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EDITORIAL

2D materials as a new platform for photonic applications

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Two-dimensional (2D) layered materials possess sheet-like structures with single-atom or few-atom thicknesses. They exhibit exceptional electronic and optical properties due to quantum confinement in the direction perpendicular to the 2D plane. Besides being the basis of various modulators and photodetectors, 2D materials have realized light sources with femtosecond pulse duration utilizing their ultrahigh optical nonlinearity. Recent developments and explorations of various 2D materials and their heterostructures have prompted intense research on various photonic devices with superior performance and functionalities. These developments can pave the way for realistic applications of 2D materials, and boost the fundamental study of various physical effects and phenomena.

This special issue on "2D materials for photonic applications" covers the most recent progresses in photonic applications of 2D materials. In the three reviews and two original research articles included, it introduces light sources, modulators, and fabrication methods of 2D materials. The significant benefits of 2D materials for electronics and photonics are also presented, providing a roadmap for a broad range of application fields.

Mustonen et al. [1] summarized the fabrication methods of large-area transparent graphene electrodes for industry, including liquid exfoliation and chemical vapor deposition. Zhong et al. [2] reviewed different graphene-based all-optical modulators, and comprehensively discussed their performances in detail. Yao et al. [3] focused on integrated optical switches enabled by 2D materials and beyond. They summarized state-of-the-art optical switches (e.g., all-optical, thermo-optical, and electro-optical modulators) in terms of their energy consumption and response time, showing several stimulating charts. Mu et al. [4] and Li et al. [5] demonstrated pulse generation based on 2D nanoparticles, which can potentially generate stable and rectangular pulses. These researches are highly promising for practical applications.

The five articles selected for this special issue cover only a portion of the recent advances and applications in this rapidly growing domain of 2D materials. In the future, significant developments in 2D materials for photonic applications are expected. We hope that this special issue on "2D materials for photonic applications" will interest readers, and provide useful references that will inspire future research in this exciting field.

In addition, we would like to express sincere gratitude to the editors of *Frontiers of Optoelectronics* for providing a valuable opportunity to organize this special issue. We also thank all authors who have contributed their articles, and the many reviewers who have generously offered their valuable time to provide high-quality reviews of all papers.

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