Special Issue

Recent Developments in 2D Materials: Growth, Characterization and Applications

Message from the Guest Editors

This Special Issue aims to provide a timely, authoritative snapshot of the rapidly evolving 2D-materials landscape in 2025, capturing both fundamental discoveries and the first waves of real-world implementation. By assembling contributions that span scalable synthesis, in situ/operando metrologies, emergent quantum and classical phenomena, and device-level demonstrations, we will achieve the following objectives:

- Highlight transformative growth strategies that transition 2D materials from bespoke laboratory flakes to wafer-scale, application-ready platforms.
- Showcase frontier characterization techniques—especially in operando probes and data-driven analysis—that uncover dynamic, buried, or ultrafast processes inaccessible to conventional methods.
- Elucidate novel physics and chemistries unique to reduced dimensionality, including moiré-engineered quantum phases, intrinsic 2D magnetism/ferroelectricity, room-temperature excitonics, and unconventional superconductivity.
- Demonstrate functional devices and system-level integrations that address pressing technological needs in the fields of electronics, photonics, energy, environment, and biomedicine.

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Deadline for manuscript submissions

31 October 2026

Applied Sciences

an Open Access Journal by MDPI

Impact Factor 2.5
CiteScore 5.5

mdpi.com/si/260177

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Message from the Editor-in-Chief

As the world of science becomes ever more specialized, researchers may lose themselves in the deep forest of the ever increasing number of subfields being created. This open access journal *Applied Sciences* has been started to link these subfields, so researchers can cut through the forest and see the surrounding, or quite distant fields and subfields to help develop his/her own research even further with the aid of this multi-dimensional network.

Editor-in-Chief

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