EDITORIAL

Inaugural Editorial for the Journal of *Membrane Research*

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Abstract

This inaugural editorial introduces the creation and vision of the *Membrane Research*, emphasizing its role as a platform for advancing fundamental understanding and technological innovations in membrane science and engineering. The journal aims to bridge the gap between theoretical modeling, numerical simulations, and experimental studies in membrane research, fostering interdisciplinary collaboration across materials science, chemistry, physics, and environmental engineering. Particular attention is given to the development, characterization, and application of diverse membrane materials including polymeric, ceramic, hybrid, metal-organic framework, covalent organic framework, and emerging two-dimensional materials for water treatment, gas separation, energy conversion, and environmental remediation. By highlighting these core directions, the *Membrane Research* seeks to provide a comprehensive and forward-looking forum for the dissemination of innovative research and for shaping the future of membrane science and technology.

Keywords: membrane materials, 2D-materials, metal-organic framework, separation technology, water and energy applications.

1 Introduction

Membrane science has evolved into a transformative field at the intersection of chemistry, materials engineering, environmental science, and energy technology [1]. As global challenges surrounding clean water, sustainable energy, and environmental protection intensify, membrane-based technologies have demonstrated unparalleled potential to deliver efficient, scalable, and environmentally friendly solutions [2, 3]. The continuous progress in materials innovation, computational design, and system integration has propelled membranes from conventional filtration media to multifunctional platforms capable of addressing diverse societal and industrial needs [4].

Recognizing this rapid evolution and the growing need for a dedicated venue that bridges interdisciplinary research, *Membrane Research* is established as an international, peer-reviewed journal committed to advancing the science and technology of membranes. The journal aims to unite fundamental discoveries with real-world applications, spanning from molecular design and synthesis to large-scale deployment in water purification, energy storage, biomedical separation, and catalytic processes. Through rigorous evaluation and a focus on innovation, *Membrane Research* seeks to promote the exchange of pioneering ideas and facilitate collaborations between academia,

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industry, and policy-making communities.

The launch of *Membrane Research* reflects our vision to cultivate a dynamic platform that not only disseminates high-impact research but also shapes the future direction of the field. By integrating advances in nanostructured materials, computational modeling, and green fabrication, the journal aspires to foster a new era of intelligent and sustainable membrane technologies. In doing so, it aims to inspire the next generation of scientists and engineers to push the boundaries of membrane science toward a cleaner, more energy-efficient, and sustainable world.

2 A Vision for the Journal

Membrane Research aspires to be more than just a publication venue, it seeks to serve as a catalyst for innovation, promoting scientific discourse and collaboration across academia, industry, and policy. Our goal is to illuminate the critical role that membrane technologies play in addressing the grand challenges of our era: clean water scarcity, sustainable energy, and environmental protection. Through rigorous peer review and open exchange of ideas, we aim to foster a scholarly environment that values both fundamental understanding and technological impact.

3 Scope and Objectives

The journal will publish original research articles, reviews, communications, and perspectives covering but not limited to the following areas:

- **Advanced membrane materials**: including polymeric, inorganic, hybrid, MOF/COF-based, MXene, and nanocomposite membranes.
- **Membrane fabrication and modification**: novel synthesis routes, surface engineering, and scalable production methods.
- **Separation processes and performance**: water desalination, wastewater treatment, gas and vapor separation, pervaporation, and solvent recovery.
- **Energy and environmental applications**: fuel cells, redox flow batteries, CO_2 capture, and resource recovery.
- **Emerging interdisciplinary frontiers**: smart, self-healing, and biomimetic membranes; nanofluidics; and membrane-assisted catalysis.

Our editorial policy emphasizes innovation, reproducibility, and sustainability- principles that will define the next generation of membrane technologies.

4 The State of the Field

Over the past two decades, the landscape of membrane research has undergone a profound transformation. The development of **nanostructured and 2D materials**, such as graphene oxide, MXenes, and covalent organic frameworks (COFs), has opened new frontiers for tunable selectivity and unprecedented permeability [5, 6]. Similarly, **green fabrication techniques**, including bio-inspired and solvent-free processes, are redefining sustainable production [7]. Hybrid materials that integrate **metal–organic frameworks (MOFs)** or **high-entropy oxides** have demonstrated promising multifunctionality in both separation and catalysis [8, 9].

Beyond materials, digitalization and **machine learning-driven membrane design** are rapidly gaining ground, enabling predictive insights into structure–property relationships and accelerating discovery cycles [10, 11]. Meanwhile, **membrane system integration** in circular economy frameworks-from zero-liquid discharge systems to electro-driven separations-reflects a paradigm shift toward holistic environmental stewardship.

5 Our Commitment and Future Roadmap

The launch of *Membrane Research* marks the beginning of a journey toward global recognition and scientific excellence. We are committed to maintaining a transparent, fair, and rapid peer review process, while ensuring accessibility through open science principles. As outlined in our roadmap, indexing applications will follow the publication of seven issues (for Scopus), eight issues (for Web of Science), and ten articles (for DOAJ).

We warmly invite researchers, practitioners, and emerging scholars from around the world to contribute to this endeavor through original submissions, review articles, and collaborations that transcend disciplinary boundaries. Together, we can shape a more sustainable and knowledge-driven future through the science of membranes.

6 Conclusion

The establishment of *Membrane Research* marks an important milestone in uniting the global membrane community under a shared vision of innovation, sustainability, and scientific excellence. By fostering

collaboration across disciplines and emphasizing both fundamental and applied research, the journal aims to accelerate the development of next-generation membrane technologies that address the world's most pressing environmental and energy challenges. We look forward to building a vibrant platform where creativity meets rigor, and where every contribution helps shape a more sustainable and knowledge-driven future through the science of membranes.

Acknowledgment

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Data Availability Statement

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Conflicts of Interest

The author declares no conflicts of interest.

Ethical Approval and Consent to Participate

Not applicable.

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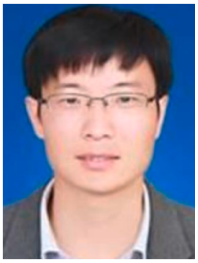

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