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Editor's Foreword

Dear Scholars, Researchers, Engineers, and Esteemed Readers,

At the nanoscale, matter reveals possibilities that are not apparent in bulk materials. Changes in size, shape, composition, interface, and atomic arrangement can transform electrical transport, optical response, magnetism, catalytic activity, mechanical behavior, and interactions with biological systems. These effects provide the foundation for materials that do more than occupy space: they sense, convert, store, protect, communicate, repair, and respond. Understanding and controlling such functions is among the most creative and consequential challenges in contemporary materials science.

The promise of functional nanomaterials is already visible across energy, electronics, photonics, catalysis, environmental technology, medicine, and smart systems. High-performance electrodes can support new approaches to energy storage and conversion; nanoscale catalysts can improve selectivity and reduce resource use; tailored optical and electronic structures can enable sensitive devices; and biofunctional materials can open new routes for diagnosis, delivery, and regenerative applications. Yet substantial questions remain regarding mechanism, reproducibility, durability, scalability, safety, and environmental impact. Scientific progress depends on addressing these questions together rather than treating performance as an isolated outcome.

The journal *Functional Nanomaterials* (FNM) is established as an international, peer-reviewed, open-access forum for the science, engineering, and application of nanomaterials with advanced functionality. FNM seeks to connect fundamental understanding with purposeful design. We welcome research that explains how nanoscale structure produces function, how interfaces govern behavior, how fabrication controls performance, and how materials can be translated from proof of concept toward reliable systems.

The journal's scope includes nanomaterials with electrical, optical, magnetic, catalytic, biological, thermal, and mechanical functions. Major application areas include energy storage and conversion, nanoelectronics, nanophotonics, sensing, catalysis, environmental remediation, biomedicine, smart and responsive materials, and integrated nanosystems. We also welcome research on hybrid and hierarchical materials, two-dimensional materials, nanocomposites, porous frameworks, functional coatings, and other emerging platforms when nanoscale design is central to the contribution.

FNM places particular emphasis on structure-property-function relationships. Reports of enhanced performance are most valuable when they clarify why the enhancement occurs and under what conditions it persists. We therefore encourage the integration of synthesis, advanced characterization, theoretical modeling, and computation. In situ and operando methods, multiscale simulation, data-driven materials discovery, and materials informatics can help reveal dynamic mechanisms and accelerate design, provided that the underlying data and assumptions are transparent.

Our editorial direction will be guided by four principles. First, rigor in characterization: claims about composition, structure, mechanism, and performance should be supported by appropriate evidence and controls. Second, reproducibility: synthesis conditions, processing steps, measurement protocols, and uncertainty should be reported with sufficient detail to support verification. Third, functional relevance: evaluation should reflect realistic operating conditions whenever possible, including stability, cycling, selectivity, interference, and comparison with meaningful

benchmarks. Fourth, responsible development: authors should consider material availability, manufacturing demands, toxicity, life-cycle impacts, and end-of-life pathways where these issues are relevant.

These principles are especially important as the field moves toward increasingly complex materials and data-rich experimentation. Complexity can generate new function, but it can also obscure causality. Machine learning can accelerate screening, but predictions remain dependent on data quality and experimental validation. Miniaturization can improve efficiency, but scale-up may introduce new constraints in cost, consistency, integration, or safety. FNM welcomes studies that confront these tensions directly and that report limitations with the same care as positive results.

The journal also aims to foster exchange across disciplinary boundaries. Functional nanomaterials are created and used by communities with different scientific languages: physicists, chemists, materials scientists, engineers, biologists, clinicians, environmental researchers, and data scientists. Breakthroughs often emerge when these perspectives meet around a well-defined problem. We encourage interdisciplinary contributions that integrate methods meaningfully and make their reasoning accessible to readers beyond a narrow specialty.

FNM will publish original research, authoritative reviews, methodological advances, and forward-looking perspectives. We welcome both fundamental and applied studies, provided they offer a clear advance in understanding or capability. Work that establishes robust design rules, improves comparability, develops shared datasets or benchmarks, or explains unexpected and negative results can make an important contribution to the field. Open access will allow these findings to reach researchers, educators, innovators, and practitioners across institutional and geographical boundaries.

We warmly invite the global nanomaterials community to submit its most careful and imaginative work, to participate in constructive peer review, and to help define the standards by which progress should be judged. We are committed to an editorial process that values originality, evidence, clarity, and scientific integrity. The journal's success will depend on a community willing not only to present achievements, but also to ask difficult questions about mechanism, reliability, and impact.

With this inaugural issue, we begin with the conviction that nanoscale science can contribute to technologies that are more capable, efficient, and sustainable - but only when function is understood as deeply as it is demonstrated. On behalf of the editorial team, I thank our authors, reviewers, readers, and partners for their support. We look forward to building FNM into a trusted platform where fundamental insight and responsible innovation advance together.

Functional Nanomaterials (FNM)
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