Mostafa Dadashi Firouzjaei

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Research Profile

As a Research Scientist, I develop advanced functional materials and technologies for energy and environmental applications. My work connects sustainable materials design, energy storage and conversion, environmental protection, and resource recovery, with particular expertise in membranes, MXenes, metal-organic frameworks, and functional polymers. I combine materials synthesis, membrane fabrication, environmental microbiology, and life cycle assessment to advance energy-efficient separations, water purification, PFAS removal, and biofouling control. My goal is to translate materials research into practical solutions for energy and environmental challenges.

Education

Ph.D. | **2022**
Civil and Environmental Engineering, University of Alabama.

M.S. | **2020**
Environmental Engineering, University of Alabama.

M.Sc. | **2017**
Materials Science and Engineering, Sharif University of Technology.

B.Eng. | **2015**
Materials and Metallurgical Engineering, Iran University of Science and Technology.

Research Experience and Focus

Research Scientist | **Current**
Advanced functional materials and technologies for energy and environmental applications, sustainable separations, and resource recovery.

Membrane Research | **Research focus**
Nanocomposite membrane fabrication, selective transport, surface functionalization, and biofouling mitigation.

Materials Sustainability | **Research focus**
Life cycle assessment of materials synthesis and scalable approaches to water purification and resource recovery.

Honors and Awards

Outstanding Research by Ph.D. | **2022**
Civil Engineering, University of Alabama.

Graduate Student of the Year | **2021**
Engineering Council of Birmingham.

Graduate Council Fellowship | **2020**
University of Alabama.

Publications (59)

2026

1. Standardizing and optimizing disk inhibition zone testing against E. coli for reproducible evaluation of antibacterial polymeric membranes

Journal of Membrane Science Letters · 2026

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2. Optimizing CO2 separation with PEBAX/ionic-liquid blend membranes: A polymer grade study

Journal of Environmental Chemical Engineering · 2026

Read Online | PDF

3. Thickness-controlled polyamide membranes via centrifugal thin-film deposition for improved fouling and high-recovery performance

npj Clean Water · 2026

Read Online | PDF

4. Large-Scale MXene Membrane Fabrication via Nonsolvent Phase Separation

Small Methods · 2026

Read Online | PDF

5. Water supply and infrastructure challenges in rural low-Income arid and semi-arid lands (ASALs): A case study of Turkana, Kenya

PLOS Water · 2026

Read Online | PDF

6. Life Cycle Assessment of Silver, Copper, and Zinc-Based Metal-Organic Framework Products for Industry-Scale Production and Future Horizons

ACS Sustainable Resource Management · 2026

Read Online | PDF

7. Emerging MXene and covalent-organic framework hybrids: Design strategies for energy, sensing, and environmental applications

Materials Science and Engineering: R: Reports · 2026

Read Online | PDF

2025

8. Bioinspired Polypeptide Dendrimer-Modified Thin-Film Composite Membranes for Selective Lithium-Magnesium Separation with DFT Insights

Advanced Functional Materials · 2025

Read Online | PDF

9. Antibacterial properties and underlying mechanisms of Mo2TiC2Tx and Mo2Ti2C3Tx MXenes targeting Escherichia coli (Gram-negative bacterium)

Nanoscale Horizons · 2025

Read Online | PDF

10. Electro-Conductive Silver-Coated Polyamide-Imide Membranes for Sustainable Water Treatment

Advanced Sustainable Systems · 2025

Read Online | PDF

11. Multiple Household Water Sources and Uses in Rural ASALs: Evidence and Proposed Solutions from Turkana, Kenya

Groundwater for Sustainable Development · 2025

Read Online | PDF

12. Customizing Surface Grafting and Interlayer Functionalization for PFOA Separation in Polyamide Membranes

Water Research X · 2025

Read Online | PDF

13. Analysis of Metal-Organic Framework and Polyamide Interfaces in Membranes for Water Treatment and Antibacterial Applications

Small Methods · 2025

Read Online | PDF

14. Tailoring MXene composition and structure for High-Performance mixed matrix membranes in CO2 separation applications

Separation and Purification Technology · 2025

Read Online | PDF

15. Six key variables in 2D MXenes for hydrogen evolution electrocatalysis

Materials Today · 2025

Read Online | PDF

16. Enhancing sustainable energy production through co-polyamide membranes for improved pressure-retarded osmosis performance and environmental impact: synthesis and life cycle assessment

Green Chemistry · 2025

Read Online | PDF

17. A perspective on MXene-enhanced biofiltration-membrane water reuse treatment systems: A review and experimental validation

Desalination · 2025

Read Online | PDF

2024

18. Functionality review and life cycle assessment of a silver-based MOF for advanced material and sustainability applications

Graphene and 2D Materials · 2024

Read Online | PDF

19. Lifecycle assessment of membrane synthesis for the application of thermo-osmotic energy conversion process

Case Studies in Chemical and Environmental Engineering · 2024

Read Online | PDF

20. Nonsolvent-induced phase separation

Polymeric Membrane Formation by Phase Inversion · 2024

Read Online | PDF

21. Evaluating the efficiency of modified hydrophobic PVDF membrane for the removal of PFOA substances from water by direct contact membrane distillation

Desalination · 2024

Read Online | PDF

22. Metal-organic frameworks' latent potential as High-Efficiency osmotic power generators in Thin-Film nanocomposite membranes

Chemical Engineering Journal · 2024

Read Online | PDF

23. Unveiling the impact of monomer reactivity on the morphology and functionality of thin-film composite membranes

Chemical Engineering Journal · 2024

Read Online | PDF

24. Wearable textile supercapacitors: material advancements and applications

Journal of Energy Storage · 2024

Read Online | PDF

25. Electro-Conductive Ti3C2 MXene Multilayered Membranes: Dye Removal and Antifouling Performance

Advanced Functional Materials · 2024

Read Online | PDF

2023

26. Hybrid/integrated treatment technologies for oily wastewater treatment

Advanced Technologies in Wastewater Treatment · 2023

Read Online | PDF

27. Metal Ions Removal from Organic Solvents using MXene-Based Membranes

ACS Applied Engineering Materials · 2023

Read Online | PDF

28. 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 · 2023

Read Online | PDF

29. Emperor's new clothes: Novel textile-based supercapacitors using sheep wool fiber as electrode substrate

Nano Trends · 2023

Read Online | PDF

30. 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 · 2023

Read Online | PDF

31. Synthesis of heterogeneous metal organic Framework-Graphene oxide nanocomposite membranes for water treatment

Chemical Engineering Journal · 2023

Read Online | PDF

32. Life-Cycle Assessment of Ti3C2Tx MXene Synthesis

Advanced Materials · 2023

Read Online | PDF

33. MXenes antibacterial properties and applications: a review and perspective

Small · 2023

Read Online | PDF

2022

34. The anticancer properties of metal-organic frameworks and their heterogeneous nanocomposites

Biomaterials Advances · 2022

Read Online | PDF

35. An ultrasonic-assisted rapid approach for sustainable fabrication of antibacterial and anti-biofouling membranes via metal-organic frameworks

Materials Today Chemistry · 2022

Read Online | PDF

36. The implications of 3D-printed membranes for water and wastewater treatment and resource recovery

The Canadian Journal of Chemical Engineering · 2022

Read Online | PDF

37. Functionalized polyamide membranes yield suppression of biofilm and planktonic bacteria while retaining flux and selectivity

Separation and Purification Technology · 2022

Read Online | PDF

38. Loose nanofiltration membranes functionalized with in situ-synthesized metal organic framework for water treatment

Materials Today Chemistry · 2022

Read Online | PDF

39. Chemistry, abundance, detection and treatment of per-and polyfluoroalkyl substances in water: a review

Environmental Chemistry Letters · 2022

Read Online | PDF

40. Nanodiamond-decorated thin film composite membranes with antifouling and antibacterial properties

Desalination · 2022

Read Online | PDF

41. MXenes: The two-dimensional influencers

Materials Today Advances · 2022

Read Online | PDF

42. Environmental Application of Two-and Three-Dimensional Nanomaterials for Wastewater Treatment

The University of Alabama Libraries Digital Collections · 2022

Read Online

2021

43. Preparation and modification of low-fouling ultrafiltration membranes for cheese whey treatment by membrane bioreactor

Case Studies in Chemical and Environmental Engineering · 2021

Read Online | PDF

44. The role of membrane-based technologies in environmental treatment and reuse of produced water

Frontiers in Environmental Science · 2021

Read Online | PDF

45. Effective strategy for UV-mediated grafting of biocidal Ag-MOFs on polymeric membranes aimed at enhanced water ultrafiltration

Chemical Engineering Journal · 2021

Read Online | PDF

2020

46. Tailoring the biocidal activity of novel silver-based metal azolate frameworks

ACS Sustainable Chemistry & Engineering · 2020

Read Online | PDF

47. Toward sustainable tackling of biofouling implications and improved performance of TFC FO membranes modified by Ag-MOF nanorods

ACS Applied Materials & Interfaces · 2020

Read Online | PDF

48. 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

Read Online | PDF

49. 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

Read Online

50. In situ Ag-MOF growth on pre-grafted zwitterions imparts outstanding antifouling properties to forward osmosis membranes

ACS Applied Materials & Interfaces · 2020

Read Online | PDF

51. Recent advances in functionalized polymer membranes for biofouling control and mitigation in forward osmosis

Journal of Membrane Science · 2020

Read Online | PDF

52. The Water Purification Robustness of Metal-organic Framework-polyamide Nanocomposite Thin Films Toward Long Term Organic, Inorganic, and Bacterial Contamination

University of Alabama Libraries · 2020

Read Online

2019

53. A novel gold nanocomposite membrane with enhanced permeation, rejection and self-cleaning ability

Journal of Membrane Science · 2019

Read Online | PDF

54. 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

Read Online | PDF

55. Nanocomposite membranes for water separation and purification: Fabrication, modification, and applications

Separation and Purification Technology · 2019

Read Online | PDF

2018

56. Simultaneous improvement of antimicrobial, antifouling, and transport properties of forward osmosis membranes with immobilized highly-compatible polyrhodanine nanoparticles

Environmental Science & Technology · 2018

Read Online | PDF

57. A novel nanocomposite with superior antibacterial activity: a silver-based metal organic framework embellished with graphene oxide

Advanced Materials Interfaces · 2018

Read Online | PDF

58. 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

Read Online | PDF

2016

59. The impact of MOF feasibility to improve the desalination performance and antifouling properties of FO membranes

RSC Advances · 2016

Read Online | PDF