

Editorial

Editorial: Charting New Frontiers in Low-Dimensional Materials

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How To Cite: Zhu, H. Editorial: Charting New Frontiers in Low-Dimensional Materials. *Low-Dimensional Materials* **2025**, 1(1), 1.

The 21st century has witnessed a paradigm shift in materials science with the rise of low-dimensional materials—a class of substances whose physical properties are profoundly shaped by reduced dimensionality. Beginning with the groundbreaking isolation of monolayer graphene in 2004, low-dimensional systems have grown to encompass an extraordinary variety of 2D materials (such as transition metal dichalcogenides, hexagonal boron nitride, and MXenes), 1D nanostructures (nanowires, nanotubes), and 0D quantum dots. These systems not only defy classical bulk behaviors but also present unprecedented opportunities for innovation in areas ranging from quantum information and neuromorphic computing to energy harvesting, biosensing, and next-generation optoelectronics.

The launch of *Low-Dimensional Materials (LDM)* reflects the increasing need for a focused, high-impact, and open-access platform dedicated to this rapidly advancing and highly interdisciplinary field. Our mission is to publish cutting-edge research that addresses fundamental scientific questions, enables novel device concepts, and fosters translation into real-world technologies. We aim to serve as a hub connecting physicists, chemists, materials scientists, engineers, and data scientists who are collaboratively shaping the future of low-dimensional materials and their applications.

This journal seeks to spotlight a wide range of topics, including but not limited to:

- **Dimension-specific phenomena:** Quantum confinement, edge effects, and surface-dominated properties in 0D (quantum dots), 1D (nanowires/nanotubes), and 2D (atomically thin layers) systems
- **Emergent low-dimensional architectures:** van der Waals heterostructures, moiré superlattices, topological materials, and hybrid dimensional composites
- **Device-oriented research:** Low-dimensional materials in transistors, photodetectors, spintronic devices, flexible electronics, and quantum computing platforms
- **Energy applications:** Nanoscale materials for batteries, supercapacitors, photocatalysis, thermoelectrics, and hydrogen evolution
- **Biomedical interfaces:** Low-dimensional systems for biosensing, drug delivery, bioimaging, and neural interfaces
- **Advanced synthesis:** Bottom-up growth, exfoliation techniques, defect engineering, and scalable manufacturing
- **Characterization breakthroughs:** Atomic-resolution imaging, in situ spectroscopy, and machine learning-driven analysis
- **Theory & computation:** First-principles modeling of low-dimensional systems, AI-guided material discovery
- **Sustainability focus:** Environmental impact assessment and green synthesis of low-dimensional materials

We are especially interested in works that demonstrate interdisciplinary approaches, data-driven discovery, and innovative experimental or theoretical methodologies. The journal welcomes original research articles, reviews, perspectives, methods papers, and data reports.



The establishment of *Low-Dimensional Materials* would not have been possible without the support of our international editorial board. Their expertise spans foundational science to advanced engineering, ensuring that our editorial process remains rigorous, fair, and forward-looking.

We are also committed to fostering scientific transparency, open data, and ethical publishing practices. As an open-access journal, all articles will be freely available to readers worldwide, supporting equitable knowledge dissemination and accelerating scientific progress.

On a personal note, it is a great honor for me to serve as the founding Editor-in-Chief of *Low-Dimensional Materials*. I believe this journal will become a vibrant platform not only for the exchange of technical results, but also for the cultivation of new ideas and research communities. I encourage authors to bring their boldest insights to our pages, and readers to engage critically with the content.

In closing, I would like to express my deep appreciation to the authors who contributed to this first issue, to the reviewers who upheld the integrity of the publication process, and to the editorial and publishing teams at Scilight Press who worked tirelessly to bring this journal to life. Your dedication has laid a strong foundation for a journal that, I am confident, will grow into a leading voice in materials science.

Let us together embrace the challenge of navigating the quantum, electronic, and structural frontiers of low-dimensional systems—and illuminate new pathways in science and technology.

Conflicts of Interest

The author declares no conflict of interest.