gas detection, **Materials Chemistry and Physics**, 298, 127449, 2023
18. Sumit Kumar, Rajneesh Chaurasiya, Shashank Shekhar Mishra, Partha Kumbhakar, Gang Meng, Chandra Sekhar Tiwary, [Krishanu Biswas](#), Mahesh Kumar Nanocomposites of Quasicrystal Nanosheets and MoS₂ Nanoflakes for NO₂ Gas Sensors, **ACS Applied Nano Materials**, 6, 5952-5962, 2023
 19. Shashank Shekhar Mishra, Partha Kumbhakar, Subramanian Nellaiappan, Nirmal Kumar Katiyar, Raphael Tromer, Cristiano F Woellner, Douglas S Galvao, Chandra S Tiwary, Chanchal Ghosh, Arup Dasgupta, [Krishanu Biswas](#), Two-Dimensional Multicomponent Quasicrystal as Bifunctional Electrocatalysts for Alkaline Oxygen and Hydrogen Evolution Reactions, **Energy Technology**, 11, 2200860, 2023.
 20. Supriya Koul, Vikas Shivam, Kausik Chattopadhyay, R Manna, [Krishanu Biswas](#), NK Mukhopadhyay, Development of Oxide Dispersed Austenitic Stainless Steel through Mechanical Alloying and Spark Plasma Sintering, **Ceramics International**, 31, 9522-9533, 2022.
 21. Jitesh Kumar, Albert Linda, M Sadhasivam, KG Pradeep, NP Gurao, [Krishanu Biswas](#), The effect of Al addition on solid solution strengthening in CoCrFeMnNi: Experiment and modelling, *Acta Materialia*, 238, 118208, 2022.
 22. Nidhi Sharma, Raushan Kumar, Rahul Mitra, Harry Charalambous, Andrew Chihpin Chuang, [Krishanu Biswas](#), Shikhar Krishn Jha, Novel processing route for design and manufacturing of metal toughened nanoceramics: Al–Al₂O₃ nanocermets, **Ceramics International**, 48, 25168-25182, 2022.
 23. Anurag Bajpai, Jatin Bhatt, NP Gurao, Krishanu Biswas, Accelerated design of multicomponent metallic glasses using machine learning, **Journal of Materials Research**, 37, 2428-2445, 2022.
 24. Rahul Mitra, Anurag Bajpai, [Krishanu Biswas](#), Machine learning based approach for phase prediction in high entropy borides, **Ceramics International**, 48, 16695-16706, 2022
 25. Nidhi Sharma, Tuhina Saxena, Syed Nasimul Alam, Bankim Chandra Ray, [Krishanu Biswas](#), Shikhar Krishn Jha, Ceramic-based nanocomposites: A perspective from carbonaceous nanofillers, **Materials Today Communications**, 31, 103764, 2022
 26. Lalita Sharma, Nirmal Kumar Katiyar, Arko Parui, Rakesh Das, Ritesh Kumar, Chandra Sekhar Tiwary, Abhisek K Singh, Aditi Halder, [Krishanu Biswas](#), Low-cost high entropy alloy (HEA) for high-efficiency oxygen evolution reaction (OER), **Nano Research**, 1-8, 2022
 27. Ashwani Kumar, Bhagyaraj Jayabalan, Chetan Singh, Jayant Jain, Subrata Mukherjee, [Krishanu Biswas](#), Sudhanshu S Singh, Processing and properties of yttria and lanthana dispersed ODS duplex stainless steels, **Materials Science and Engineering: A**, 837, 142746, 2022.
 28. SS Mishra, KU Mb, SP Thomas, CS Tiwary, [K Biswas](#), VB Kamble, Highly Sensitive and Selective Triethylamine Sensing through High-Entropy Alloy (Ti-Zr-Cr-V-Ni) Nanoparticle-Induced Fermi Energy Control of MoS₂ Nanosheets, **ACS applied materials & interfaces**, 14, 13653-13664, 2022.
 29. Abheepsit Raturi, [K Biswas](#), NP Gurao, Elastic and plastic anisotropy in a refractory high entropy alloy utilizing combinatorial instrumented indentation and electron backscatter diffraction, **Journal of Alloys and Compounds**, 896, 162902, 2022.
 30. Chandra Sekhar Tiwary, Prafull Pandey, Suman Sarkar, Rakesh Das, Sumanta Samal, [Krishanu Biswas](#), Kamania Chattopadhyay Five decades of research on the development of eutectic as engineering materials, **Progress in Materials Science**, 123, 100793, 2022.

31. N K Katiyar, S Dhakar, [Krishanu Biswas](#), C S Tiwary, S Sharma, Electrooxidation of Hydrazine utilizing High Entropy Alloys: Assisting oxygen evolution reaction at the thermodynamic Voltage, **ACS Catalysis**, 11 (22), 14000-14007, 2021.
32. L Sharma, N Kumar et al., Low-Cost High Entropy Alloy (HEA) for High-Efficiency Oxygen Evolution Reaction (OER), **Nano Research**, 15, 4799, 2021.
33. N.Kumar, [Krishanu Biswas](#), S. Sharma, C S Tiwary, A perspective on the catalysis using the high entropy alloys, **Nano Energy**, 88, 106261, 2021.
34. P. Shrivastava, S.N. Alama, D. Panda, S.K. Sahoo, T. Maity, K Biswas, Development and mechanical properties investigation of Cu-MWCNT-graphite nanoplatelets hybrid Nanocomposites, **Diamond and Related Materials**, 117,108467, 2021.
35. K. Tiwari, M. Paliwal, M. Verma, [Krishanu Biswas](#), Solidification behavior of nanoscaled tri-phasic bismuth-indium-tin alloy particles embedded in AlCuFe quasicrystalline matrix, **J. Alloys and Compounds**, 867, 159011, 2021.
36. S. Mukhopadhyay, P.Pandey, N. Baler, [Krishanu Biswas](#), S.K. Makineni, K. Chattopadhyay, The role of Ti addition on the evolution and stability of γ/γ' microstructure in a Co₃₀Ni₁₀Al₅Mo₂Ta Alloy, **Acta Materialia**, 208, 116736, 2021.
37. S.Sinha, V.K. Sahu, V.Beura, R.Sonkusare, R. Kalsar, A. KL Das, J. Basu, N. P. Gurao, [Krishanu Biswas](#), Initial texture dependence of nanocrystalline omega phase formation during high pressure torsion of commercially pure titanium, **Mater. Sc and Engg. A**, 802, 140687, 2021.
38. S.S. Mishra, T.P. Yadav, Ram Manohar Yadav, Anand B. Puthirath, Liangzi Deng, Moein Adnani, Ching-Wu Chu, Robert Vajtai, P.M. Ajayan, [Krishanu Biswas](#), N.K. Mukhopadhyay, ON Srivastava, Effect of Ga substitution on structural and magnetic properties of Fe₅₀Mn₂₅Al_{25-x}Ga_x Heusler alloys, **J. Alloys and Compd**, 854, 156756, 2021.
39. N. Katiyar et al., Formic acid and Methanol Electro-oxidation and Counter Hydrogen Production Using Nano High Entropy Catalyst, **Materials Today Energy**, 16, 2020, 100393
40. S. Nellaiappan, Nirmal Kumar Katiyar, R. Kumar, A. Parui, K. D. Malviya, K. G. Pradeep, A.K. Singh, S. Sharma, C.S. Tiwary and [Krishanu Biswas](#), High-Entropy Alloys as Catalysts for the CO₂ and CO₂ Reduction Reactions: Experimental Realization, **ACS Catalysis** 10(6), 2020, 3658-3663.
41. Urs. Kusuma; Nirmal Kumar Katiyar, R. Kumar; [Krishanu Biswas](#), A. Singh; C.S. Tiwary and V. Kamble, Multi-component (Ag-Au-Cu-Pd-Pt) Alloy Nanoparticles Decorated p-type 2D-Molybdenum Disulphide (MoS₂) for Enhanced Hydrogen Sensing, **Nanoscale** 12, 11830-11841.
42. T. Baidya et al., Low-Temperature Propylene Epoxidation Activity of CuO-CeO₂ Catalyst with CO+O₂ Mixture: Role of Metal-Support Interaction on Reducibility and Catalytic Property of CuO Species, **J. Phys. Chem. C**, 124, 26, 14131-14146
43. N. Sharma, A. Bajpai, P. Yadav, S. Nellaiappan, S. Sharma, C.S. Tiwary, [Krishanu Biswas](#), A Green Route for Beneficiation of Metallic Materials from Electronic Waste for Selective Reduction of CO₂, **ACS Sustainable Chemistry & Engineering**, 8(32) 12142-12150.

For a complete list of publications, see

https://scholar.google.com/citations?hl=en&user=KTKaS6AAAAAJ&view_op=list_works&sortby=pupdate