Few-layered graphene oxide embedded 1DPhC microcavity for amplified spontaneous emission source

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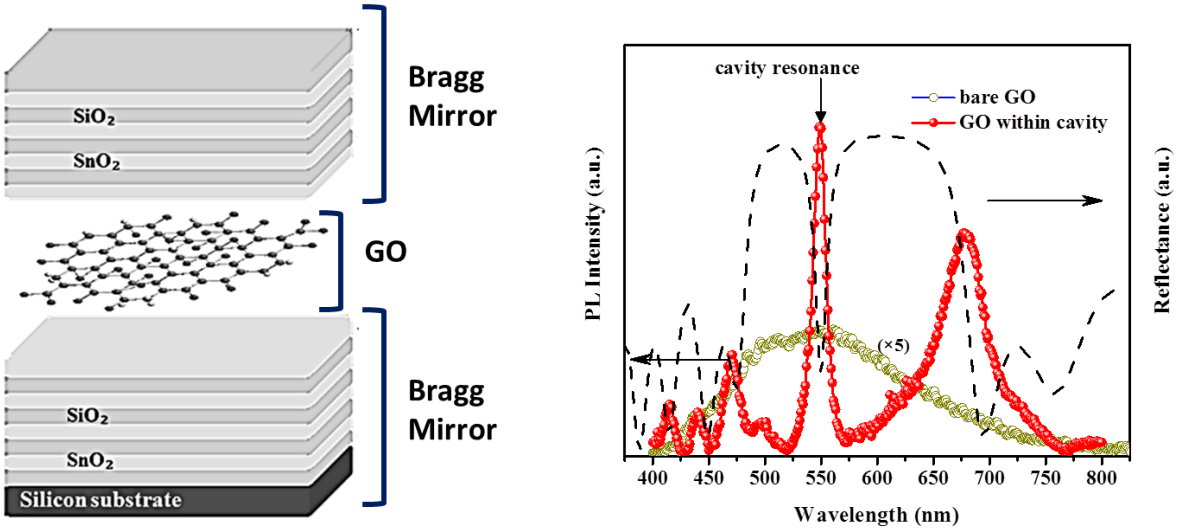
Extensive rich physical properties of graphene and its intermediate product graphene oxide (GO), make them promising candidates for photonic applications [1,2]. Optical micro-cavities can be designed by engineering structural defects in photonic crystals (PhCs) and used to control spontaneous emission from active materials [3, 4]. In this study, a novel amplified spontaneous emission (ASE) system based on GO embedded sol-gel fabricated all-dielectric one-dimensional photonic crystal (1DPhC) micro-resonator is presented**.** The schematic of the structure is shown in figure 1(a). Figure 1(b) compares the PL spectra obtained from a bare GO film on a Silicon substrate and that from GO layer inserted between two Bragg reflectors comprising of alternating layers of SiO2 and SnO2. It can be observed that the GO emissions at the micro-cavity resonance and at the band edges are extremely enhanced compared to the PL emission from the no-cavity structure and within the photonic stop-band it is completely suppressed. Continuous tuning of the a novel amplified spontaneous emission (ASE) peak by modulating the photonic stop band with the detection angle was also reported, making the GO incorporated 1DPhC a novel and attractive system for integrated optic applications.



Figures 1. (a) Schematic of the GO embedded Bragg Mirror. (b) Comparison of PL spectra of bare GO layer on a substrate and GO layer within the micro-cavity obtained under 325 nm excitation.

References

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