ASHISH KUMAR, PhD

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Rolla, Missouri-65401, USA

Objective

Innovative researcher with a strong foundation in nanofiber-based materials for Fuel cells, energy storage, electrochemistry, air/water filtration, mine ventilation, electrochemical systems, and pollution mitigation. Seeking to contribute interdisciplinary expertise in material science, membrane engineering, and nanotechnology to advance sustainable solutions for energy, environment, and industrial safety. Passionate about bridging advanced manufacturing with real-world impact through academic-industry collaboration.

Experience

- **Missouri University of Science and Technology [🌐]** *2023 - Present*
  Postdoc Fellow Rolla, USA
- **Indian Institute of Technology, Delhi [🌐]** *2022 - 2023*
  Senior Research fellow Delhi, India

Education

- **Indian Institute of Technology, mandi** *2017 - 2022*
  PhD-Mechanical and Materials Engineering Mandi, India
  - CGPA: 8.25/10
- **National Institute of Technology, Kurukshetra** *2015-2017*
  M.tech-Material Science and Nanotechnology Kurukshetra, India
  - CGPA: 8.5/10
- **Lingaya's University, Faridabad** *2011-2015*
  B.tech-Electronics and Communication Engineering Faridabad, India
  - CGPA: 7.02/10

Projects

- **Missouri University of Science and Technology** *2023-2025*
  - Dust Suppression Technologies for Road Haulage and Underground Mine Ventilation in Deep Metal Mines-Freeport, USA
  - Sustainable Recovery and Repurposing of Spent Lithium-Ion Batteries for Circular Economy Integration in Grid and EV Applications-InterCom Global, USA
  - Acid Mist Pollution Prevention for Copper Electrowinning Facilities (EPA-Grant number 97797001)
  - Establishing Techniques for Emergency Responses in Underground Battery Electric Vehicles Fires (NIOSH- Grant number 1U60OH012350-01-00)
  - Particulate matter, Coal and silica dust separation using polymeric membranes (MST-SEED Grant)
- **Indian Institute of Technology, Delhi** *2022-2023*
  - Study on air ventilation in central air-conditioning units in post COVID-19 scenario guided by machine learning and artificial intelligence technique (Department of Scientific and Industrial Research)
- **Indian Institute of Technology, Mandi** *2017-2022*
  - Nanofiber-Integrated Electrochemical Biosensing Platforms for Real-Time Detection of Environmental Analytes-IIT Mandi Seed Grant
  - Treatment of Acid Mine Drainage for Heavy Metal Removal (Project ID: 15 / 18-PERC /2018-19)

- Efficient removal of most penetrating particles (dia 350 nm) from air/ water using supersonically blown ultrafine PVDF nanofibers (september 2018- 2021) with iitm/serb/ssr/215
- Sustainable wastewater treatment through bio-photoelectric catalysis and bioproduction) july 2018-2021)-iitm/mhrd-imprint/ad/169
- Development of low cost highly efficient indigenous mask amid covid-19 from waste plastic (august 2017 - till present) with iit mandi seed grant-iitm/sg/ssr/60

• **National Institute of Technology, Kurukshetra and CSIR-CSIO, Chandigargh** *2015-2017*

- Fabrication Characterizations of Heterostructures High Electron Mobility Transistor toward Sensing Application
- Enhanced optical and electrical properties of Ag-CdSe nanocomposites via green synthesis for electronics and electrical application

• **Lingaya's University faridabad** *2011-2015*

- Silicon based solar power gadget charger

PATENTS AND PUBLICATIONS

C=CONFERENCE, J=JOURNAL, P=PATENT, A=ACCEPTED, T=THESIS

[J] **Kakoria, A.** and Sinha-Ray, S. (2018). A review on biopolymer-based fibers via electrospinning and solution blowing and their applications. Fibers, 6(3), p.45. [🌐]

[J] **Kakoria, A.,** Devi, B., Anand, A., Halder, A., Koner, R.R., and Sinha-Ray, S. (2018). Gallium oxide nanofibers for hydrogen evolution and oxygen reduction. ACS Applied Nano Materials, 2(1), pp.64-74. [🌐]

[J] **Kakoria, A.,** Sinha-Ray, S., and Sinha-Ray, S. (2021). Industrially scalable Chitosan/Nylon-6(CS/N) nanofiber-based reusable adsorbent for efficient removal of heavy metal from water. Polymer, 213, p.123333. [🌐]

[J] **Kakoria, A.,** Chandel, S. S., and Sinha-Ray, S. (2021). Novel supersonically solution blown nanofibers from waste PET bottles for PM0.1-2 filtration: From waste to pollution mitigation. Polymer, 124260. [🌐]

[J] **Kakoria, A.,** and Sinha-Ray, S. (2022). Ultrafine nanofiber-based high-efficiency air filter from waste cigarette butts. Polymer, 125121. [🌐]

[J] Thakur, S.S., Chandel, S.S., **Kakoria, A.** and Sinha-Ray, S., 2022. Enhancement in pool boiling heat transfer of ethanol and nanofluid on novel supersonic nanoblown nanofiber textured surface. Experimental Heat Transfer, 35(4), pp.516-532. [🌐]

[J] Zaid, M.M., Amoah, N., **Kakoria, A.,** Wang, Y., and Xu, G. (2023). Advancing occupational health in mining: investigating low-cost sensors suitability for improved coal dust exposure monitoring. Measurement Science and Technology, 35(2), p.025128 [🌐]

[J] Iqbal,A., **Kakoria, A.,** Riaz, S.T., Xu, J., Pushparaj, R.I. and Xu, G., 2025. Comparative fire hazards of lithium-ion battery chemistries: Linking thermal behavior, gas toxicity, and state-of-charge to composite risk profiles. Journal of Power Sources, 655, p.237914. [🌐]

[C] Giri, P., **Kakoria, A.,** Verma, S. and Sinha-Ray, S., 2022. Nanofibers for sustainable filtration: a waste to energy approach. In Machines, Mechanism and Robotics: Proceedings of iNaCoMM 2019 (pp. 1693-1701). Springer Singapore [🌐]

[C] Giri, P., **Kakoria, A.,** Verma, S. and Sinha-Ray, S., 2020. Reuse of Cigarette Filters for Energy Applications. In Functional Textiles and Clothing 2020 (pp. 161-168). Singapore: Springer Singapore. [🌐]

[C] Giri, P., **Kakoria, A.,** Verma, S., Sinha-Ray, S. (2022). Nanofibers for Sustainable Filtration: A Waste to Energy Approach. In: Kumar, R., Chauhan, V.S., Talha, M., Pathak, H. (eds) Machines, Mechanism and Robotics. Lecture Notes in Mechanical Engineering. Springer, Singapore. [🌐]

[T] Environmental Polution Mitigation using solution blown nanofibers [🌐]

[T] Fabrication Characterizations of Heterostructures High Electron Mobility Transistor toward Sensing Application [🌐]

[P] Patent granted on (27/05/2023)-Nanofiber from waste Plastic bottles. (Application Number=E-2/790/2023/DEL), (App. Number-202011022177) Patent No:482026 [🌐]

[P] Patent filed on (03-12-2021)-Nanofibers from waste cigarette butts. (Application Number=E-1/63874/2021-KOL). (app. Number-202131056249) [🌐]

[A] Optimizing Acid Mist Suppression: Unraveling Surfactant Effects on Bubble Formation and Bursting Dynamics in Copper Electrowinning (Accepted-Journal of Sustainable Metallurgy)

Submissions in Preparation

P=Preparation

[P] Triboelectric-Enhanced Self-Powered Electroactive Surface Modified PVDF/Ti3C2Tx MXene Functionalized Nanotextured Nanofiber Membrane with High Surface Potential for High-Efficiency Indoor/Outdoor Submicron PM(0.3-2)µm Filtration in **Journal of Membrane Science**

[P] Quantitative Analysis of Gases Emitted During LIB Thermal Runaway: A comparative study of SOC effects on LFP and NMC modules in **Journal of Power Sources**

[P] Inherent Electrostatic Potential and Particle Capture Efficiency of PET Nanofibers Produced by Electrospinning and Supersonic Blowing in **Journal of Membrane Science**

[P] Advancing Aerosol Filtration: Theoretical Foundations, Computational Models, and Experimental Insights into Fibrous Filters in **Separation and Purification technology**

[P] Optimizing the Impacts of Organic and Surfactants on the Suppression of Sulfuric Acid Mist in Electrowinning System in **Hydrometallurgy**

[P] Synergistic Charge Engineered Supersonically Nanoblown Ultrafine Nanofibers for the Advanced Filtration of Respirable Silica Dust in Mining Environments in **Environmental science and Technology**

[P] Lab Scale investigation of the Effectiveness of different fire extinguishing agents on Lithium-ion Batteries fires in **Journal of Power Sources**

Teaching and Mentorship

- **Teaching** *2017-2022*
  Indian Institute of Technology, Mandi [🌐]
  - Served as Teaching Assistant, Indian Institute of Technology, Mandi, 2017-2022
  - Delivered engaging lectures and hands-on workshops for undergraduate courses in Material science for engineers (IC-241), Nanomanufacturing (ME-509), Mechanical workshop, Creep-Fatigue interactions (EN-613), Manufacturing Engineering (ME-308)
  - Prepared course curriculum preparation, course teaching, design and evaluate mid-term quizzes and end-term exams, Conducting laboratory for undergraduates with integrated research, tutorial preparation, attendance sheet preparation, and individual mentorship
  - Received Best TA award for Material Science for engineers.

- **Teaching** *2015-2017*
  National Institute of Technology, Kurukshetra [🌐]
  - Delivered tutorials and conducted lab on courses Nanomaterials and their properties (MNT501T), Material Characterization Techniques (MNT507T) and Nano Electronics (MNT506T)
  - Preparation and conducting tutorial classes, Labs, and grading exams

- **Mentorship** *2023-2025*
  Missouri University of Science and Technology, USA [🌐]
  - Mentoring 5 PhDs for their PhD research

- **Mentorship** *2022-2023*
  Indian Institute of Technology, Delhi [🌐]
  - Mentored 1 PhD, 1 master's and 2 undergrad students for their research

- **Mentorship** *2017-2022*
  Indian Institute of Technology, Mandi [🌐]
  - Mentored 3 PhD students, 3 master's students and 1 undergraduate students for their research

Industry Experience

- Collaborated with industries like Innospec, Amira global, Intercom Global, BASF, Clariant, Freeport and Pixon Chemie to work on different projects in mining field application such as acid mist suppression in copper electrowinning, aerosol filtration, gas and fire suppression.
- Worked on an Industry collaborative project, "study on air ventilation in central air-conditioning units in post-COVID-19 scenario guided by machine learning and artificial intelligence technique." I have worked on this project closely with our industry partners, such as AFI India and Elofic Industries.
- Mentored two undergraduate students in developing an ANN model to predict the system's performance metrics, such as energy efficiency, cooling/heating loads, and indoor air quality indices based on sensor data inputs.

Proposal writing

- Wrote NSF proposal on A waste-to-value-added product: Valorization of PET waste into ultrafine nanofiber-based gas sensor and filter to mitigate the toxic gas emission from lithium-ion batteries
- Wrote proposal for Ministry of Textile on Multi-metal and hetero atom decorated energy efficient carbon nanofibers from spent heavy metal membranes
- Wrote NSF proposal on Using AI and Alternative Approaches for Nanofiber Material Discovery
- Wrote NSF proposal on Using Low-Frequency Sound Waves to Suppress Acid Mist in Copper Electrowinning
- Wrote NSF proposal on molecular Structure Directed Surfactant Adsorption at the Electrolyte-Air Interface: Implications for Enhanced Acid Mist Suppression in Copper Electrowinning

Skills

- **Programming Languages:** Python
- **Database Systems:** MySQL
- **Data Science & Machine Learning:** Tensorflow
- **Mathematical & Statistical Tools:** MATLAB and R
- **Research Skills:** Systematic Literature Review and Bibliometric Analysis

Honors and Awards

- PhD work recognised by 200 (local and national) media news channels in India such as Times of India, Mint, Dainik Bhaskar, NDTV etc. [] []
- International Travel and Accommodation grant-IWAM Dubai (Feb 2020 and 2022)
- Cleared Engineering Gate Exam-Central government exam committee
- Reviewer of Elsevier Journal- Process Biochemistry
- Best Prototype Award on Engineer's Day
- Best TA award for Material Science for Engineers course

Conference Presentation

- **International** *2020-2025*

- **Ashish Kakoria**, and Sumit Sinha Ray. "Industrially scalable Chitosan/Nylon-6 (CS/N) nanofiber-based reusable adsorbent for efficient removal of heavy metal from water." International Workshop on Advanced Materials, February 22nd-26th , 2020, **Dubai**, UAE.
- **Ashish Kakoria**, and Sumit Sinha Ray. "Novel supersonically solution blown nanofibers from waste PET bottle for PM0. 1-2 filtration: From waste to pollution mitigation." International Workshop on Advanced Materials, February 22nd-26th , 2022, **Dubai**, UAE.
- **Ashish Kakoria**, Michael Moats, and Guang Xu. "Controlling acid mist for copper electrowinning." SME Arizona Conference, December 3rd, 2023, Tucson, Arizona, **USA**.
- **Ashish Kakoria**, Mirza Mohammad Zaid, and Guang Xu. "Effect of Surfactants on the bubble size, and its bursting mechanism in copper electrowinning using high speed camera imaging." SME Conference, February 25th-28th, 2024, Phoenix, Arizona, **USA**.
- **Ashish Kakoria**, Mirza Mohammad Zaid, and Guang Xu. "PVDF-Ti3C2Tx(MXene) ultrafine nanofiber membrane for effective fine particulate matter(0.1-2.5 m) filtration." International Mine Ventilation Conference, August 11th-15th, 2024, Sydney, **Australia**.
- **Ashish Kakoria**, and Guang Xu. "Environmental pollution mitigation by solution blown nanofibers." 7th International Symposium on Mine Safety Science and Engineering, August17th-21st, 2024, Pittsburgh, Pennsylvania, **USA**.
- **Ashish Kakoria**, and Guang Xu. "Controlling acid mist for copper electrowinning." 7th International Symposium on Mine Safety Science and Engineering, August 18th, 2024, Pittsburgh, Pennsylvania, **USA**
- **Ashish Kakoria**, Ellen Amoako Afful, and Guang Xu. "Acid mist pollution prevention for copper electrowinning facilities." SME Arizona Conference, December 8th, 2024, Tucson, Arizona, **USA**

- **Ashish Kakoria**, Mirza Mohammad Zaid, and Guang Xu. "A Study on the Effect of Surfactant on the Bubble Size, its Bursting Dynamics, and Acid Mist Suppression Using High-Speed Camera Imaging." SME Conference, February 23rd-26th, 2025, Denver, Colorado, **USA**
- **Ashish Kakoria**, and Guang Xu. "Nanofiber Filters for Industrial Dust Control." The 20th North American Mine Ventilation Symposium, June 21st-26th, Pittsburgh, Pennsylvania, **USA**
- **Ashish Kakoria**, and Guang Xu. "PVDF-Ti3C2Tx(MXene) Ultrafine Nanofiber Membrane for Effective Fine Particulate Matter(0.3-2 mm) Filtration." The 20th North American Mine Ventilation Symposium, June 21st-26th, Pittsburgh, Pennsylvania, **USA**

• **National** *2019-2020*

- ICFNM-2019 - IIT BHU, **India**.
- NCRDNN-2019 - Jadavpur University, **India**.
- ICANN-2019 - IIT Guwahati, **India**.
- ICT-2020 - ICT Mumbai, **India**.
- HIMCOSTE, 2020 - IIT Mandi, **India**.
- FTC-2020 - Functional Textiles and Clothing, IIT Delhi, **India**.

Additional Information

Languages: English, Hindi
Interests: Cricket, Table Tennis, football, Reading novels

References

1. **Dr. Guang Xu**
   Associate Professor, Department of Mining and Explosive engineering
   Missouri University of science and Technology, USA
   Email: Guang.Xu@mst.edu
   Phone: +1-5733416079
   Relationship: Postdoc Advisor

2. **Dr. Amit Rawal**
   Professor, Department of Textile and Fibre Engineering, India
   Indian Institute of Technology, Delhi, India
   Email: Amitrawal77@hotmail.com
   Phone: +91-9958205917
   Relationship: Postdoc Advisor

3. **Dr. Ashish R. Kumar**
   Assistant Professor, Department of Energy and Mineral Engineering,
   Penn State University
   Email: awk5528@psu.edu
   Phone: +1-8594947498
   Relationship: Mentor