

# MUHAMMAD M. RAHMAN

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## EDUCATION

- Ph.D., Cornell University, NY, USA** 2016  
Department of Fiber Science  
Thesis: Protein-based Green Resins and Nanocomposites from Waste Residues  
Thesis Advisors: Stuart Leigh Phoenix and Anil Netravali
- M.Sc., Tuskegee University, AL, USA** 2012  
Department of Mechanical Engineering  
Thesis: A Comprehensive Experimental Study of E-glass/epoxy Composites Modified with Amino-functionalized Multi-walled Carbon Nanotubes  
Advisor: Mahesh Hosur
- B.Sc., BUET, Dhaka, Bangladesh** 2005  
Department of Mechanical Engineering  
Thesis: Stress Analysis in Poly-vinyl Chloride (PVC) Pipe and Construction of a Pressure Testing Device to Test Hydrostatic Pressure of PVC Pipe

## PROFESSIONAL APPOINTMENTS

- Assistant Research Professor** 2021 – Present  
Department of Material Science & NanoEngineering, Rice University
- Research Scientist, Ajayan Research Group** 2019 – 2021  
Department of Material Science & NanoEngineering, Rice University
- Postdoctoral Research Associate, Ajayan Research Group** 2018 – 2019  
Department of Material Science & NanoEngineering, Rice University
- Postdoctoral Research Associate, Supervisor: Stuart Leigh Phoenix** 2017 – 2018  
Department of Mechanical Engineering, Cornell University
- Graduate Research Assistant** 2012 – 2016  
Department of Fiber Science, Cornell University
- Graduate Research Assistant** 2010 – 2012  
Department of Materials Science & Engineering, Tuskegee University
- Assistant Manager, Procurement Division (Head Office)** 2007 – 2010  
Rural Power Company Limited (RPCL), Dhaka, Bangladesh.
- Plant Engineer, Mechanical Maintenance Division (Power plant)** 2005 – 2007  
Rural Power Company Limited, Dhaka, Bangladesh

## **RESEARCH INTERESTS**

Biomaterials and Bioinspired Design, Additive Manufacturing, Composite Materials, Mechanical Behavior of Materials, Nanocomposites, Food and Agricultural Sustainability

## **RESEARCH GRANTS**

### **Flowserve US, Inc**

Project title: High-Temperature-Resistant Hierarchical 1D Nanofiber-2D Nanosheet Composite Coatings, Duration: 01/2023 – 12/2023

PI: M. M. Rahman, Rice University, Co-PI: D. Preston, Rice University

Award size: USD 120,000 (USD 100,000 awarded to Dr. Rahman)

### **Flowserve US, Inc**

Project title: Additive Manufacturing of High-Performance Polymeric Nanocomposites for Severe Service Applications, Duration: 01/2023 – 12/2023

PI: M. M. Rahman, Rice University, Co-PI: R. Verduzco, Rice University

Award size: USD 100,000 (USD 50,000 awarded to Dr. Rahman)

### **Carbon Hub, Rice University**

Project title: Carbon Nanotubes Based Prepregs with Super-high-volume Fractions for advanced high-performance composites, Duration: 05/2022 – 11/2023

PI: M. M. Rahman, Rice University

Award size: USD 100,000

### **Alberta Innovates – Technology Futures**

Project title: Process Development for Transforming Alberta's Asphaltenes into High-value Carbon Fibers (Phase-II), Duration: 08/2021 – 01/2023

PI: M. G. Kibria, University of Calgary, Co-PI: M. M. Rahman, Rice University

Award size: CAD \$500,000 (CAD \$250,000 awarded to Dr. Rahman)

### **U.S. Endowment for Forestry and Communities**

Project title: Cellulose Nanocrystal-Protein Nanocomposite Coating for Perishable Fruits, Duration: 06/2021 – 05/2022

PI: M. M. Rahman, Rice University

Award size: USD 50,000

### **National Science Foundation**

Project title: Reducing Food Waste: Commercialization of Protein-based Edible Coatings for Perishable Produce, Duration: 06/2021 – 05/2022

PI: M. M. Rahman, Rice University

Award size: USD 50,000

### **Alberta Innovates – Technology Futures**

Project title: Process Development for Transforming Alberta's Asphaltenes into High-value Carbon fibers (Phase-I), Duration: 08/2020 – 02/2021

PI: Md. G. Kibria, University of Calgary, Co-PI: M. M. Rahman and P. M. Ajayan, Rice University  
Award size: CAD \$50,000 (CAD \$25,000 awarded to Dr. Rahman)

## RESEARCH PUBLICATIONS

### Patents

3. Rahman, M. M.; Jung, S.; Pottackal, N.; Ajayan, P. M. Poly-albumen based green coating to enhance shelf life of perishable foods. US Patent Application No.: 17/373, 316, 2022.
2. Sajadi, S. M.; Kumar, A.; Boul, P. J.; Rahman, M. M.; Thaemlitz, C.; Ajayan, P. M. Additive manufacturing-assisted method for making structural elements having controlled failure characteristics. US Patent Application No.: 16/874, 449, 2021.
1. Rahman, M. M.; Sajadi, S. M.; Kumar, A.; Boul, P. J.; Thaemlitz, C.; Ajayan, P. M. Cement-based direct ink for 3D-printing of complex architected structures. US Patent Application No.: 16/596, 396, 2020.

### Journal Articles (\* indicates corresponding author)

55. Das, M.; Das, R.; Ambekar, R.S.; Pal, V.; Pottackal, N.; Saadi, M.A.S.R., Maguire, A.; Panda, S.K.; Kabbani, M.; Ajayan, P.M.; Rahman, M. M.\*, Tiwary, C.S. Recent Progress in 3D Printing of Advanced Materials. Accepted in *Materials Today*.
54. Saadi, M.A.S.R.; Advincula, P.A.; Thakur, M.S.H.; Khater, A.; Saad, S.; Zeraati, A.s.; Nabil, S.K.; Zinke, A.; Roy, S.; Lou, M.; Bheemasetti, S.N.; Bari, M.A.A.; Zheng, Y.; Beckham, J.L.; Gadhamshetty, V.; Vashisth, A.; Kibria, M.G.; Tour, J.M.; Ajayan, P.M.; Rahman, M.M.\* Sustainable Valorization of Asphaltene via Flash Joule Heating. Accepted in *Science Advances*.
53. Zhu, D.; Zhang, J.; Wu, X.; Yan, Q.; Liu, F.; Zhu, Y.; Gao, X.; Rahman, M.M.; Yakobson, B.I.; Ajayan, P. M.; Verduzco, R. Understanding Fragility and Engineering Activation Stability in Two-Dimensional Covalent Organic Frameworks. Accepted in *Chemical Science*.
52. Khan, M.A.; Nabil, S.K.; Al-Attas, T.; Yasri, N.G.; Roy, S.; Rahman, M. M.; Larter, S.; Ajayan, P.M.; Hu, J.; Kibria, M.G. Zero-crossover electrochemical CO<sub>2</sub> reduction to ethylene with coproduction of valuable chemicals. *Chem Catalysis*.
51. Vemuri, B.; Chilkoor, G.; Dhungana, P.; Islam, J.; Baride, A.; Koratkar, N.; Ajayan, P.M.; Rahman, M. M.; Hoefelmeyer, J.D.; Gadhamshetty, V. Oxygen reduction reaction with manganese oxide nanospheres in microbial fuel cells. *ACS Omega*
50. Saadi, M.A.S.R.; Maguire, A.; Pottackal, N.; Thakur, M.S.H.; Hart, J.; Ajayan, P. M.; Rahman, M. M.\*. Direct Ink Writing: A 3D printing technology for diverse materials. *Advanced Materials*

49. Saad, S.; Zeraati, A.S.; Roy, S.; Saadi, M.A.S.R.; Radović, J.R.; Rajeev, A.; Miller, K.A.; Bhattacharyya, S.; Larter, S.R.; Natale, G.; Sundararaj, U.; Ajayan, P.M.; Rahman, M.M.\*; Kibria, M.G. Transformation of Petroleum Asphaltenes to Carbon Fibers. *Carbon*.
48. Ghosal, P.; Gupta, B.; Ambekar, R.; Rahman, M. M.; Ajayan, P. M.; Aich, N.; Gupta, A. K.; Tiwary, C.S. 3D Printed Materials in Water Treatment Applications. *Advanced Sustainable Systems*.
- Selected as a front cover in *Advanced Sustainable Systems*
47. Susarla, S.; Chilkoor, G.; Kalimuthu, J. R.; Saadi, M. A. S. R.; Cui, Y.; Arif, T.; Tsafack, T.; Puthirath, A. B.; Sigdel, P.; Jasthi, B.; Sudeep, P. M.; Hu, L.; Hassan, A.; Castro-Pardo, S.; Barnes, M.; Roy, S.; Verduzco, R.; Kibria, M. G.; Filleter, T.; Lin, H.; Solares, S. D.; Koratkar, N.; Gadhamshetty, V.; Rahman, M. M.\*; Ajayan, P. M. Corrosion Resistance of Sulfur–Selenium Alloy Coatings. *Advanced Materials* 2021, 2104467.
- Featured in *Phys.org*, *Eureka Alert*, *Science daily*, and numerous news outlets.
46. Sajadi, S. M.; Vásárhelyi, L.; Mousavi, R. Rahmati, A. H.; Kónya, Z.; Kukovecz, A.; Arif, T.; Filleter, T.; Vajtai, R.; Tiwary, C. S.; Rahman, M. M.\*, Ajayan, P. M. Damage-tolerant 3D Printed Ceramics via Conformal Coating. *Science Advances* 2021, 7, eabc5028
- Featured in *Materials Today*, *3D printing industry*, *Phys.org*, *Eureka Alert*, *Science daily*, and numerous news outlets.
45. Mescola, A.; Paolicelli, G.; Ogilvie, S. P.; Guarino, R.; McHugh, J. G.; Rota, A.; Iacob, E.; Gnecco, E.; Valeri, S.; Pugno, N. M.; Gadhamshetty, V.; Rahman, M. M.; Ajayan, P. M.; Dalton, A. B.; Tripathi, M.; Graphene Confers Ultralow Friction on Nanogear Cogs. *Small* 2021, 2104487.
44. Adnan, M. A.; Khan, M. A.; Rahman, M. M.; Ajayan, P. M.; Hu, J.; Kibria, M. G.; Transition pathways towards net-zero emissions methanol production. Accepted in *Green Chemistry* 2021.
43. Roy, S.; Zhang, X.; Puthirath, A. B.; Meiyazhagan, A. K.; Bhattacharyya, S.; Rahman, M. M.; Babu, G. ; Susarla, S.; Saju, S. K.; Tran, M. K.; Sassi, L.; Saadi, M. A. S. R.; Lai, J.; Sahin, O.; Sajadi, S. M.; Dharmarajan, B.; Salpekar, D.; Chakingal, N.; Baburaj, A.; Shuai, X.; Adumbukulath, A.; Miller, K. A.; Gayle, J. M.; Ajnsztajn, A.; Prasankumar, T.; Harikrishnan, V. V. J.; Ojha, V.; Kannan, H.; Khater, A.; Zhu, Z.; Iyengar, S. A.; Castro, S.; Autreto, P. A.; Oliveira, E. F.; Gao, G.; Tijerina, J. T.; Yadav, R. M.; Arepalli, S.; Vajtai, R.; Ajayan, P. M. Structure, Properties and Applications of Two-dimensional Hexagonal Boron Nitride. *Advanced Materials* 2021, 202101589.
42. Zhu, Y.; Zhu, D.; Gao, G.; Yan, Q.; Xu, J.; Liu, Y.; Alahakoon, S.; Rahman, M. M.; Ajayan, P. M.; Egap, E.; Verduzco, R. Metal oxide catalysts for the synthesis of COFs and one-step preparation of COF composites. *Chemistry of Materials* 2021, 33 (15), 6158–6165.

41. Zhu, D.; Hu, Z.; Rogers, T.; Barnes, M.; Tseng, C.; Mei, H.; Sassi, L.; Zhang, Z.; Rahman, M. M.; Ajayan, P. M.; Verduzco, R. Patterning, Transfer, and Tensile Testing of Covalent Organic Frameworks Films with Nanoscale Thickness. *Chemistry of Materials* 2021, 33(17), 6724–6730.
40. Zhu, D.; Zhu, Y.; Yan, Q.; Liu, F.; Yu, P.; Tseng, C.; Tjahjono, N.; Huang, P.; Rahman, M. M.; Egap, E.; Ajayan, P. M.; Verduzco, R. Pure Crystalline Covalent Organic Framework Aerogels. *Chemistry of Materials* 2021, 33 (11), 4216-4224.
39. Zhu, D.; Xu, G.; Barnes, M.; Zhang, Z.; Zhang, J.; Li, Y.; Khalil, S.; Rahman, M. M.\*; Verduzco, R.; Ajayan, P. M. Covalent Organic Frameworks for Batteries. *Advanced Functional Materials* 2021, 202100505.
38. Khan, M.A.; Al-Attas, Tareq; Roy, S.; Rahman, M. M.; Ghaffour, N.; Thangadurai, V.; Larter, S.; Hu, J.; Ajayan, P.M.; Kibria, M.G. Seawater Splitting for Hydrogen Production: A Solution Looking for a Problem? *Energy & Environmental Science* 2021, 14, 4831-4839.
37. Zhu, D.; Zhang, Z.; Li, Y.; Barnes, M.; Khalil, S.; Rahman, M. M.; Ajayan, P. M.; Verduzco, R. Rapid, ambient temperature synthesis of imine covalent organic frameworks catalyzed by transition metal nitrates. *Chemistry of Materials* 2021, 33 (9), 3394-3400.
36. Yuan, F.; Salpekar, D.; Baburaj, A.; Hasan, S.; Putirath, A. B.; Saadi, M.A.S.R.; Robles, F.C.; Robetzazi, H.; Roy, S.; Sun, D.; Kotov, N.A.; Rahman, M. M.\*; Ajayan, P. M. Fiber reinforced Monolithic Supercapacitor with Interdigitated Interfaces. *Journal of Materials Chemistry A*. 2021, 9, 11033-11041.
35. Sajadi, S. M.; Enayat, S.; Vászrhelyi, L.; Alabastri, A.; Lou, M.; Sassi, L.M.; Kutana, A.; Bhowmick, S.; Durante, C.; Kukovecz, A.; Puthirath, A. B.; Kónya, Z.; Vajtai, R.; Boul, P.; Tiwary, C. S.; Rahman, M. M.\*; Ajayan, P. M. Three-dimensional Printing of Complex Graphite Structures. *Carbon* 2021, 181, 260-269.
34. Sajadi, S. M.; Tiwari, C.S.; Rahmati, A. H.; Eichmann, S. L.; Thaemlitz, C. J.; Salpekar, D.; Puthirath, A. B.; Boul, P. J.; Rahman, M. M.\*; AshokKumar, M.; Ajayan, P. M. Deformation Resilient Cement Structures using 3D Printed Molds. *iScience* 2021, 24(3), 102174.
33. Tripathi, M.; Lee, F.; Michail, A.; Anastopoulos, D.; McHugh, J.; Ogilvie, S.; Large, M.; Amorim Graf, A.; Lynch, P.; Parthenios, J.; Papagelis, K.; Roy, S.; Rahman, M. M.; King, A.; Ajayan, P.; Dalton, A. Structural Defects Modulate Electronic and Nanomechanical properties of 2D materials. *ACS Nano* 2021, 15(2), 2520-2531.
32. Zhu, D.; Li, X.; Li, Y.; Barnes, M.; Tseng, C.; Khalil, S.; Rahman, M. M.; Ajayan, P. M.; Verduzco, R. Transformation of One-Dimensional Linear Polymers into Two-Dimensional Covalent Organic Frameworks Through Sequential Reversible and Irreversible Chemistries. *Chemistry of Materials* 2021, 33(1), 413-419.

31. Yuan, F.; Huang, Y.; Qian, J.; Rahman, M. M.\*; Ajayan, P. M.; Sun, D. Free-standing SnS/Carbonized Cellulose Film as Durable Anode for Lithium-Ion Batteries. Accepted in *Carbohydrate Polymers* 2021, 255, 117400.
30. Maguire, A.; Pottackal, N.; Saadi, M.A.S.R.; Rahman, M. M.\*; Ajayan, P. M. Additive Manufacturing of Polymer-based Structures by Extrusion Technologies. *Oxford Open Materials Science* 2021, 1(1): itaa004.
29. Chilkoor, G.; Shrestha, N.; Kutana, A.; Hernández, F. C. R.; Yakobson, B. I.; Meyyappan, M.; Ajayan, P. M.; Rahman, M. M.\*; Gadhamshetty, V. Atomic Layers of Graphene for Microbial Corrosion Prevention. *ACS Nano* 2021, 15(1), 447-454.
28. Chilkoor, G.; Jawaharraj, K.; Vemuri, B. Kutana, A.; Triptahi, M.; Kota, D.; Arif, T.; Filleter, T.; Dalton, A.B.; Yakobson, B.I.; Meyyappan, M.; Rahman, M. M.\*, Ajayan, P. M., Gadhamshetty, V. Hexagonal Boron Nitride for Sulfur Corrosion Inhibition. *ACS Nano* 2020, 14(11), 14809-14819.
27. Barnes, M.; Sajadi, S.M.; Parekh, S.; Rahman, M. M.\*; Ajayan, P.M.; Verduzco, R. Reactive 3D Printing of Shape Programmable Liquid Crystal Elastomers. *ACS Applied Materials & Interfaces* 2020, 12(25), 28692-28699.
  - Featured in *Phys.org*, *Eureka Alert*, *Science daily*, and numerous news outlets.
26. Jung, S.; Cui, Y.; Barnes, M.; Satam, C.; Zhang, S.; Chowdhury, R.; Adumbumkulath, A.; Sahin, O.; Miller, C.; Sajadi, S.M.; Sassi, L.; Ji, Y.; Bennett, M.; Yu, M.; Friguglietti, J.; Merchant, F.; Verduzco, R.; Roy, S.; Vajtai, R.; Meredith, J.C.; Youngblood, J.; Koratkar, N.; Rahman, M. M.\*; Ajayan, P.M. Multifunctional bionanocomposite coatings for perishable fruits. *Advanced Materials* 2020, 32(26), 1908291.
  - Selected as an inside back cover in *Advanced Materials*.
  - Featured in *Science*, *Materials Today*, *Science daily*, and numerous news outlets.
25. Sajadi, S. M.; Woellner, C. F.; Ramesh, P.; Eichmann, S. L.; Sun, Q.; Boul, P. J.; Thaemlitz, C.; Rahman, M. M.; Baughman, R. H.; Galvão, D.S.; Tiwary, C.S.; Ajayan, P.M. 3D Printed Tubulanes as Lightweight Hypervelocity Impact Resistant Structures. *Small* 2019, 15(52), 1904747.
  - Selected as frontispiece in *Small*.
  - Featured in *Business Insider*, *New Atlas*, *Science Daily*, and numerous news outlets.
24. Rahman, M. M.\*; Puthirath, A.B.; Adumbumkulath, A.; Tsafack T.; Robotjazi, H.; Barnes, M.; Wang, Z.; Kommandur, S.; Susarla, S.; Sajadi, S.; Salpekar, D.; Yuan, F.; Babu, G.; Nomoto, K.; Islam, SM; Verduzco, R.; Yee, SK; Xing, H.G.; Ajayan, PM. Fiber reinforced layered dielectric nanocomposite. *Advanced Functional Materials* 2019, 29(28), 1900056.
  - Featured in *Materials Today*, *Ceramics.org*, *Nanowerk*, and numerous news outlets.

23. Sajadi, S.M.; Boul, P.J.; Thaemlitz, C.; Meiyazhagan, A.K.; Puthirath, A.B.; Tiwary, C.S.; Rahman, M. M.\*; Ajayan, P.M. Direct Ink Writing of Cement Structures Modified with Nanoscale Additive. *Advanced Engineering Materials* 2019, 21(8), 1801380.
  - Selected as back cover in *Advanced Engineering Materials*.
22. Rahman, M. M.; Netravali, A. N. Advanced green composites from liquid crystalline cellulose fibers and waxy maize starch-based resins. *Composites Science and Technology* 2018, 162, 110-116.
  - Featured in *Materials Today*.
21. Rahman, M. M.; Netravali, A. N. High-performance ‘Green’ Nanocomposite using Aligned Bacterial Cellulose and Soy Protein. *Composites Science and Technology* 2017, 146, 183-190.
20. Patil, N.V., Rahman, M. M.; Netravali, A. N. ‘Green’ Composite Using bioresins from agro-wastes and modified sisal fibers. *Polymer Composites* 2017, 40(1), 99-108.
19. Rahman, M. M.; Netravali, A. N. Micro-fibrillated cellulose reinforced eco-friendly polymeric resin from non-edible ‘Jatropha curcus’ seed waste after biodiesel production. *RSC Advances* 2016, 6, 47101-47111.
18. Rahman, M. M.; Netravali, A. N. Aligned Bacterial Cellulose Arrays for Composite Material. *ACS Macro Letters* 2016, 5(9), 1070-1074.
17. Rahman, M. M.; Netravali, A. N. Oriented Bacterial Cellulose-Soy Protein based Fully ‘Green’ Nanocomposites. *Composites Science and Technology* 2016, 136, 85-93.
  - Featured in *Nano Today* and *Materials Today*.
16. Rahman, M. M.; Netravali, A. N.; Tiimob, B. J.; Apalangya, V.; Rangari, V. K. Bio-inspired “green” nanocomposite using hydroxyapatite synthesized from eggshell waste and soy protein. *Journal of Applied Polymer Science* 2016, 133, 43477.
15. Rahman, M. M.; Hosur, M.; Zainuddin, S.; Jahan, N.; Miller-Smith, E. B.; Jeelani, S. Enhanced Tensile Performance of Epoxy and E-glass/epoxy Composites by Randomly oriented Amino-functionalized MWCNTs at Low Contents. *Journal of Composite Materials* 2015, 49 (7), 759–770.
14. Rahman, M. M.; Hosur, M.; Hsiao, K. T.; Wallace, L.; Jeelani, S. Low Velocity Impact Properties of Carbon Nanofibers Integrated Carbon fiber/epoxy Hybrid Composites Manufactured by OOA–VBO Process. *Composite Structures* 2015, 120, 32–40.
13. Rahman, M. M.; Ho, K.; Netravali, A. N. Bio-based Polymeric Resin from Agricultural Waste, Neem (*Azadirachta indica*) Seed Cake, for Green Composites. *Journal of Applied Polymer Science* 2015, 132, 41291. DOI: 10.1002/app.41291.

12. Islam, M. E.; Rahman, M. M.; Hosur, M.; Jeelani, S. Thermal Stability and Kinetics Analysis of Epoxy Composites Modified with Reactive Polyol Diluent and Multiwalled Carbon Nanotubes. *Journal of Applied Polymer Science* 2015, *132*, 41558.
11. Rahman, M. M.; Netravali, A. N.; Tiimob, B. J.; Rangari, V. K. Bio-derived “Green” Composite from Soy Protein and Eggshell Nanopowder. *ACS Sustainable Chemistry and Engineering* 2014, *2* (10), 2329–2337.
10. Rahman, M. M.; Netravali, A. N. Green Resin from Forestry Waste Residue “Karanja (Pongamia pinnata) Seed Cake” for Biobased Composite Structures. *ACS Sustainable Chemistry and Engineering* 2014, *2* (10), 2318–2328.
9. Jajam, K. C.; Rahman, M. M.; Hosur, M. V.; Tippur, H. V. Fracture Behavior of Epoxy Nanocomposites Modified with Polyol Diluent and Amino-functionalized Multiwalled Carbon Nanotubes: A Loading Rate Study. *Composites Part A: Applied Science and Manufacturing* 2014, *59*, 57–69.
8. Zainuddin, S.; Fahim, A.; Arifin, T.; Hosur, M. V.; Rahman, M. M.; Tyson, J. D.; Jeelani, S. Optimization of Mechanical and Thermomechanical Properties of Epoxy and E-glass/epoxy Composites Using NH<sub>2</sub>-MWCNTs, Acetone Solvent and Combined Dispersion Methods. *Composite Structures* 2014, *110*, 39–50.
7. Jahan, N.; Narteh, A.; Hosur, M.; Rahman, M. M.; Jeelani, S. Effect of Carboxyl Functionalized MWCNTs on the Cure Behavior of Epoxy Resin. *Open Journal of Composite Materials* 2013, *03* (02), 40–47.
6. Salam, M. B. A.; Hosur, M. V.; Jahan, N.; Rahman, M. M.; Jeelani, S. Improvement in Mechanical and Thermo-Mechanical Properties of Carbon fiber/Epoxy Composites Using Carboxyl Functionalized Multi-Walled Carbon Nanotubes. *Polymer and Polymer Composites* 2013, *21* (8), 495–507.
5. Rahman, M. M.; Hosur, M.; Zainuddin, S.; Vaidya, U.; Tauhid, A.; Kumar, A.; Trovillion, J.; Jeelani, S. Effects of Amino-functionalized MWCNTs on Ballistic Impact Performance of E-glass/epoxy Composites Using a Spherical Projectile. *International Journal of Impact Engineering* 2013, *57*, 108–118.
4. Rahman, M. M.; Zainuddin, S.; Hosur, M. V.; Robertson, C. J.; Kumar, A.; Trovillion, J.; Jeelani, S. Effect of NH<sub>2</sub>-MWCNTs on Crosslink Density of Epoxy Matrix and ILSS properties of E-glass/epoxy Composites. *Composite Structures* 2013, *95*, 213–221.
3. Rahman, M. M.; Zainuddin, S.; Hosur, M. V.; Malone, J. E.; Salam, M. B. A.; Kumar, A.; Jeelani, S. Improvements in Mechanical and Thermomechanical Properties of E-glass/epoxy Composites Using Amino-functionalized MWCNTs. *Composite Structures* 2012, *94* (8), 2397–2406.



2. Rahman, M. M.; Hosur, M.; Zainuddin, S.; Jajam, K. C.; Tippur, H. V.; Jeelani, S. Mechanical Characterization of Epoxy Composites Modified with Reactive Polyol Diluent and Randomly oriented Amino-functionalized MWCNTs. *Polymer Testing* 2012, 31 (8), 1083–1093.
1. Rahman, M. M.; Hosur, M.; Ludwick, A. G.; Zainuddin, S.; Kumar, A.; Trovillion, J.; Jeelani, S. Thermo-mechanical Behavior of Epoxy Composites Modified with Reactive Polyol Diluent and Randomly oriented Amino-functionalized Multiwalled Carbon Nanotubes. *Polymer Testing* 2012, 31 (6), 777–784.

### Book Chapters

1. Rahman, M. M.; Netravali, A. N. ‘Green’ Resins from Plant Sources and Strengthening Mechanisms. Book Chapter in *Advanced Green Composites* published by Scrivener Publishing.

### Manuscript under Review or Revision

5. Sajadi, S.M.; Das, R.; Thakur, M.S.H.; Boul, P.; Rahman, M.M.; Tiwary, C.S.; Ajayan, P.M. Direct Ink Writing of Metals and Multi-material Structures. Under review in *Matter*.
4. Islam, J.; Obulisamy, P.K.; Dalton, A.B.; Upadhyayula, V.K.K.; Sani, R.; Rahman, M.M.; Ajayan, P.M.; Tripathi, M.; Gadhamshetty, V. Few Layered Graphene for Microbial Methanol Fuel Cells. Under review in *ACS Nano*.
3. Zhu, D.; Yan, Q.; Zhu, Y.; Ajnsztajn, A.; Rahman, M.M.; Ajayan, P.M.; Verduzco, R. Solvent induced incremental pore collapse in two-dimensional covalent organic frameworks. Under review *Chemical Science*.
2. Khater, A.; Bhattacharyya, S.; Saadi, M. A. S. R.; Barnes, M.; Lou, M. Harikrishnan, V.; Sajadi, S.M.; Boul, P.J.; Tiwary, C.S.; Zhu, H.; Rahman, M.M.; Ajayan, M. P. Processing Dynamics of Carbon Nanotubes-Epoxy Nanocomposites during 3D printing. Under Review in *Composites: Part B*.
1. Herkal, S.; Rahman, M. M.; Nagaraja, S.; Harikrishnan, V, Ajayan, P. M. Additive Manufacturing of Macro-scale Schwarzites for Vibration Isolation and Damping Enhancement. Under Review in *Applied Materials Today*.

### HONORS AND AWARDS

<b>Napier Rice Launch Challenge</b> , 2 <sup>nd</sup> position, Advisor of Team ‘EpiFresh’	2022
<b>Rice Business Plan Competition</b> , Semifinalist among 42 teams from the world, Advisor of Team ‘EpiFresh’	2022
<b>Rice Business Plan Competition</b> , Selected for ‘Bio-nanocomposite coating of perishable foods’ from Rice University, Advisor of Team ‘EpiFresh’	2022

<b>BBC Bangla</b> , Featured on bio-nanocomposite coating for perishable foods as TV news on February 19	2022
<b>The Daily Star</b> , Featured on bio-nanocomposite coating for perishable foods in front page of leading newspaper on January 2	2022
<b>Create the Future Design Contest</b> , Tech Briefs, Winner, Sustainability	2021
<b>National Science Foundation (NSF) I-Corps</b> , Technical Lead	2021
<b>Hershel M. Rich Invention Award</b> , Rice University	2020
<b>Materials Research Society (MRS) Fall/Spring</b> , Invited Speaker	2020
<b>Scientia Lecture Series Invited Speaker</b> , Rice University	2019 – 2020
<b>Southwest I-Corps (NSF) Technical Lead</b> , Houston	2018
<b>The Climate Reality Project Leader</b> trained by Al Gore	2017
<b>MiSK-UNDP Youth delegate</b> , New York	2017
<b>Sigma Xi- Research Society Symposium</b> , Tuskegee University, 1 <sup>st</sup> prize	2012
<b>Sigma Xi- Research Society Symposium</b> , Tuskegee University, 3 <sup>rd</sup> prize	2011
<b>BHEL-GE Gas Turbine Services (BGGTS) Ltd.</b> , India, Honorary award	2006
<b>Technical Scholarship</b> , Government of Bangladesh	2000 – 2005

## TEACHING EXPERIENCE

### Rice University

Additive Manufacturing (MSNE 413/513), <b>Instructor</b>	Fall 2022
Additive Manufacturing (MSNE 413/513), <b>Instructor</b>	Fall 2021
Additive Manufacturing (MSNE 413/513), <b>Instructor</b>	Fall 2020
Biomimetic Strategies (MSNE 555), Guest Lecturer	Spring 2018
Materials Science for Engineer (MSNE 301), Guest Lecturer	Fall 2018

### Tuskegee University

Thermal Science Lab (MENG 412), Lab Instructor	Spring 2012
Strength of Materials (MENG 316), Guest Lecturer	Fall 2011
Fluid Mechanics (MENG 313), Teaching Assistant	Fall 2011
Engineering Economics (MENG 429), Teaching Assistant	Spring 2011
Dynamics (MENG 212), Teaching Assistant	Spring 2011
Design for Manufacturing (MENG 420), Teaching Assistant	Fall 2010

## INVITED TALKS

Multiscale Mechanical Modeling and Research Network (MMMRN)	January 15, 2022
International Biodeterioration& Biodegradation Symposium (IBBS18)	September 09, 2021
Rice University, TX, 2 <sup>nd</sup> Annual AMPT Symposium	January 22, 2021
MRS Spring/Fall Virtual Meeting 2020	November 28, 2020
South Dakota School of Mines, Electrical Engineering Seminar Series	November 12, 2020

Rice University, TX, MSNE Seminar Series	April 16, 2020
Rice University, TX, 2019-2020 Scientia Lecture Series	September 17, 2019
Air Force Research laboratory, OH, Structural Materials Division	April 30, 2019
Oak Ridge National Laboratory, TN, MSTD	December 08, 2017
Cornell University, NY, Department of Fiber Science	September 22, 2016

## SELECTED CONFERENCE PROCEEDINGS & PRESENTATIONS

Cui, Y.; Jung, S.; Ajayan, P.M.; Rahman, M. M. Protein-Based Multifunctional Bionanocomposite- A Conformal Coating for Perishable Fruits. *MRS Virtual Spring/Fall Meeting*, November 27- December 04, 2020.

Rahman, M. M.; Netravali, A. N. From Agro-wastes to Advanced 'Green' Composites. *CCMR Symposium*, Cornell University, Ithaca, NY, May 19, 2015.

Rahman, M. M.; Netravali, A. N. From Agro-wastes to Advanced 'Green' Polymers for Automotive Composites. *ACCE (Automotive Composites Conference & Exhibition)*, Society of Plastic Engineers, Nova, MI, September 09-11, 2014.

Rahman, M. M.; Islam, M. E.; Hosur, M. V.; Jeelani, S. Kinetics of Degradation of Epoxy Composites Modified with Reactive Polyol Diluent and Amino-functionalized Multiwalled Carbon Nanotubes. *45<sup>th</sup> International SAMPE Technical Conference (ISTC)*, Wichita, KS, October 21-24, 2013.

Rahman, M. M.; Zainuddin, S.; Hosur, M. V.; Malone, J. E.; Kumar, A.; Jeelani, S. Optimization of Low-Velocity Impact Properties of E-glass/epoxy Composites Using Plasticizing Modifiers. *ASME International Mechanical Engineering Congress and Exposition*, Houston, TX, November 09-15, 2012.

Rahman, M. M.; Hosur, M. V.; Zainuddin, S.; Vaidya, U.; Kumar, A.; Trovillion, J.; Jeelani, S. Effect of Amino-functionalized MWCNTs on High Velocity Impact Properties of E-glass/epoxy composites, *American Society of Composites (ASC) conference*, Arlington, TX, October 1-3, 2012.

Rahman, M. M.; Zainuddin, S.; Hosur, M. V.; Jeelani, S. Enhancement of Energy Absorption Capability of GFRP Composites Using Plasticizing Modifier, *SAMPE Conference*, Baltimore, MD, May 21-24, 2012.

Rahman, M. M.; Zainuddin, S.; Hosur, M.V.; Jeelani, S. Interlaminar Shear Strength Properties of E-glass/epoxy Nanocomposites Enhanced with Functionalized Multiwalled Carbon Nanotubes. *Sigma Xi - The Scientific Research Society Symposium*, Tuskegee University Chapter, Tuskegee, AL, April 27, 2012.

Rahman, M. M.; Zainuddin, S.; Hosur, M. V.; Kumar, A.; Trovillion, J.; Jeelani, S. Effect of Enhanced Crosslink Density on Interfacial Strength of E-glass/epoxy Composites Modified by

Amino-functionalized MWCNTs. *International Conference on Mechanical Engineering (ICME) conference*, Dhaka, Bangladesh, December 18-20, 2011.

Rahman, M. M.; Zainuddin, S.; Hosur, M.V.; Jeelani, S. Experimental Study on the Effect of Enhanced Crosslink Density on Mechanical Properties of E-glass/epoxy Composites Modified with Amino-functionalized MWCNTs. *ASME International Mechanical Engineering Congress and Exposition*, Denver, CO, November 11-17, 2011.

Rahman, M. M.; Zainuddin, S.; Hosur, M. V.; Robertson, C. J.; Salam, M. B. A.; Kumar, A.; Jeelani, S. Experimental Investigation of E-glass/epoxy Composites Modified Using NH<sub>2</sub>-MWCNTs through Sonication and Calendaring Methods, *43<sup>th</sup> International SAMPE Technical Conference (ISTC)*, Fort Worth, TX, October 17-20, 2011.

Rahman, M. M.; Zainuddin, S.; Hosur, M.V.; Jeelani, S. Flexure Properties of E-glass/epoxy Nanocomposites Enhanced with Functionalized Multiwalled Carbon Nanotubes. *Sigma Xi - The Scientific Research Society Symposium*, Tuskegee University Chapter, Tuskegee, AL, March 18-19, 2011.

## **ADVISING/MENTORSHIP EXPERIENCE**

### **Graduate Students**

Nicholas Curtis, MSNE, Rice University (Co-advisor)	2021 – present
Md. Sajedul Thakur, MSNE, Rice University (Advisor)	2021 – present
Neethu Pottackal, MSNE, Rice University (Co-advisor)	2020 – present
Alianna Maguire, MSNE, Rice University	2020 – present
M.A.S.R. Saadi, MSNE, Rice University (Advisor)	2020 – present
Vijay Harikishan, MSNE, Rice University	2019 – present
Ali Khater, MSNE, Rice University	2018 – present
Seyed M. Sajadi, MSNE, Rice University	2018 – 2021
Fanshu Yuan, MSNE, Rice University	2018 – 2019
Sandhya Susarla, MSNE, Rice University	2018 – 2019

### **Undergraduate Students**

Daniel Stulski, Mechanical Engineering, Rice University	2021 – present
Chloe Kong, MSNE, Rice University	2020 – present
Aasha Zinke, MSNE, Rice University	2020 – present
Nancy Qui, MSNE, Rice University	2018 – 2021
Grant Wilkinson, Mechanical Engineering, Rice University	2018 – 2019
Sylvia Jung, MSNE, Rice University	2018 – 2021
Qiyun Xu, Fiber Science, Cornell University	2017 - 2018
Vienna Chen, Fiber Science, Cornell University	2014 - 2016
Kelly Ho, Biological & Environmental Engg., Cornell University	2012 - 2014
Jeffrey Huang, Material Science and Engineering, Cornell University	
Everett Miller-Smith, Mechanical Engineering, Tuskegee University	2011 - 2012
Jonathon E Malone, Mechanical Engineering, Tuskegee University	2010 - 2011
Charles J Robertson, Mechanical Engineering, Tuskegee University	
James Holly, Mechanical Engineering, Tuskegee University	

## ACADEMIC COMMUNITY SERVICE

### Referee for Journals:

Nature Communications, Advanced Materials, Science Advances, Advanced Materials Technologies, Advanced Intelligent Systems, Additive Manufacturing, ACS Applied Materials & Interfaces, ACS Biomaterials Science & Engineering, ACS Applied Nanomaterials, Carbon, Cellulose, Composite Science and Engineering, Macromolecules, Polymer, Industrial & Engineering Chemistry Research, Journal of Composite Materials, Journal of Materials Science, Journal of Materials Engineering and Performance, Emergent Materials, MRS Communications, SN Applied Sciences, AATCC Journal of Research, Applied Composite Materials,.

### Grant Proposal Reviewer:

ACS Petroleum Research Fund (PRF), 2022

### Chair at Sessions at Scientific Meetings:

2022 Annual Meeting, Carbon Hub, Rice University

### Professional Memberships:

Carbon Hub, Rice University	2021 –
The Ken Kennedy Institute, Rice University	2021 –
Additive Manufacturing, Performance and Tribology (AMPT) Center, Rice University	2021 –
Member of American Society of Mechanical Engineers (ASME)	2011 –
Member of Society for Advancement of Material and Process Engineering (SAMPE)	2011 –
Member of American Chemical Society (ACS)	2012 –
Member of Material Research Society (MRS)	2013 –