

International Symposium on Graphene & 2D Materials: Advances in Synthesis, Defects, and Applications (G2DMA)

Scope (proposed tagline): *From Fundamental Layers to Scalable Devices—Electronics, Photonics, Energy, and Biomedicine*

Core Topics

- **Synthesis & Growth:** CVD, MBE, chemical/solution exfoliation, liquid-phase routes, deterministic transfer, wafer-scale processing
- **Defects & Interfaces:** edge chemistry, grain boundaries, point defects, heterostructures, interlayer coupling, surface functionalization
- **Advanced Characterization:** Raman/TERS, XPS/UPS, TEM/STEM/EDS/EELS, AFM/STM/KPFM, photoluminescence, THz spectroscopy, in-situ/operando methods
- **Devices:** FETs, photodetectors, modulators, memristors, spintronic elements, flexible/wearable systems, integrated photonics
- **Energy & Environment:** electrocatalysis (HER/OER/ORR), batteries/supercapacitors, thermal management, photocatalysis, CO₂ reduction
- **Bio & Health:** biocompatibility, biosensors, drug delivery, antimicrobial coatings, tissue interfaces
- **Membranes & Separation:** water purification, gas separation, ion/proton transport, osmotic energy
- **Modeling & Data Science:** DFT/MD, multiscale simulations, AI/ML for structure–property–performance prediction
- **Manufacturing & Standards:** roll-to-roll, reliability, metrology, packaging, supply chains, sustainability and EHS

Material Families

- **Graphene family:** graphene, graphene oxide (GO), reduced graphene oxide (rGO)
- **h-BN (hexagonal boron nitride)**
- **Transition-metal dichalcogenides (TMDs):** MoS₂, WS₂, MoSe₂, WSe₂, MoTe₂
- **Phosphorene (black phosphorus derivatives)**
- **MXenes:** Ti₃C₂T_x, Nb₂CT_x, V₂CT_x
- **Elemental 2D materials:** silicene, germanene, borophene
- **2D oxides/oxyhalides/halides**

- **2D perovskites (Ruddlesden–Popper, Dion–Jacobson)**
- **2D MOFs/COFs (layered hybrid frameworks)**

Proposed Tracks

- **Synthesis & Processing of 2D Layers** (CVD/MBE, chemical exfoliation, deterministic stacking)
- **Defects, Doping & Interface Engineering** (defect control, edge functionalization, interlayer physics)
- **Advanced & In-Situ Characterization** (correlative, operando, multimodal approaches)
- **Electronics & Photonics with 2D Materials** (high-frequency, THz, integrated photonics)
- **Energy Conversion & Storage** (catalysis, battery/supercapacitor electrodes, thermoelectrics)
- **Sensors & Biointerfaces** (chemical/biosensors, biocompatibility, toxicology)
- **Membranes & Separation Technologies** (water treatment, gas/ion sieving)
- **Modeling, AI/ML & Data-Driven Design** (computational screening, inverse design)
- **Manufacturing, Reliability & Standards** (scalable fabrication, metrology, EHS, lifecycle)