MUBASHIR QAMAR ANSARI

CURRICULUM VITAE

Associate Research Scientist
The Dow Chemical Company
Address: 608 Wilson Drive, Midland, MI 48642
Cell Phone: (540) 394-1676
E-Mail: mansari5@dow.com
LinkedIn: https://www.linkedin.com/in/mqansari/

EDUCATION:

8/2014-2/2019	Ph.D.	Chemical Engineering	Virginia Tech
8/2014-9/2017	M.Eng.	Chemical Engineering	Virginia Tech
7/2008-5/2012	B.Tech.	Chemical Engineering	IIT-BHU

EXPERIENCE

3/2022-Present Associate Research Scientist, Core R&D Dow Inc. Manager: Andrew Zalusky
9/2019-2/2022 Senior Research Specialist, Core R&D Dow Inc. Manager: Andrew Zalusky

- Leading an injection molding capability, to innovate with various Dow businesses and groups, including Dow Plastics Additives, Packaging & Specialty Plastics, Dow Performance Silicones, Corporate R&D, and Ventures and Business Development.
- Cultivated and leading project pipeline of $2.75 million, since 2021, through business partnerships
- Leading multigenerational planning and capital management for the injection molding platform.
- Engaged with academia through invited seminars (4 invited lectures on sustainability and digitization topics, and one keynote talk), and campus recruitment activities.
- Ideated and led projects to support new business developments by technical and marketing de-risking studies, that are leading to formation of new business platforms.
- Key areas of research focus: polymer blends, including HDPE-binary blends for rigid packaging application, post-consumer recycle incorporation, polyethylene blends for flexible packaging; additives, including nucleators, flame retardants, process aids, substances of concern replacement; high throughput research, digitization, data management; capability development.
- Key application focus: automotive (sustainable composites, electromagnetic interference shielding composites, post-consumer incorporation into TPO formulations, translucent TPO, FR improvement for EVs, impact modification of long and short chain Nylon for EVs and traditional vehicles), caps and closures, blown film for packaging.
- Workflow integration leader, to enable digitization of polymer processing capabilities.
- Four **patent applications**, based on work at Dow.
- **Commercialization:** EVERCAP™ HDPE DMDA-1241 (HDPE product enabling mono-material sustainable packaging), APPEEL™ 35D220 and APPEEL™ 35D140, REVOLOOP™ DMDR-1210 (PCR containing HDPE formulation, nominated for R&D 100); REVOLOOP™ CE (Dow's first blown film resin, containing PCR, Gold Award Winner in the category of Plastic Upcycling by Edison Awards); PFAS free polyethylene products.
- **External Award/Recognition:** 2022 Rising Star by Plastics News

9/2019-2/2022 Senior Research Specialist, Core R&D Dow Inc. Manager: Andrew Zalusky

- Polymer processing, applied rheology, characterization capability development, and data integration to support product development in the flexible and rigid packaging space.
- Evaluation, adoption, and implementation of new technologies to enable formulation screening.

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- Ideation, project shaping, stakeholder management and project management
- Injection molding platform leader: Shaping and executing projects for Dow businesses.
- Intellectual property documentation, safety documentation and project documentation.
- Integration of automation, modeling, and data analysis tools to enable digitalization.

4/2019-8/2019 Senior Engineer, Core R&D Dow Inc. Manager: Andrew Zalusky

- Development of in-line rheology method to enable thermoplastic formulation screening.
- Film blowing and injection molding capability development and validation.
- Support Dow's ambitious sustainability plans to commercialize novel products for film blowing and injection molding applications by formulating resins with recycled content

8/2014-2/2019 Ph.D. Virginia Tech Adviser: Donald G. Baird

Thesis: Generation of Thermotropic Liquid Crystalline Polymer (TLCP)-Thermoplastic Composite Filaments and Their Processing in Fused Filament Fabrication (FFF).

- Generated nearly continuously reinforced composite filaments for 3D Printing (Additive Manufacturing)
- Used rheology to combine polymers with non-overlapping processing temperatures using co-extrusion.
- Tensile strength and modulus of ABS-TLCP filaments were improved by 7 and 20 times, respectively.
- Tensile strength and modulus of PPS-TLCP filaments were improved by 2 and 12 times, respectively.
- Devised recycling schemes for in-situ composites for automotive and aerospace applications.
- Exfoliated carbon nanotubes using a novel CO_2 method for blending with ABS for use in FFF.
- Mentoring and project alignment of undergraduate and first year graduate students.
- **Project:** Generated flame-retardant fibers for combat uniforms for the US Army (9/2017-3/2018)

Key Courses: Rapid Prototyping, Polymer Processing, Finite Element Analysis, Non-Newtonian Fluids, Polymer Viscoelasticity, Transport Phenomena

Granted Patent (US 2021/0095115 A1, Pub. Date: 4/1/2021**):** Thermoplastic Composites for use in Fused Filament Fabrication, a 3-D Printing Process. Inventors: D.G. Baird, **M.Q. Ansari,** C.D. Mansfield.

8/2014-12/2018: Graduate Teaching Assistant Chemical Engineering, Virginia Tech

- Delivered lectures on polymer processing, rheology and 3D Printing in the polymer processing and non-Newtonian fluid courses instructed by my PhD adviser, Dr. Donald Baird.
- Assisted instructors in teaching chemical engineering courses (Heat Transfer, Separation processes, Plant Design). Graded assignments, tests and held regular office hours.
- Designed experiments, taught, and graded performance of the students in the Unit operations laboratory.

6/2012-8/2014: Process Engineer, BPCL, Mumbai Refinery (Fortune 500)

- Supervised a Hydrogen Generation Unit (150 tons/day) and a Crude Distillation Unit (6 MMTPA).
- Led a team comprising of Panel Men, Engineers, and Field Operators for the smooth operation of units.
- Other responsibilities: Manpower management, updating P&ID's and safety.
- Successfully handled many emergency shutdowns and one 4-yearly planned shutdown to implement modifications, catalyst replacement and equipment maintenance such as furnace, reactors, exchangers.
- Trainings: Steady state simulation (Pro-II), Experion Operations by Honeywell and OTS H_2 Simulator.
- Proposed and implemented process improvement for boiler feed water reliability that avoided spurious plant trips. Awarded first prize among 6000 engineers.

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5/2011-6/2011: Summer Intern, Indian Oil Corporation Limited, Haldia India

- Demonstrated advantages of implementing a heat exchanger arrangement for reducing furnace oil consumption for vacuum distillation unit

7/2008-5/2012: BS INDIAN INTITUTE TECHNOLOGY (BHU) Adviser: Dr. A.S.K. Sinha

- Research: Photocatalytic production of H_2 from H_2S.
- Research: Microwave digestion of ZSM-5 and its characterization using FT-IR, BET and XRD.
- **Thesis:** Designed Synthetic Rubber Plant (300 tons/day).

SKILL SETS

Rheology ● Fused Filament Fabrication (3D Printing) ● Single and Twin screw Extruder ● Co-Extrusion ● Injection Molding ● Compression Molding ● DSC ● TGA ● SEM ● WAXS ● SAXS ● XRD ● DMA ● FT-IR ● BET ● Mechanical Testing ● Hot stage optical microscope ● Film Blowing ● Compounding

HONORS & AWARDS

- Aspire award by Virginia Tech — Fall 2018
- Society of Rheology Travel Grant to attend its 90th annual meeting in Houston — Fall 2018
- NSF Student Award to attend 29th International SFF Symposium in Austin, Texas — Summer 2018
- Society of Plastic Engineers Travel Award to attend ANTEC 2018 in Orlando — Spring 2018
- Robert Hord & Kender Graduate Fellowships, Virginia Tech: — Fall '14-Spring '16, Spring '17, Fall '18
- GSA, Virginia Tech Travel Awards — Spring 2017, Fall 2017 and Fall 2018
- BPCL Refinery Suggestion award for proposing and implementing boiler feed water reliability — 2014
- Golden Jubilee Scholarship by Indian Institute of Chemical Engineers — 2009, 2010 & 2012
- Undergraduate fellowship by University Grant Commission, India — 2010-2012
- Award for commercializing Dow's first PCR containing formulation, Agility CE™ — 2021
- Several Bronze, Silver, Gold, and Spotlight awards by Dow — 2019-2023
- Edison Award (Gold) in "Plastics Upcycling Category" category for REVOLOOP™ CE
- Recognized as "2022 Rising Star" by Plastics News — 2022
- REVOLOOP™ DMDR 1210 nominated for R&D 100 — 2023

ENTERPRENEURSHIP CHALLENGES

Formed and led team named "RheoPrinter" to compete in following challenges based on my ideas:

- Ideafest 2018, Danville VA: Top 20 finalist among 120 participants — March 2018
- 2018 Virginia Tech Entrepreneur Challenge — February 2018
- NSF ICorps Virginia Tech Regional Program, Blacksburg- Top team — April 2018
- VTKW Global Entrepreneurship Challenge Semifinals, Blacksburg-Finalist — April 2017

SERVICES, LEADERSHIP, PROFESSIONAL SOCIETIES, JOURNAL RESPONSIBILIES

- Local organizing team member for 88th Annual Meeting, Society of Rheology, Tampa — Spring 2017
- Global Ambassador, Cranwell International Center, Virginia Tech — 2016-17
- Student advisory board member at Smith Career center, Virginia Tech — Spring 2015
- Member of the Ad-hoc Committee on future conferences of the Society of Rheology — 3/2022-Now
- Board member of the Society of plastics engineers' Technical Interest Group on Thermoplastic Elastomers — 3/2022-Now
- SPE ANTEC 2023 Technical Program Chair of Elastomers
- Moderator of Sustainability Session at SPE ANTEC 2023
- Technical Program Chair of Advances in Materials @ CAMX 2023, Georgia, organized by SAMPE.
- Journal Reviewer: Polymer Engineering & Science, Polymer composites and Multidiscipline Modeling in Materials and Structures, Polymer, International Polymer Processing, Physics of Fluids
- Member of Society of Plastics Engineers since 2018

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- Member of Society of Rheology since 2017
- Moderated Applied Rheology Session at ANTEC 2021.
- Session chair for "Applied Rheology and Rheology Methods" at 92nd Annual Meeting of the Society of Rheology, Bangor Maine. Responsibilities include Inviting abstract submission, reviewing and deciding abstract acceptance, presiding over 39 platform presentations.

PUBLICATIONS/PATENTS/CONFERENCE PRESENTATIONS

Granted Patent

1. D.G. Baird, **M.Q. Ansari,** C.D. Mansfield, "Thermoplastic Composites for use in Fused Filament Fabrication, A 3-D Printing Process", **(**US 2021/0095115 A1, Pub. Date: 4/1/2021)

Patent Application

2. IMPROVED BARRIER LDPE FOR INJECTION MOLDING APPLICATION
3. Polyethylene Compositions for Closure Applications
4. PPA FORMULATION BASED ON POLYMERIC PHOSPHITE, PDMS, PEG
5. POLYETHYLENE COMPOSITIONS CONTAINING RECYCLED MATERIAL

Publications

6. C. Mansfield, T. Chen, **M. Ansari**, D. Baird, "The Rheology of Ultra-High Molecular Weight Poly(ethylene oxide) Dispersed in a Low Molecular Weight Carrier, in preparation", Physics of Fluids, Submitted on 10/30/21
7. **M. Ansari,** C. Thurber, D. Roscioli, J. Wang, K. Olson, M. Larive, K. Lu, Y. Zeng, J. Martin, "Model PCR Study to Understand the Effect of Contaminants on Film Properties, International Polyolefins Conference 2022, Galveston.
8. Y. Hu, **M. Ansari**, M. Jones. C. Reinhardt, K. Koppi, Z. Zhou, L. Colin, "Compatibilization of HDPE/PP Recycling Mixture for Injection Molding" International Polyolefins Conference 2022, Galveston.
9. H. Guo, M. Wills, J. Kohn, F. Zhang, **M. Ansari**, K. Koppi, E. Marchbanks, "Acrylic Additive for Thermoplastics Melt Flow Enhancement", ANTEC 2021.
10. **M.Q. Ansari**, C. Thurber, K. Olson, E. Marchbanks, M. Larive, J. Wang, "Processing-Property Relationships for Polyethylene Blown Films using Six Factor Statistical Modeling" International Polyolefins Conference 2020, Houston.
11. **M.Q. Ansari**, A. Redmann, T. A. Osswald, M. J. Bortner, D. G. Baird, "Application of Thermotropic Liquid Crystalline Polymer Reinforced Acrylonitrile Butadiene Styrene in Fused Filament Fabrication", Additive Manufacturing, 29, 100813 (2019).
12. **M.Q. Ansari,** M. J. Bortner, D.G. Baird, "Generation of Polyphenylene Sulfide Reinforced with a Thermotropic Liquid Crystalline Polymer for Application in Fused Filament Fabrication", Additive Manufacturing, 29, 100814 (2019).
13. **M.Q. Ansari,** D.G. Baird, "Generation of High-performance Polyphenylene Sulfide-Thermotropic Liquid Crystalline Polymer Composite Filaments for Use in Fused Filament Fabrication", In AIP Conference Proceedings, vol. 2139, no. 1, p. 190001. AIP Publishing, 2019.
14. **M.Q. Ansari**, C.D. Mansfield, T. Chen, D.G. Baird, "Recyclable Composites Based on Polymers Reinforced with Liquid Crystalline Polymers", 18th Annual SPE ACCE, Detroit, 2018.
15. **M.Q. Ansari,** D.G. Baird, "Assessing the performance of continuously reinforced Acrylonitrile Butadiene Styrene with a Thermotropic Liquid Crystalline Polymer in Fused Filament Fabrication", SPE ANTEC 2018, Orlando.
16. **M.Q. Ansari,** C.D. Mansfield, D.G. Baird, "A Process for Generating Composites of Acrylonitrile-Butadiene-Styrene Reinforced with a Thermotropic Liquid Crystalline Polymer for Use in Fused Filament Fabrication", SPE ANTEC 2016, Indianapolis.

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Oral Presentations (Conferences/Symposiums)

17. **Denver talk**
18. **Chris's ACS talk**
19. **M.Q. Ansari**, K.A. Koppi, D. Ramirez, E. Marchbanks, J. Kohn, D. Kababik and R. Schneider, "Spiral mold flow processability characterization of polyethylene", 92nd Annual Meeting of the Society of Rheology, Bangor Maine
20. **M.Q. Ansari**, D.G. Baird, "Rheology of thermotropic liquid crystalline polymers for generating high-performance strands for use in Fused Filament Fabrication", 90th Annual Meeting, SOR, Houston.
21. **M.Q. Ansari**, D.G. Baird, "Continuously Reinforced and Wholly Thermoplastic Composite Filaments for Application in Fused Filament Fabrication" 29th Annual International Solid Freeform Fabrication Symposium, Austin, Texas.
22. **M.Q. Ansari,** D.G. Baird, "Novel continuously reinforced composite filaments for use in Fused Filament Fabrication", 10th Annual Chemical Engineering Graduate Student Assembly Research Symposium, Virginia Tech, Blacksburg.
23. **M.Q. Ansari**, D.G. Baird, "Continuously reinforced filaments for application in Fused Filament Fabrication, a form of 3D Printing", 2018 GSA Research Symposium, Virginia Tech.
24. **M.Q. Ansari,** D.G. Baird, "Assessing the orientation relaxation of thermotropic liquid crystalline polymers below their melting point using dynamic mechanical analysis", ANTEC 2017, California.
25. **M.Q. Ansari**, D.G. Baird, "Identifying the Reprocessing Temperature of the Thermotropic Liquid Crystalline Polymer Reinforced Composite Filaments for Application in Fused Filament Fabrication Using Dynamic Mechanical Analysis", 9th Annual Chemical Engineering Graduate Student Assembly Research Symposium, Virginia Tech, Blacksburg.
26. **M.Q. Ansari,** C.D. Mansfield, D.G. Baird, "Assessing the orientation relaxation of thermotropic liquid crystalline polymers below their melting point using dynamic mechanical analysis", 88th Annual Meeting, Society of Rheology, Tampa.
27. **M.Q. Ansari**, D.G. Baird, "Dual Extrusion Technology for Filament Fabrication for use in Fused Deposition Modeling", Virginia Soft Matter Workshop IV, VCU, Richmond.
28. **M.Q. Ansari**, C.D. Mansfield, D.G. Baird, "Generation of Thermotropic Liquid Crystalline Polymer Thermoplastic Composite Filaments and Their Processing in Fused Filament Fabrication", 8th Annual Chemical Engineering. Graduate Student Assembly Research Symposium, Virginia Tech, Blacksburg.
29. **M.Q. Ansari,** D.G. Baird, **"**Novel PP Composites for Fused Filament Fabrication (3-D Printing)", Advances in Polyolefins 2017, Santa Rosa, California.
30. C.D. Mansfield, **M.Q. Ansari,** D.G. Baird, The melt rheology of poly(ethylene oxide) powder mixtures of varying initial molecular weight distribution subject to non-oxidative thermal degradation, 88th Annual Meeting, Society of Rheology, Tampa.
31. D.G. Baird, **M.Q. Ansari,** C.D. Mansfield, C. Qian, Generation of thermotropic liquid crystalline polymer thermoplastic composite filaments and their processing in fused filament fabrication, in American Chemical Society (Ed.), 251st ACS National Meeting (2016).

Poster Presentations

32. **M.Q. Ansari**, D.G. Baird," Assessing the Performance of Continuously Reinforced and Wholly Thermoplastic Composite Filaments in Fuse Filament Fabrication, a Form of Additive Manufacturing", 18th annual SPE Automotive Composites Conference & Exhibition, Detroit 2018.
33. **M.Q. Ansari**, D.G. Baird," Generation of Thermotropic Liquid Crystalline Polymer (TLCP)-Thermoplastic Composite Filaments and Their Processing in Fused Filament Fabrication (FFF)", 2018 BASF Research Forum, Iselin, New Jersey.
34. **M.Q. Ansari**, D.G. Baird, "Continuously reinforced Polyphenylene Sulfide filaments for application in Fused Filament Fabrication", 2018 MII Technical Review, Blacksburg.
35. **M.Q. Ansari**, C.D. Mansfield, D.G. Baird, "Thermotropic Liquid Crystalline Polymer reinforced Polyphenylene Sulfide filaments for application in Fused Filament Fabrication", 2017 Southeast Polymer Forum, Virginia Tech, Blacksburg.

36. **M.Q. Ansari,** C.D. Mansfield, D.G. Baird, "Dual Extrusion Method for Reinforcing Acrylonitrile Butadiene Styrene with Thermotropic Liquid Crystalline Polymer for Fused Filament Fabrication and Identification of Post Processing Temperature", 2016 MII Technical Review, Blacksburg.
37. **M.Q. Ansari**, C.D. Mansfield, D.G. Baird," Fabrication of continuously reinforced Filaments using Dual Extrusion Technology for use in Fuse Filament Fabrication", 16th-annual SPE Automotive Composites Conference & Exhibition, Detroit.
38. **M.Q. Ansari**, C.D. Mansfield, D.G. Baird, "Generation of Thermotropic Liquid Crystalline Polymer Thermoplastic Composite Filaments and Their Processing in Fused Filament Fabrication", 32nd Annual GSA Research Symposium & Exposition, Virginia Tech, Blacksburg.
39. **M.Q. Ansari**, C.D. Mansfield, D.G. Baird, "Generation of Thermotropic Liquid Crystalline Polymer Thermoplastic Composite Filaments and Their Processing in Fused Filament Fabrication", 2016 Southeast Polymer Forum, University of Tennessee, Knoxville.
40. **M.Q. Ansari**, U. Sharma, A.S.K Sinha. Microwave Digestion of ZSM-5 and its characterization by FTIR, BET Surface Area Analysis, and XRD Studies. 8th Annual Session of Chemical Engineering Congress (SCHEMCON-2012); p213

Invited Talks:

41. Dow Plastics Additives Innovation Seminar — October 2019
42. Dow's Rheology Center of Excellence — August 2021
43. Invited industrial speaker for "Careers in Rheology" session at 92nd Annual Meeting of the Society of Rheology, Bangor Maine — October 2021
44. Keynote speaker at Chandigarh group of colleges — October 2022
45. Invited by Michigan State University to present department seminar — March 2022
46. Invited guest lecture on digitization at Michigan State University — April 2022
47. Invited guest lecture on digitization at Michigan State University — March 2023
48. 11 internal invited talks