Adil Majeed Rather

DST Inspire Faculty, NIT Srinagar, India



I am a distinguished materials scientist with over eight years of experience at various global universities and institutes. I am currently working as a DST Inspire Faculty at the National Institute of Technology (NIT), Srinagar-India. Before that, I have been working as a postdoctoral research fellow at North Carolina State University, USA, focusing on developing multi-functional superomniphobic surfaces. Before this, I worked for 1.5 years as a postdoctoral research fellow at The Ohio State University, USA, focusing on developing stimuli-responsive liquid crystal surfaces for liquid droplet manipulations. I have authored over 30 research publications and hold five patents that demonstrate my innovative contributions to the field. My expertise encompasses a wide range of analytical techniques and software tools, and I have good experience in mentoring students. My research excellence has been recognized with numerous national and international awards. With a strong portfolio of pioneering research and a proven ability to translate scientific advancements into practical applications, I am well-equipped to drive forward the field of materials science in an academic environment. I am eager to bring my expertise, innovation, and dedication to the university/institution and contribute to creative research and innovations in materials engineering.

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Education and Appointments

2025 — Present: National Institute of Technology Srinagar, India
DST Inspire Faculty

2021 — 2025: North Carolina State University, North Carolina, USA
Postdoctoral Research Associate
Advisor: Dr. Arun Kumar Kota
Research Areas
•Fabrication of multifunctional superomniphobic surfaces
•3D printing of multifunctional superhydrophobic materials

2020 — 2021: The Ohio State University, Columbus, Ohio, USA
Postdoctoral Research Associate
Advisor: Dr. Xiaoguang Wang
Research areas
• Stimuli-responsive liquid crystal interfaces for controlled manipulation of water droplets
•Controlled manipulation of underwater gas bubbles

2015 – 2019: Indian Institute of Technology Guwahati, Assam, India

Ph.D., Chemistry
Advisor: Dr. Uttam Manna
Thesis title: Facile synthesis of durable and bulk superhydrophobic materials

2013 – 2015: Aligarh Muslim University, Aligarh, U.P., India
M.Sc., Chemistry

2010 – 2013: Aligarh Muslim University, Aligarh, U.P., India
B.Sc. (Hons) Chemistry

Teaching Experience

2025 Teaching **General Inorganic Chemistry** to Master's students at NIT Srinagar, India. In this course, I teach structure and reactivity of main group elements, Coordination Chemistry-I and Coordination Chemistry-II

2025 Teaching **Research Methodology** to Ph.D. (1st year) students at NIT Srinagar, India. In this course, I teach Introduction to Research Methodology, Research Design, and Report Writing, as well as various methods for searching literature reviews, among other topics.

2025 Teaching **Bioinorganic Chemistry** to Master's students at NIT Srinagar, India. In this course, I teach enzymes and metalloenzymes in biochemical reactions

2017 Teaching Assistant for Physical Chemistry Laboratory (CH-535, IIT Guwahati). In this course, my responsibilities were to teach the new M.Sc. entrants to demonstrate how to measure the contact angle on lotus leaf and estimation of complexation in inorganic complexes.

2016 Teaching Assistant for Chemical Science Technology Laboratory (CH 334, IIT Guwahati). In this course, undergraduate students were taught different separation techniques.

2016 Teaching Assistant for Physical Chemistry Laboratory (CH-535, IIT Guwahati). In this course, my responsibilities were to teach the new M.Sc. entrants to demonstrate how to measure contact angle on lotus leaf and estimation of complexation in inorganic complexes.

Instrumental & Technical Skills

Instruments Scanning Electron Microscope (SEM), FTIR/ATR, UV-Visible absorption spectrophotometer, Contact angle goniometer, Optical and Fluorescence microscope, Plasma Etching, Centrifugation, 3D printer, Particle size analyser, Spray Coatings, Chemical vapor deposition, Thin film fabrications

Technical Microsoft Office, including Word, Excel, PowerPoint, and Adobe Illustrator

Publications (Total: **31**), Citations: **806**; H-Index:**17**; Google Scholar

33. M. J. Zarei, S. Pillai, **A. M. Rather**, M. S. Barrubeeah, T. Echekki, A. K. Kota, Ultra-stretchable superomniphobic surfaces via machine-learning-guided laser ablation, *Matter*, 2026, 9, 102610.

32. **A. M. Rather**, S. Pillai, A. Nair, M. J. Zarei, Y. J. Kim, H. Nia, A. K. Kota, Liquid crystal elastomer-based reversible metamorphosis for loss-less droplet manipulation, *Mater. Horiz*., 2026, https://doi.org/10.1039/D5MH01295C

31. M. J. Zarei, S. Pillai, O. Eldaly, **A. M. Rather**, S. Vallabhuneni, M. A. Zikry, A. K. Kota. Hyperelastic superomniphobic surfaces via microprotrusion-induced stress redistribution. *Mater. Horizons*, **2025**, 12, 9229.

30. Y. J. Kim, **A. M. Rather**, D. Parbat, N. Pandya, S. Park, A. K. Kota, Valorization of Corn Waste: Oil–Water Separation and Fuel Enhancement, *ACS Sustain. Chem. Eng.,* **2025,** *13*, 15663.

29. M. J. Zarei, S. Pillai, O. Eldaly, **A. M. Rather**, S. Vallabhuneni, M. A. Zikry, A. K. Kota. Hyperelastic superomniphobic surfaces via microprotrusion-induced stress redistribution. *Mater. Horizons*, **2025**, 12, 9229.

28. **A. M. Rather**, M. Barrubeeah, M. J. Zarei, Y. J. Kim, S. Vallabhuneni, A. K. Kota. 3D printing of superhydrophobic and multifunctional objects via simple and inexpensive vat photopolymerization, *Nanoscale*, **2025**, 17, 6637.

27. M. S. Tanweer*, Z. Iqbal, **A. M. Rather***, M. Alam, Zinc Oxide/Moringa Oleifera Gum-Grafted L-Methionine Functionalized Polyaniline Bionanocomposites for Water Purification, *Water,* **2024**, 16, 2576

26. **A. M. Rather**, S. Vallabhuneni, A. J. Pyrch, M. Barrubeeah, S. Pillai, A. Taassob, F. N. Castellano, A. K. Kota. Color morphing surfaces with effective chemical shielding. *Nat. Commun.*, **2024**, 15, 3735.

25. **A. M. Rather**, D. J. Sutherland, R. M. Sabino, S. Vallabhuneni, W. Wang, K. C. Popat, A. K. Kota. Hemp-Based Sustainable Slippery Surfaces: Icephobic and Antithrombotic Properties. *ACS Sustain. Chem. Eng.,* **2023***,* 11, 2397.

24. **A. M. Rather,** Y. Xu, Y.Chang, R. L. Dupont, A. Borbora, U. I. Kara, J. C. Fang, R. S. Mamtani, M. Zhang, Y. Yao, S. Adera, X. Bao, U. Manna, X. Wang, Stimuli-Responsive Liquid-Crystal-Infused Porous Surfaces for Manipulation of Underwater Gas Bubble Transport and Adhesion, *Adv. Mater,* **2022***,* 34, 2110085.

23. **A. M. Rather,** Y. Xu, Y. Yao, J. C. Fang, R. S. Mamtani, R. K. A. Bennett, R. G. Atta, S. Adera, U. Tkalec, X. Wang. Liquid crystal–based open surface microfluidics manipulate liquid mobility and chemical composition on demand, *Science Advances*, **2021**, *7*, eabi7607

22. **A. M. Rather**, Y. Xu, S. Song, J. C. Fang, R. L. Dupont, U. I. Kara, Y. Chang, J. A. Paulson, R. Qin, X. Bao, X. Wang*. Ultrasensitive and Selective Detection of SARS-CoV-2 Using Thermotropic Liquid Crystals and Image-Based Machine Learning, *Cell Reports Physical Science,* **2020**, *1*, 100276.

21. **A. M. Rather**, P. Srikrishnarka, A. Baidya, A. Shome, T. Pradeep*, U. Manna* Evaluating the Impact of Tailored Water Wettability on Performance of CO_2 Capture. *ACS Appl. Energy Mater*. **2020**, *11*, 10541.

20. **A. M. Rather,** A. Shome, K. Maji, A. Yashwantha, D. K. Patel, U. Manna. A Scalable Chemical Approach for Synthesis of Highly Tolerant and Efficient Oil Absorbent. *Chem. Asian J*., **2019**, *14*, 4732.

19. **A. M. Rather**, U. Manna*. Green and Rapid Synthesis of Durable and Super-Oil (under Water) and Water (in Air) Repellent Interfaces. *ACS, Appl. Mater. Interfaces*, **2018,** *10***,** 23451.

18. **A. M. Rather,** A. Shome, B. K. Bhunia, B. B. Mandal, U. Manna*. Simultaneous and Controlled Release of Two Different Bioactive Small Molecules from Nature-Inspired Single Material. *J. Mater. Chem. B,* **2018**, 6, 7692.

17. **A. M. Rather**, A. Shome, S. Kumar, B. K. Bhunia, B. B. Mandal, H. K. Srivastava, U. Manna*. Alkali Metal-ion Assisted Michael Addition Reaction in Controlled Tailoring of Topography in a Superhydrophobic Polymeric Monolith. *J. Mater. Chem. A,* **2018***, 6,* 17019.

16. **A. M. Rather**, U. Manna*. Stretchable and Durable Superhydrophobicity that Acts both in Air and Under Oil. *J. Mater. Chem. A*, **2017,** *5*, 15208.

15. **A. M. Rather**, N. Jana, P. Hazarika, U. Manna*. Sustainable Polymeric Material for the Facile and Repetitive Removal of Oil-Spills through the Complementary Use of Both Selective-Absorption and Active-Filtration Processes. *J. Mater. Chem. A*, **2017**, *5*, 23339.

14. **A. M. Rather**, S. Mahato, K. Maji, Gogoi, N. Gogoi, U. Manna*. 'Reactive' Nano-Complex Coated Medical Cotton: A Facile Avenue for Tailored Release of Small Molecules. *Nanoscale*, **2017**, *9*, 16154.

13. **A. M. Rather**, N. Jana, S. Begum, H. K. Srivastava, U. Manna*. Exceptional Control on Physical Properties of a Polymeric Material through Alcoholic Solvent Mediated Environment-Friendly Michael Addition Reaction**.** *Green Chem*., **2017**, *19*, 4527.

12. **A. M. Rather**, U. Manna*. Facile Synthesis of Tunable and Durable Bulk Superhydrophobic Material from Amine "Reactive" Polymeric Gel. *Chem. Mater*. **2016**, *28*, 8689.

11. Y. Xu, Y. Chang, Y. Yao, M. Zhang, R. L Dupont, **A. M Rather**, X. Bao, X. Wang, Modularizable Liquid-Crystal-Based Open Surfaces Enable Programmable Chemical Transport and Feeding using Liquid Droplets, *Adv. Mater.,* **2022**, 34, 2108788.

10. Y. Yao, R. K. Bennett, Y. Xu, **A. M. Rather,** S. Li, T. C. Cheung, A. Bhanji, M. J. Kreder, D. Daniel, S. Adera, J. Aizenberg. Wang, X. Wettability-based ultrasensitive detection of amphiphiles through directed concentration at disordered regions in self-assembled monolayers. *PNAS*, **2022**, 119, e2211042119.

9. A. Shome, **A. M. Rather**, A. Borbora, P. Srikrishnarka, A. Baidya, T. Pradeep, U. Manna*, Design of a Wastepaper-Derived Chemically 'Reactive 'and Durable Functional Material with Tailorable Mechanical Property Following an Ambient and Sustainable Chemical Approach, *Chemistry–An Asian Journal*, **2021**, *16*, 1988

8. A. Shome, J. C. Moses, **A. M. Rather**, B. B Mandal, U. Manna, Unconventional and facile fabrication of chemically reactive silk fibroin sponges for environmental remediation, *ACS Applied Materials & Interfaces*, **2021**, *13*, 24258.
7. A. Shome, A. Das, N. Rawat, **A. M. Rather,** U. Manna*. Reduction of Imine Based Cross-linkages to Achieve Sustainable Underwater Superoleophobicity That Performs at Challenging Conditions. *J. Mater. Chem. A*, **2020**, 8, 15148
6. A. Shome, **A. M. Rather**, U. Manna*, Chemically Reactive Protein Nanoparticles in Synthesis of Durable and Deformable Superhydrophobicity—that performs in Severe Settings. *Nanoscale Adv*., **2019**, 1, 1746.
5. A. Shome, **A. M. Rather**, Aindrilla Ghosal, B. K. Bhunia, B. B. Mandal, U. Manna*. Rational Chemical Engineering in Natural Protein Derived Functional Interface. *ACS Sustainable Chem. Eng*., **2019**, 7, 7502.
4. A. Das, S. Sengupta, J. Deka, **A. M. Rather**, K. Raidongia, U. Manna*. Synthesis of Fish Scale and Lotus Leaf Mimicking, Stretchable and Durable Multilayers. *J. Mater. Chem. A*, **2018**, 6, 15993.
3. A. Shome, **A. M. Rather**, U. Manna*, Aloe Vera Mucilage Derived Highly Tolerant Underwater Superoleophobic Coating. *J. Mater. Chem. A*, **2018**, 6, 22465.
2. A. Das, J. Deka, **A. M. Rather**, B. K. Bhunia, P. P. Saikia, B. B. Mandal, K. Raidongia, U. Manna*. Strategic Formulation of Graphene Oxide Sheets for Flexible Monoliths and Robust Polymeric Coatings Embedded with Durable Bioinspired Wettability. *ACS Appl. Mater. Interfaces*, **2017**, 9, 42354.
1. D. Parbat, S. Gaffar, **A. M. Rather**, A. Gupta, U. Manna*. A General and Facile Chemical Avenue for the Controlled and Extreme Regulation of Water Wettability in Air and Oil Wettability under Water. *Chem. Sci*., **2017**, 8, 6542.

Books

1. **A. M. Rather***, A. H. Dar, U. H. Shah, A. Shome, A. Borbora, Cellulose Based Nanomaterials in Energy Conversion/Storage Devices, *Springer*, **2024**, *CRC Press, Taylor and Francis Group.*119-144.
2. **A. M. Rather**, Y. Xu, R. L. Dupont, X. Wang, Polymeric Membranes in Wastewater Treatment, *Nanoscale Engineering of Biomaterials: Properties and Applications*, Springer, *Singapore*, **2022**, 487-515.
3. A. A. Dar, A. H. Malik, A. H. Dar, M. A. Ganayee, **A. M. Rather***, Cellulose-Based Nanomaterials Solving the Food Crisis., *Springer*, **2024,** *CRC Press, Taylor and Francis Group,* 97-109.

Patents

1. U. Manna, V. Nandakumar, R. Karthick, K. Maji, A. Shome, **A. M. Rather**, An Absorbent for Remediation of Oil Spills, Indian Patent, Application No. 201841029004**,** Patent No. 454888.
2. X. Wang, R. Qin; X. Bao; Y. Xu, **A. M. Rather,** Liquid Crystal Biosensor with Ultrahigh Sensitivity and Selectivity. International Patent Publication No. US20230295693A1.

3. X. Wang, Y. Xu, **A. M. Rather,** Liquid Crystal-Infused Porous Surfaces and Methods of Making and Use Thereof, USA Patent, US20240099985A1
4. U. Manna and **A. M Rather,** A Method for Producing Superhydrophobic Coating on Fibrous Material and a Product Thereof. Indian patent # 201831014615, Patent No. 537915
5. A. K. Kota and **A. M. Rather**. Substrates Having a Material Layer That Is Color Morphic and Superomniphobic and Methods of Making These Substrates. USA Patent # Application No. 19/185,703. (Under Review)

Honors and Awards

2020 Best Ph.D. Thesis Award: Department of Chemistry, Indian Institute of Technology (IIT), Guwahati-India

2018 Tertiary Prize Award: Bionic Innovation Competition organized by 'Journal of Bionic Engineering & National-Local Joint Engineering Laboratory of Bionic Engineering, Jilin University' China

2017 Best Oral Presentation Award: International Conference on Advances in Polymer Science & Technology, organized by Asian Polymeric Association and IIT Delhi'.

2017 Institute Best Presentation Award: Research Conclave organized by Students Academic Board (SAB) of IIT, Guwahati.

2017 Department Best Poster Presentation Award: Research Conclave organized by Students Academic Board of IIT, Guwahati.

2017 Best Poster Presentation Award: Chemconvene organized by Department of Chemistry of IIT, Guwahati.

2017 Best Poster Presentation Award: International Conference on Sophisticated Instruments in Modern Research, organized by 'CIF IIT Guwahati'.

2017 Best Poster Presentation Award: International Conference on Advanced Nanomaterials and Nanotechnology (ICANN) conducted by Centre for Nanotechnology, IIT, Guwahati.

2015 Graduate Aptitude Test in Engineering (GATE): Ministry of Human Resource Development, Government of India.

Outreach

May 2024	Triangle Soft Matter Workshop North Carolina State University, USA (Presenter)
June 2023	ACS Colloids and Surface Science Symposium, North Carolina State University, USA (Presenter)
April 2018	International Bionic Innovation Competition, China (Presenter)
March 2018	Annual Chemical Engineering Symposium, IIT Guwahati (Presenter)
March 2018	Research conclave, IIT Guwahati (Presenter)

December 2017	International Conference on Advanced Nanomaterials and Nanotechnology, IIT Guwahati (Presenter)
November 2017	Advances in Polymer Science and Technology, New Delhi (Presenter)
July 2107	Chemconvene, IIT Guwahati (Presenter)
June 2017	International Conference on Sophisticated Instruments in Modern Research, IIT Guwahati (Presenter)
February 2017	20Th CRSI National Symposium in Chemistry (Presenter)

Others

Mentoring

Ph. D. Co-Supervisor of Muskaan Zuhra and Aqib Ahamd Teli (Ph.D Students, National Institute of Technology, Srinagar-India)

Berit Andersen (Undergraduate student, North Carolina State University, July 2022 -Dec 2022)
Rajdeep Mamtani (Master Student, The Ohio State University, March 2020 -May 2021)
Arpita Shome (Ph. D Student, IIT Guwahati, Assam, India, June 2016 - July 2017)
Neha (Project Internship, IIT Guwahati, Assam, India, Jan 2017 - Jun 2017)
Prateeti Hazarika (Project Internship, IIT Guwahati, Assam, India, Dec 2017 -July 2018)

Professional Affiliations

Guest Editor: Membranes Journal (MPDI)

Guest Editor: Polymer Journal (MPDI)

Editorial Board Member: Colloids and Surface Science (Elsevier)

Peer Reviewer: American Chemical Society (ACS), Wiley, RSC, Orientational Journal of Chemistry, Polymers, Nanomaterials, Coatings, Macromolecule and Applied Science Web of Science

Membership: American Chemical Society (**ACS**); (Member ID: 33180047)
Royal Society of Chemistry (**RSC**); (Member ID: 803527)
International Society of Bionic Engineering (ISBE)-China

Newsletter Article: (Stimuli Responsive Liquid Crystal Infused Porous Surfaces for Manipulation of Underwater Gas Bubble Transport and Adhesion, **A. M. Rather**, Vol 11, 2022, International Society of Bionic Engineering).

Services

Welfare Secretary at Dibang Hostel, IIT Guwahati, India (June 2017 - June 2019)

Hobbies: Adventure travel, Gardening, Driving, Reading

Sports: Cricket, Badminton, Volleyball, Lawn Tennis, Table Tennis

Professional References

1. **Dr. Uttam Manna**
   Professor
   Department of Chemistry, Indian Institute of Technology Guwahati, India
   Email: umanna@iitg.ac.in
   Phone: +917086691175

2. **Dr. Arun Kumar Kota**
   Associate Professor,
   Mechanical and Aerospace Engineering, North Carolina State University, USA
   Email: akota2@ncsu.edu
   Phone: +12403387043

3. **Dr. Xiaoguang Wang**
   Assistant Professor
   Chemical and Biomolecular Engineering, The Ohio State University, USA-43210
   Email: wang.12206@osu.edu
   Phone: +16083588588

4. **Dr. Kowsar Majid**
   Professor
   Department of Chemistry, National Institute of Technology, Srinagar, J&K, India
   Email: kowsar@nitsri.ac.in
   Phone: +91 70064 73015