

# Mostafa Dadashi Firouzjaei

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## EDUCATION

University of Alabama, Tuscaloosa, AL, USA

Ph.D., Civil and Environmental Engineering 2020-2022

Dissertation Title: "Environmental Application of Two-and Three-Dimensional Nanomaterials for Wastewater Treatment";  
 Advised by Mark Elliott

M.S., Environmental Engineering 2018-2020

Thesis Title: "The Water Purification Robustness of Metal-organic Framework-polyamide Nanocomposite Thin Films Toward Long Term Organic, Inorganic, and Bacterial Contamination"; Advised by Mark Elliott

Sharif University of Technology, Tehran, Iran

M.S., Material Science and Engineering 2015-2017

Iran University of Science and Technology, Tehran, Iran

B.S., Material Science and Engineering 2011-2015

## PROFESSIONAL EXPERIENCES

**Research Assistant Professor**, University of Alabama, August 2024-Present

**Research Scientist**, University of Alabama, October 2022-August 2024

**Visiting Research Scientist**, University of Alberta, Department of Mechanical Engineering, August 2023- October 2023 (Worked with Dr. Mohtada Sadrzadeh)

**Visiting Research Scientist**, Purdue University, Department of Materials Science and Engineering, April 2023-July 2023 (worked with Dr. Babak Anasori)

**Visiting Research Scientist**, University of Alberta, Department of Mechanical Engineering, October 2022- January 2023 (Worked with Dr. Mohtada Sadrzadeh)

**Postdoctoral Research Associate**, University of Alabama, May 2022-October 2022

**Graduate Research Assistant**, University of Alabama, Civil and Environmental Engineering Department, January 2020-May 2022

**Visiting Ph.D. Student**, Purdue University, Department of Materials Science and Engineering, June 2020-May 2021 (worked with Dr. Babak Anasori)

**Graduate Teaching Assistant**, University of Alabama, Chemical Engineering Department, May 2018-December 2019

## PEER-REVIEWED JOURNAL PUBLICATIONS

("\*" indicates I have served as the corresponding author of the article. Underline identifies graduate students & post-docs who worked under my supervision in that project. The **blue color** indicates that I had the same contribution as the first author)

**38-M. Dadashi Firouzjaei** \*, J. Clayton, H. Jafarian, A. A. Shamsabadi, A. Thakur, R. Todd, S. Nemani, M. Sadrzadeh, M. Elliott, B. Anasori \*, L. Terry \*. "A Perspective on MXene-Enhanced Biofiltration-Membrane Water Reuse Treatment Systems: A Review and Experimental Validation." *Desalination* (2024).

37-Taghipour, A., **M. Dadashi Firouzjaei**, C. Ammann, M. Elliott, P. Karami, A. Rahimpour, and M. Sadrzadeh. "Unveiling the impact of monomer reactivity on the morphology and functionality of thin-film composite membranes." *Chemical Engineering Journal* 480 (2024): 148028.

- 36-Moradi, K., **M. Dadashi Firouzjaei**, M. Elliott, and M. Sadrzadeh. "Lifecycle assessment of membrane synthesis for the application of thermo-osmotic energy conversion process." *Case Studies in Chemical and Environmental Engineering* 10 (2024): 100847.
- 35-Yousefi, A., K. Moradi, P. Karami, **M. Dadashi Firouzjaei**, M. Elliott, A. Rahimpour, and M. Sadrzadeh. "Evaluating the efficiency of modified hydrophobic PVDF membrane for the removal of PFOA substances from water by direct contact membrane distillation." *Desalination* 579 (2024): 117509.
- 34-Zandi, Z., M. Rastgar, M. Mohseni, **M. Dadashi Firouzjaei**, W. Dilokekunakul, B. Anasori, C.D. Vecitis et al. "Electro-Conductive Ti3C2 MXene Multilayered Membranes: Dye Removal and Antifouling Performance." *Advanced Functional Materials* (2024): 2401970.
- 33-Aktij, S.A., **M. Dadashi Firouzjaei\***, S.A. Haddadi, P. Karami, A. Taghipour, M. Yassari, A.A. Asad et al. "Metal-organic frameworks' latent potential as High-Efficiency osmotic power generators in Thin-Film nanocomposite membranes." *Chemical Engineering Journal* 481 (2024): 148384.
- 32-Grube, A., M.M. Shaban, L. Hilger, **M. Dadashi Firouzjaei**, A.A. Shamsabadi, Y. Demirel, M. Elliott, S. Nejati, and M. Bavarian. "Wearable Textile Supercapacitors: Material Advancements and Applications." *Journal of Energy Storage* 99 (2024): 113228.
- 31-Grube, A., A.A. Shamsabadi, **M. Dadashi Firouzjaei**, S.I.G. Peer Mohamed, L. Hilger, M. Elliott, K. McKenzie, and M. Bavarian. "Emperor's new clothes: Novel textile-based supercapacitors using sheep wool fiber as electrode substrate." *Nano Trends* 3: 100014, 2023.
- 30-Gnani Peer Mohamed, S.I., A.A. Shamsabadi, S. Kavousi, **M. Dadashi Firouzjaei**, M. Elliott, S. Yazdanparast, ... & M. Bavarian. "Metal Ions Removal from Organic Solvents using MXene-Based Membranes." *ACS Applied Engineering Materials*, 2023.
- 29-Seidi, F., A.A. Shamsabadi, **M. Dadashi Firouzjaei**, M. Elliott, M.R. Saeb, Y. Huang, ... & B. Anasori. "MXenes Antibacterial Properties and Applications: A Review and Perspective." *Small*, 2206716, 2023.
- 28-Dadashi Firouzjaei, M.\***, E. Zolghadr, A.A. Shamsabadi, M. Sadrzadeh, A. Rahimpour, F.A. Afkhami, E.K. Wujcik, and M. Elliott. "Clean water recycling through adsorption via heterogeneous nanocomposites: Silver-based metal-organic framework embellished with graphene oxide and MXene." *Case Studies in Chemical and Environmental Engineering* 7: 100296, 2023.
- 27-Dadashi Firouzjaei, M.\***, S.K. Nemani, M. Sadrzadeh, E.K. Wujcik, M. Elliott, & B. Anasori. "Life Cycle Assessment of Ti3C2Tx MXene Synthesis." *Advanced Materials*, 2300422, 2023. (**Selected for the front cover: [Link](#)**)
- 26-Jafarian, H., **M. Dadashi Firouzjaei\***, S.A. Aktij, A. Aghaei, M.P. Khomami, M. Elliott, ... & A. Rahimpour. "Synthesis of heterogeneous metal-organic Framework-Graphene oxide nanocomposite membranes for water treatment." *Chemical Engineering Journal*, 455, 140851, 2023. (Contributed as Corresponding Author).
- 25-Aktij, S.A., M. Hosseininejad, **M. Dadashi Firouzjaei**, S. Farhadi, M. Elliott, A. Rahimpour, J.B.P. Soares, M. Sadrzadeh, and Y. Mansourpanah. "High perm-selectivity and performance of tuned nanofiltration membranes by merging carbon nitride derivatives as interphase layer for efficient water treatment." *Journal of Water Process Engineering* 56: 104432, 2023.
- 24-Dadashi Firouzjaei, M.**, M. Karimiziarani, H. Moradkhani, M. Elliott, and B. Anasori. "MXenes: The two-dimensional influencers." *Materials Today Advances* 13: 100202, 2022.
- 23-Dadashi Firouzjaei, M.**, M. Pejman, M.S. Gh, S.A. Aktij, E. Zolghadr, A. Rahimpour, ... & M. Elliott. "Functionalized polyamide membranes yield suppression of biofilm and planktonic bacteria while retaining flux and selectivity." *Separation and Purification Technology*, 282, 119981, 2022.
- 22-Zolghadr, E., **M. Dadashi Firouzjaei\***, S.A. Aktij, A. Aghaei, E.K. Wujcik, M. Sadrzadeh, A. Rahimpour, F.A. Afkhami, P. LeClair, and M. Elliott. "An ultrasonic-assisted rapid approach for sustainable fabrication of antibacterial and anti-biofouling membranes via metal-organic frameworks." *Materials Today Chemistry* 26: 101044, 2022. (Contributed as Corresponding Author).

- 21-Karami, P., S.A. Aktij, B. Khorshidi, **M. Dadashi Firouzjaei**, A.A. Asad, M. Elliott, A. Rahimpour, J.B.P. Soares, and M. Sadrzadeh. "Nanodiamond-decorated thin film composite membranes with antifouling and antibacterial properties." *Desalination* 522: 115436, 2022.
- 20-Nejad, S.M., S.F. Seyedpour, S.A. Aktij, **M. Dadashi Firouzjaei**, M. Elliott, A. Tiraferri, M. Sadrzadeh, and A. Rahimpour. "Loose nanofiltration membranes functionalized with in situ-synthesized metal organic framework for water treatment." *Materials Today Chemistry* 24, 2022.
- 19-Rezaeipour, Y., E. Zolghadr, P. Alizadeh, G. Sadri, E.K. Wujcik, F.A. Afkhami, M. Elliott, and **M. Dadashi Firouzjaei\***. "The anticancer properties of metal-organic frameworks and their heterogeneous nanocomposites." *Biomaterials Advances* 139: 213013, 2022 (Contributed as Corresponding Author).
- 18-Aghaei, A., **M. Dadashi Firouzjaei**, P. Karami, S.A. Aktij, M. Elliott, Y. Mansourpanah, A. Rahimpour, J.B.P. Soares, and M. Sadrzadeh. "The implications of 3D-printed membranes for water and wastewater treatment and resource recovery." *The Canadian Journal of Chemical Engineering* 100, no. 9: 2309-2321, 2022.
- 17-Dadashi Firouzjaei, M.\***, E. Zolghadr, S. Ahmadalipour, N. Taghvaei, F.A. Afkhami, S. Nejati, and M.A. Elliott. "Chemistry, abundance, detection and treatment of per-and polyfluoroalkyl substances in water: a review." *Environmental Chemistry Letters*: 1-19, 2021.
- 16-Bazrafshan, N., **M. Dadashi Firouzjaei\***, M. Elliott, A. Moradkhani, and A. Rahimpour. "Preparation and modification of low-fouling ultrafiltration membranes for cheese whey treatment by membrane bioreactor." *Case Studies in Chemical and Environmental Engineering* 4: 100137, 2021 (Contributed as Corresponding Author).
- 15-Zolghadr, E., **M. Dadashi Firouzjaei\***, G. Amouzandeh, P. LeClair, and M. Elliott. "The Role of Membrane-Based Technologies in Environmental Treatment and Reuse of Produced Water." *Frontiers in Environmental Science* 9: 71, 2021. (Contributed as Corresponding Author).
- 14-Pejman, M., **M. Dadashi Firouzjaei**, S.A. Aktij, E. Zolghadr, P. Das, M. Elliott, M. Sadrzadeh, M. Sangermano, A. Rahimpour, and A. Tiraferri. "Effective strategy for UV-mediated grafting of biocidal Ag-MOFs on polymeric membranes aimed at enhanced water ultrafiltration." *Chemical Engineering Journal* (2021): 130704 (Same Contribution as First Author).
- 13-Dadashi Firouzjaei, M.**, S.F. Seyedpour, S.A. Aktij, M. Giagnorio, N. Bazrafshan, A. Mollahosseini, F. Samadi, S. Ahmadalipour, F.D. Firouzjaei, M.R. Esfahani, and A. Tiraferri. "Recent advances in functionalized polymer membranes for biofouling control and mitigation in forward osmosis." *Journal of Membrane Science*, 2020.
- 12-Dadashi Firouzjaei, M.**, F.A. Afkhami, M.R. Esfahani, C.H. Turner, and S. Nejati. "Experimental and molecular dynamics study on dye removal from water by a graphene oxide-copper-metal organic framework nanocomposite." *Journal of Water Process Engineering*, 2020.
- 11-Pejman, M., **M. Dadashi Firouzjaei**, S.A. Aktij, P. Das, E. Zolghadr, H. Jafarian, A.A. Shamsabadi, M. Elliott, M.R. Esfahani, M. Sangermano, and M. Sadrzadeh. "Improved antifouling and antibacterial properties of forward osmosis membranes through surface modification with zwitterions and silver-based metal organic frameworks." *Journal of Membrane Science*, 2020 (+Same Contribution as First Author).
- 10-Seyedpour, S.F., **M. Dadashi Firouzjaei**, A. Rahimpour, E. Zolghadr, A.A. Shamsabadi, P. Das, F. Afkhami, M. Sadrzadeh, A. Tiraferri, and M. Elliott. "Toward Sustainable Tackling of Biofouling Implications and Improved Performance of TFC FO Membranes Modified by Ag-MOF Nanorods." *ACS Applied Materials & Interfaces*, 2020 (+Same Contribution as First Author).
- 9-Pejman, M., **M. Dadashi Firouzjaei**, S.A. Aktij, P. Das, E. Zolghadr, H. Jafarian, A.A. Shamsabadi, M. Elliott, M. Sadrzadeh, M. Sangermano, and A. Rahimpour. "In Situ Ag-MOF Growth on Pre-Grafted Zwitterions Imparts Outstanding Antifouling Properties to Forward Osmosis Membranes." *ACS Applied Materials & Interfaces*, 2020
- 8-Seyedpour, S.F., A.A. Shamsabadi, S. Salestan, **M. Dadashi Firouzjaei**, M. Sharifian, A. Rahimpour, F. Afkhami, M.R. Kebria, M.A. Elliott, A. Tiraferri, and M. Sangermano. "Tailoring the Biocidal Activity of Novel Silver-Based Metal Azolate Frameworks." *ACS Sustainable Chemistry & Engineering*, 8(20), 2020

7-Esfahani, M.R., S.A. Aktij, Z. Dabaghian, **M. Dadashi Firouzjaei**, A. Rahimpour, J. Eke, I.C. Escobar, M.

Abolhassani, L.F. Greenlee, A.R. Esfahani, and A. Sadmani. "Nanocomposite membranes for water separation and purification: Fabrication, modification, and applications." *Separation and Purification Technology*, 2019.

6-Esfahani, M.R., N. Koutahzadeh, A.R. Esfahani, **M. Dadashi Firouzjaei**, B. Anderson, and L. Peck. "A novel gold nanocomposite membrane with enhanced permeation, rejection, and self-cleaning ability." *Journal of Membrane Science*, 2019.

5-Mozafari, M., S.F. Seyedpour, S.K. Salestan, A. Rahimpour, A.A. Shamsabadi, **M. Dadashi Firouzjaei**, M.R. Esfahani, A. Tiraferri, H. Mohsenian, M. Sangermano, and M. Soroush. "Facile Cu-BTC surface modification of thin chitosan film coated polyethersulfone membranes with improved antifouling properties for sustainable removal of manganese." *Journal of Membrane Science*, 2019.

**4-Dadashi Firouzjaei, M.**, A.A. Shamsabadi, S.A. Aktij, S.F. Seyedpour, M. Sharifian, A. Rahimpour, M.R. Esfahani, M. Ulbricht, and M. Soroush. "Exploiting synergetic effects of graphene oxide and a silver-based metal-organic framework to enhance antifouling and anti-biofouling properties of thin-film nanocomposite membranes." *ACS Applied Materials & Interfaces*, 2018.

**3-Dadashi Firouzjaei, M.**, A.A. Shamsabadi, M. Sharifian, A. Rahimpour, and M. Soroush. "A novel nanocomposite with superior antibacterial activity: a silver-based metal-organic framework embellished with graphene oxide." *Advanced Materials Interfaces*, 2018.

2-Rahimpour, A., S.F. Seyedpour, S. Aktij, **M. Dadashi Firouzjaei**, A. Zirehpour, A.A. Shamsabadi, S. Salestan, M. Jabbari, and M. Soroush. "Simultaneous improvement of antimicrobial, antifouling, and transport properties of forward osmosis membranes with immobilized highly compatible polyrhodanine nanoparticles." *Environmental Science & Technology*, 2018.

1-Zirehpour, A., A. Rahimpour, S. Khoshhal, **M. Dadashi Firouzjaei**, and A.A. Ghoreyshi. "The impact of MOF feasibility to improve the desalination performance and antifouling properties of FO membranes." *RSC Advances*, 2016.

## BOOK CHAPTERS

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2-Rahimpour, A., M. Shirzad Kebria, **M. Dadashi Firouzjaei**, M. Mozafari, M. Elliott, M. Sadrzadeh. *Nonsolvent-induced phase separation, Polymeric Membrane Formation by Phase Inversion*. Elsevier, 2024.

1-Aghaei, A., K. Suresh, **M. Dadashi Firouzjaei**, M. Elliott, A. Rahimpour, & M. Sadrzadeh. "Hybrid/integrated treatment technologies for oily wastewater treatment." In *Advanced Technologies in Wastewater Treatment* (pp. 377-419). Elsevier, 2023.

## SELECTED HONORS & AWARDS

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- Awarded the "**Outstanding Research by Ph.D. Student**" distinction in Civil Engineering by the **University of Alabama** in 2022.
- Recognized as the "**Graduate Student of the Year**" by the **Engineering Council of Birmingham**, 2021.
- Recipient of the prestigious "**Graduate Council Fellowship (GCF)**" at the **University of Alabama**, with a total award value of \$52,000, 2020.
- Achieved **10<sup>th</sup>** place among over 7,000 candidates in the **National Entrance Exam** for Master of Science and Engineering in Material Science and Engineering, 2015.

## TEACHING AND MENTORING EXPERIENCE

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Teaching Assistantship (TA) Experience at the University of Alabama:

- Process Dynamics & Control
- Unit Operations Laboratory
- Heat Transfer Operations
- Fluid Flow Operations

### Guest Lecturer Experience at the University of Alabama:

- Water and Wastewater Treatment
- Environmental Engineering Microbiology
- Environmental Measurements
- Introduction to Environmental Engineering

### Selected Undergraduate Alumni Students Mentored and their Current Positions:

- **Rilyn Todd:** Ph.D. Student in Chemical and Environmental Engineering, Yale University  
Rilyn's research on MXene waste recovery was recognized by the University of Alabama as outstanding undergraduate-led research. [Link to the News Here](#)
- **Delanie Williams:** M.S. Student in Civil and Environmental Engineering, University of Alabama
- **Will Moseley:** Environmental Engineer, Washington State Department of Ecology
- **Sam Prather:** Engineer III, Mott MacDonald
- **Karin Britt:** Engineer I, North Carolina Department of Environmental Quality
- **Westley McKane:** Toxics Reduction Engineer, Washington State Department of Ecology
- **Elizabeth Connick:** Senior Associate Scientist, Elektrofi
- **Caroline Chunn:** Production Engineer, Venture Global LNG
- **Jacob Brockwell:** Process Engineer, INEOS
- **Caroline Fourroux:** Advanced Quality Engineer, 3M
- **Elizabeth McDonough:** Engineer II, Raytheon Intelligence & Space
- **Christopher Gothman:** Process Engineer, Intelligent Epitaxy Technology
- **Briana Madden:** Civil Analyst I, Kimley-Horn
- **Kylie Overton:** Undergraduate dual major in Environmental Science and Mechanical Engineering Departments  
Kylie won outstanding Hollings Undergraduate Scholarships based on her research on MXenes; [Link to the News Here](#)

### Graduate Students Directly Supervised and their Current Positions:

- **Ehsan Zolghadr:** Ph.D., Graduated Summer 2022, Process Engineer IV at Mattson Technology
- **Reza Behzadnia:** M.S., Graduated Summer 2024, Laboratory Coordinator at the University of Alabama Civil Engineering Department
- **Mohsen Pilevar:** Ph.D. Candidate, Expected Graduation Spring 2025
- **Hesam Jafarian:** Ph.D. Student, Expected Graduation Summer 2026
- **Vivian Abungu:** Ph.D. Candidate, Expected Graduation Summer 2025
- **Mahshid Mardani:** Ph.D. Student, Started Summer 2024
- **Parastoo Taheri:** Ph.D. Student, Started Summer 2024

### SELECTED GRANT SUBMISSIONS

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- “Spin-Coated RO Membranes for Ultra-Low PFOA Removal and Seawater Desalination”- Environmental Protection Agency – EPA with Mark Elliott
- “Antibacterial ultrafiltration membranes for enhanced large-scale wastewater treatment”- United States Bureau of Reclamation – USBR with Mark Elliott
- “Large-Scale Development of Antibacterial Ultrafiltration Membranes for Decentralized Wastewater Treatment”- United States Bureau of Reclamation – USBR with Mark Elliott
- “Novel Membrane Fabrication for Improved Flux, Reduced Fouling and Efficient Treatment of PFOA” EPA-P3 with Mark Elliott

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## PROFESSIONAL LEADERSHIP AND SERVICE

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- Reviewed papers for Nature Communications, Environmental Science and Technology, Journal of Membrane Science, Water Research, Advanced Materials, Advanced Healthcare Materials, ACS Applied Materials & Interfaces, Advanced Composites and Hybrid Materials, Chemical Engineering Journal, Separation and Purification Technology, etc.
- Co-Chair of Materials Research Society (MRS) Symposium, 2D MXenes—Synthesis, Properties and Applications, 2022
- Co-Chair of American Chemical Society (ACS), 2D Materials-Polymer Interfaces and Nanocomposites, 2024
- Founder, President, and Advisor for “Nano Science and Engineering Association”, 2019-Present

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## INVITED TALKS

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- *Sustainability assessment and optimization for Material Synthesis and Manufacturing*. Flexim Manufacturing Inc, Edmonton, Canada, August 2024.
- *Functionalized Polyamide Membranes with Metal-Organic Frameworks for Wastewater Treatment*. Mechanical Engineering Department, Purdue University, May 2023.
- *Non-solvent Induced Phase Separation Technique for Polymeric Membranes Formation*. Pall Corporation, Port Washington, July 2023.

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## SELECTED CONFERENCE PRESENTATIONS

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- **Dadashi Firouzjaei, M.**, M. Elliott, and B. Anasori. "Fabrication and life cycle assessment of a large-scale polysulfone-MXene composite membrane for ultrafiltration applications." In 2024 ACS Spring Meeting. ACS, 2024.
- **Dadashi Firouzjaei, M.**, M. Elliott, and B. Anasori. "Exploring the environmental impacts and scalability of MXene synthesis for advanced applications." In 2023 AIChE Annual Meeting. AIChE, 2023.
- **Dadashi Firouzjaei, M.**, and M. Elliott. "Novel membrane fabrication for improved flux, reduced fouling and efficient treatment of PFOA." In 2023 EPA P3 Expo. Tech Connect, 2023.
- **Dadashi Firouzjaei, M.**, M. Elliott, and B. Anasori. "Clean water recycling through adsorption via nanocomposites of  $Ti_3C_2T_x$  MXene-AgMOF and graphene-oxide-Ag-MOF." In 2022 MRS Spring Meeting. MRS, 2022.
- **Dadashi Firouzjaei, M.**, D. Jiang, M. Elliott, and B. Anasori. "The environmental impacts of  $Ti_3C_2T_x$  MXene synthesis for electromagnetic interface shielding of communication satellites." In 2022 MRS Fall Meeting. MRS, 2022.
- **Dadashi Firouzjaei, M.**, A. Tiraferri, A. Rahimpour, and M. Elliott. "Metal-azolate framework decorated thin-film composite membranes: Antibacterial mode of action and beyond." In 2021 ACS Fall Meeting. ACS, 2021.

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## PROFESSIONAL AFFILIATIONS

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- American Society of Civil Engineers (ASCE)
- Materials Research Society (MRS)
- American Institute of Chemical Engineers (AIChE)
- American Chemical Society (ACS)
- American Water Works Association (AWWA)
- Alabama Water Institute (AWI)
- Alabama Materials Institute (AMI)
- The Minerals, Metals & Materials Society (TMS)