

Editorial

# Leading Energy Innovation: The Intersection of Materials and Engineering

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It is my great pleasure to introduce the inaugural issue of the *Journal of Energy Materials and Chemical Engineering (EMCE)*. This journal is established at a pivotal moment in history, when the pursuit of sustainable, affordable, and resilient energy systems is one of the most pressing global priorities. The journal aims to provide a premier platform for publishing rigorously reviewed, high-quality research that advances both the chemistry of energy materials and the engineering strategies required for their scalable deployment.

## 1. The Global Context

The urgent demand for advanced energy storage and conversion technologies has become one of the defining scientific and engineering challenges of our time. The accelerating electrification of transportation, the rapid deployment of renewable energy, and the drive to decarbonize industrial processes all require systems capable of delivering higher energy density, longer lifetimes, and improved cost-effectiveness. Yet, despite tremendous progress, current technologies are still constrained by limitations in efficiency, stability, scalability, and sustainability. Meeting these challenges demands not only innovative materials but also transformative chemical engineering processes that bridge laboratory advances with real-world deployment.

Energy materials—including high-capacity electrodes, solid-state electrolytes, electrocatalysts, membranes, and light-harvesting semiconductors—represent the backbone of future energy systems. Their composition, structure, and interfacial chemistry govern performance in next-generation batteries, hydrogen technologies, carbon capture and utilization, and solar-to-fuel conversion. At the same time, chemical engineering provides the vital framework for process intensification, scalable manufacturing, and system integration, enabling new materials to be synthesized reproducibly, incorporated into devices, and deployed at scale. This dual focus on materials and process innovation is essential for accelerating the energy transition.

In this context, *EMCE* provides a timely platform for advancing knowledge across the materials–engineering continuum. By uniting fundamental research in materials chemistry with applied developments in process and system engineering, *EMCE* seeks to drive both the discovery of next-generation energy materials and their translation into sustainable, industrially relevant technologies.

## 2. The Role of *EMCE*

The mission of *EMCE* is to bridge the disciplines of chemistry, materials science, and engineering, bringing together diverse communities to accelerate innovation across the energy field. The journal emphasizes both fundamental advances in molecular and materials chemistry and applied breakthroughs in scalable processes and system integration. By covering this full spectrum, *EMCE* provides a unique forum where scientific discovery meets engineering practice.

The scope of the journal includes, but is not limited to:

- Energy Materials: synthesis, structure, and property control of materials for batteries, supercapacitors, fuel cells, electrolyzers, solar cells, thermoelectrics, and hydrogen storage.
- Catalysis and Interfacial Chemistry: electrocatalysts, photocatalysts, and thermocatalysts for reactions central to sustainable energy conversion, including water splitting, CO<sub>2</sub> reduction, nitrogen fixation, and carbon utilization.

- Chemical Engineering for Energy Systems: process intensification, membrane separation, reactor design, and circular economy approach for sustainable energy and chemical production.
- Modeling, Computation, and AI: multi-scale simulations, density functional theory, molecular modeling, and machine learning frameworks that accelerate the prediction, design, and optimization of energy materials and processes.
- Sustainability and Systems Analysis: techno-economic evaluation, life-cycle assessment, and integration of renewable energy systems into broader infrastructures.

### 3. A Platform for Interdisciplinary Collaboration

One of the defining features of *EMCE* will be its role as a hub for interdisciplinary collaboration. Today's energy challenges cannot be solved within the boundaries of a single discipline. Chemists design molecules, materials scientists tailor microstructures, engineers integrate processes, and computational scientists provide predictive insights. By offering a forum that welcomes contributions across these communities, *EMCE* will help accelerate the translation of laboratory advances into practical, real-world technologies. The journal also recognizes the growing importance of computational and data-driven approaches. Artificial intelligence and machine learning are increasingly being applied to predict material properties, optimize synthesis pathways, and accelerate discovery. By highlighting such studies, *EMCE* will showcase how digital tools can complement experimental research to shorten innovation cycles.

### 4. Looking Ahead

Launching a new journal is both a responsibility and an opportunity. It is a responsibility to ensure the highest standards of scientific rigor, fairness, and transparency in peer review. It is an opportunity to shape the future of a research community by providing a trusted platform for sharing ideas, results, and perspectives. With the support of distinguished editorial board members, dedicated reviewers, and an engaged community of authors and readers, *EMCE* aspires to become a leading voice in the global energy research landscape.

We envision *EMCE* as more than just a publication outlet. It will be a place where new concepts are introduced, where interdisciplinary debates are fostered, and where young researchers can find inspiration and guidance. The journal will encourage submissions that not only advance fundamental understanding but also demonstrate pathways toward application and societal impact.

On behalf of the editorial team, I invite researchers worldwide to join us in building this community. By contributing your best work to *EMCE*, by engaging in thoughtful peer review, and by sharing the journal with colleagues and collaborators, you help establish a forum that will accelerate progress in one of the defining challenges of our time—the global transition to sustainable energy.

The launch of *EMCE* is made possible by the vision of our contributors, the dedication of reviewers, and the support of Scilight Press. This inaugural issue marks only the beginning. With your participation, we aim to grow *EMCE* into a world-class journal that not only documents advances but also inspires the breakthroughs that will power a cleaner, more sustainable, and more equitable future.

### Conflicts of Interest

The author declares no conflict of interest.