

Recent Advances in Diamond Science and Technology

I am pleased to present this Topical Section of *Physica Status Solidi* (*a*), highlighting recent advancements in diamond science and technology. This collection features cutting-edge research in diamond-based materials and devices, with contributions stemming from the 28th edition of the international *Surface and Bulk Defects in Diamond* (SBDD) workshop. The workshop brought together researchers from diverse fields to discuss the latest developments, and the papers featured in this Topical Section reflect the latest innovations of diamond research.

The papers cover a wide range of topics, from fundamental studies of defect creation in diamond to innovative approaches in quantum sensing, device fabrication, and electrochemical processes. These contributions underscore the importance of diamond's unique properties in real-world applications, particularly in the fields of quantum information and biomedicine. Novel experimental techniques are introduced, such as a combined confocal-AFM setup that enables sub-diffractional spatial resolution for quantum sensing, and a study on boron-doped nanocrystalline diamond coatings for self-sensing AFM cantilevers, which facilitate advanced nanoscale measurements. Other research papers explore temperature-sensing using cathodoluminescence spectroscopy of nitrogen-doped nanodiamonds and the

application of graphene on diamond for electronic devices, demonstrating the growing intersection of diamond with other advanced materials for next-generation technologies. Together, these papers showcase the ongoing evolution of diamond research, highlighting its multifaceted role in both fundamental science and emerging technological innovations.

As research in diamond technology progresses, so too does the need for advanced characterization techniques to better understand and optimize these materials. The 28th SBDD workshop, held in February 2024 in Hasselt, Belgium, provided a platform for delegates to exchange ideas, foster collaborations, and envision the future of diamond research. I hope that this collection of articles will continue the vibrant discussions initiated at the workshop, inspire new avenues of research, and contribute to the ongoing development of diamond-based technologies, both within this field and across related disciplines.

Hasselt, February 2025.

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DOI: 10.1002/pssa.202500083