

Graphene hybrid structures for integrated and flexible optoelectronics (Recent Progress)

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Abstract:

Low light absorption and inefficient carrier extraction in Gr are the major bottlenecks which have hindered the development of high-performance Gr-based optoelectronics. Gr hybrid photodetectors where Gr serve as either photoabsorbing or transparent conducting layer have proved an important alternate to improve the efficiency of Gr based photodetectors. Through the integration of Gr with a large family of materials and structures (optical and device), the detection spectrum is expanded from UV to THz with much improved R performance at high speed. Availability of a broad family of photosensitive materials integratable with Gr not only offers the possibility to enhance the photodetection efficiency of these structures but also gives the freedom to design the on-demand photodetectors in a specific wavelength regime. Thanks to the flexibility, extraordinary mechanical properties, and integration of Gr with various substrates and photosensitive materials, hybrid Gr optoelectronics devices have also found applications in flexible and wearable electronics. I will review the recent progress on materials, photoresponse enhancement methods, and the integration of the Gr hybrid structures with Si and other flexible platforms. I will also summarize the challenges and future opportunities of Gr hybrids structures for the optoelectronics applications.