



Editorial

Editorial for *Semiconductor Materials and Devices*

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Studying *Semiconductor Materials and Devices* is particularly important because it highlights not only the scientific intricacies of material science and electronic engineering but also the critical need for integrated, interdisciplinary efforts. As our exploration of advanced semiconductor technologies advances, it becomes clear that material innovation can profoundly influence both the performance of next-generation devices and the realization of cutting-edge applications. Addressing these challenges requires groundbreaking research approaches and dedicated platforms for disseminating transformative discoveries. We recognize these urgent needs; therefore, *Semiconductor Materials and Devices (SemiMD)* seeks to bridge the gap between fundamental semiconductor research and practical device engineering, fostering dialogue that accelerates technological progress in both domains. By prioritizing studies that advance the fundamental understanding and industrial application of *Semiconductor Materials and Devices*, we aim to provide a comprehensive platform where innovative ideas and collaborative projects can flourish. We focus on research exploring material synthesis, characterization methods, device architectures, reliability mechanisms, and emerging applications, with particular emphasis on the convergence of emerging material systems (such as wide-bandgap semiconductors, two-dimensional materials, and organic semiconductors) and disruptive device concepts, including high-performance sensors and quantum devices. This journal aims to serve as a hub for knowledge exchange and intellectual collision, sparking actionable scientific insights that ultimately drive semiconductor technology toward higher performance, lower power consumption, and broader application.

We firmly believe that genuine progress springs from the resonance of diverse voices. The journal warmly welcomes contributions from researchers, engineers, technical experts, and industry advocates across academia and industry. By cultivating an open, rigorous and dynamic communication platform, we aim to pool global wisdom, jointly reveal the intricate interactions between materials and devices, and explore new possibilities for the future development of electronics, optoelectronics and quantum information technology.

My research journey in the field of semiconductor nanomaterials for sustainable energy conversion and environmental remediation began with a deep dive into the fundamental properties and practical application of nanoscale *Semiconductor Materials and Devices* at Xi'an Jiaotong University, China. Initially, I focused on the synthesis and characterization of semiconductor nanomaterials, particularly 0D quantum dots, 1D nanowires, and 2D nanosheets, which exhibited unique optical and electronic properties due to their size and quantum confinement effects. These materials and related devices held immense potential for applications in solar energy conversion, e.g., photovoltaics, photocatalysis, and photothematic desalination, as they could be engineered to absorb a broader spectrum of sunlight and convert it into electricity, active species or heat energy more efficiently than traditional bulk materials. As I delved deeper into the field, I encountered the challenge of not only optimizing the energy efficiency of these nanomaterials in lab but also addressing the long-term stability and performance in real world. Despite the progress in materials synthesis and devices preparation, the durability of semiconductor materials under prolonged exposure to sunlight, moisture, and other environmental factors remained a concern. Moreover, the route for these laboratory results to commercial products necessitated a thorough investigation into their environmental fate. But researchers in the field of materials were often unaware of the industrial manufacturing, and vice versa. This is just one illustration of the interdisciplinary gap that exists between semiconductor materials science and engineering. In an effort to overcome this issue, I have led several multidisciplinary projects that aimed



to integrate the expertise of materials scientists, device engineers, and product designer. However, attempts to connect such interdisciplinary initiatives have often been met with resistance, highlighting the need for a more collaborative and integrated approach to research in the fields of *Semiconductor Materials and Devices*.

The persistent challenges within the semiconductor domain have served as the impetus for the establishment of *SemiMD*. Although the semiconductor sector is supported by a multitude of specialized journals, few encompass the entire breadth of semiconductor science—from the investigation of structural and physical properties of advanced materials to device fabrication, modeling, and their practical applications in energy, environmental monitoring, and sensing technologies. Crucially, there exists an urgent demand for a dedicated platform that emphasizes translational research, facilitating the efficient progression of laboratory discoveries into viable technological solutions. *SemiMD* seeks to address this gap by committing to the dissemination of high-caliber research that spans the full semiconductor value chain, including material design and synthesis, device performance evaluation, reliability assessment, and industrial implementation. The primary objective of the journal is to foster a holistic understanding of *Semiconductor Materials and Devices* while expediting their deployment in tackling global challenges. As the founding Editor-in-Chief of *SemiMD*, I envision the journal into a reputable and essential resource for researchers and practitioners seeking comprehensive insights into all facets of semiconductor science and technology. We are committed to maintaining rigorous peer-review standards that uphold transparency, ethical conduct, and scientific integrity, in accordance with the guidelines set forth by the Committee on Publication Ethics (COPE). Each submission will be subjected to meticulous scrutiny to ensure the publication of work of the highest quality. I anticipate that *SemiMD* will make a foundational contribution to the international semiconductor community, particularly as the demand for advanced semiconductor technologies intensifies and their significance in sustainable development becomes increasingly critical on a global scale.

Conflicts of Interest

Given my role as Editor-in-Chief, I, Wenxiu Que, am not involved in the peer review of this paper and had no access to information regarding its peer-review process. Full responsibility for the editorial process of this paper was delegated to another editor of the journal.

Use of AI and AI-Assisted Technologies

During the preparation of this work, the author used AI tools for on-line searches, textual drafting and language polishing. After using this tool, the author reviewed and edited the content as needed and takes full responsibility for the content of the published article.