High-performance ultraviolet photodetectors based on ZnS/graphene hybrid nanostructures

김연호†, 김상진[1], 홍병희[2], 장두전[2]
한국기초과학지원연구원; [1]한국과학기술연구원;
[2]서울대학교 화학부
(yeonho@kbsi.re.kr†)

Ultraviolet (UV) light photodetectors constructed from solely inorganic semiconductors still remain unsatisfactory because of their low electrical performances. To overcome this limitation, the hybridization is one of the key approaches that have been recently adopted to enhance the photocurrent. High-performance UV photodetectors showing stable on-off switching and excellent spectral selectivity have been fabricated based on the hybrid structure of solution-grown ZnS nanobelts and CVD-grown graphene. Sandwiched structures and multilayer stacking strategies have been applied to expand effective junction between graphene and photoactive ZnS nanobelts. A multiply sandwich-structured photodetector of graphene/ZnS has shown a photocurrent of 0.115mA under illumination of 1.2mWcm^{-2} in air at a bias of 1.0V, which is higher 10^7 times than literature values. The multiple-sandwich structure of UV-light sensors with graphene having high conductivity, flexibility, and impermeability is suggested to be beneficial for the facile fabrication of UV photodetectors with extremely efficient performances.