

Editorial

# Lighting Materials and Devices: Mechanism, Reliability, and Integration in Modern Lighting

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Lighting science has entered a new phase. Solid-state lighting and display technologies have matured from the pursuit of efficiency alone to a broader agenda that includes spectral quality, operational reliability, manufacturability, and application-specific performance. Energy efficiency remains a baseline requirement, while lighting is increasingly coupled with sensing, data, and control, enabling human-centric illumination, wearable and flexible optoelectronics, high-resolution displays, and photonic systems for healthcare, agriculture, and environmental monitoring.

This shift has also changed how progress is made. Progress rarely arises from a single layer of the technology stack. Materials innovations must be assessed under device-relevant conditions; device concepts must be supported by robust packaging, thermal management, and optical extraction; and system integration increasingly determines real-world impact. Work that remains useful beyond a single performance report typically connects fundamental photophysics with engineering constraints and application requirements, supported by rigorous characterization and reproducible metrics.

*Lighting Materials and Devices (LMD)* is launched to serve this integrated research landscape. *LMD* is an international, peer-reviewed journal publishing advances across lighting materials, device architectures, and integrated implementations. Our editorial emphasis is on studies that make the link from mechanism to operation explicit, and that treat reliability and integration as design variables rather than secondary considerations.

*LMD* welcomes research on advanced lighting materials (inorganic, organic, and hybrid emitters; rare-earth and transition-metal doped systems; mechanoluminescent, thermoluminescent, persistent, and up/down-conversion materials), as well as lighting devices and architectures (LEDs and laser lighting; OLEDs, QD-LEDs, and Micro-/Mini-LEDs; flexible, wearable, and transparent emitters; human-centric and adaptive lighting; optical design, light extraction, packaging, and thermal engineering). We also welcome modeling, integration, and application studies, including charge/energy transport and excitation modeling, AI-assisted material discovery and optical system design, IoT-based smart lighting, application-driven demonstrations, and sustainability assessments.

Beyond topic coverage, we place particular weight on contributions that enable progress across laboratories and across scales: clear mechanistic interpretation with appropriate controls; device-relevant testing with well-defined conditions; quantified stability and variability; and integration-ready concepts that connect emission with electronics, sensing, and control.

## Focus of the Inaugural Volume

The inaugural volume will highlight three problem-driven directions. First, reliability and lifetime engineering: what fails, why it fails, and which test protocols allow meaningful comparison. Second, intelligent lighting integration: how sensing, control, and emission can be coupled in closed-loop designs under defined operating environments. Third, emerging emitters beyond conventional phosphors: which mechanisms and material platforms reshape trade-offs among spectrum, efficiency, stability, and scalability. We welcome proposals for topical collections and consensus-oriented Methods & Protocols papers that help standardize materials reporting, device testing, and reliability evaluation.



*LMD* publishes Original Research Articles, Short Communications, Reviews, Perspectives/Opinions, Methods & Protocols, and Industrial Insights/Technology Reports. We aim for editorial decisions that are consistent and well-justified, supported by peer review that is fair, constructive, and timely. We encourage transparent reporting of materials and device fabrication, measurement conditions, and uncertainty where appropriate, in a form sufficient for replication. Selected papers will be featured through Editor's Choice and curated topical collections.

We invite researchers and engineers from academia, industry, and national laboratories to contribute work that advances lighting materials, devices, and integrated systems with clarity, rigor, and practical relevance.

### **Conflicts of Interest**

Given the role as the Editor-in-Chief of the journal, Rongjun Xie had no involvement 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**

No AI tools were utilized for this paper.