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High-performance Photoconductive devices based on Graphene-Nanowire Hybrid Structures HYUNGWOO LEE, Department of Physics and Astronomy, Seoul National University, Seoul, Korea, KWANG HEO, Seoul National University, JAESUNG PARK, Pohang University of Science and Technology, YONGJU PARK, SEUNGUK NOH, Seoul National University, KWANG S. KIM, Pohang University of Science and Technology, CHANGHEE LEE, BYUNG HEE HONG, Seoul National University, JIKANG JIAN, Xinjiang University, SEUNGHUN HONG, Department of Biophysics and Chemical Biology, Seoul National University — The photoconductivity effect in various semiconducting materials has been extensively utilized for optoelectronic applications. However, conventional photoconductive channels exhibited rather slow responses to external light pulses because the photogenerated electrons and holes survive for a rather long time even after the lights are turned off. On the other hand, single-layer graphene (SLG) was reported to exhibit quite a fast photoconductivity, while its rather small photocurrent levels may limit the practical applications. Herein, we developed graphene-CdS nanowire (NW) hybrid structures for high-speed photoconductivity and large photoresponse. The hybrid structure consists of CdS NWs which were selectively grown in specific regions on a SLG sheet. The photosensor based on graphene-CdS NW hybrid structures exhibited rather large photocurrents as well as much faster operation speed than those based only on CdS NW networks. This simple but efficient strategy takes advantages of both graphene and NWs, and it should enable the fabrication of high performance optoelectronic devices for practical applications.

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