Electronic Supplementary Material (ESI) for Journal of Materials Chemistry
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Graphene-Nanowire Hybrid Structures for High-performance Photoconductive Devices

Supplementary Information

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1. Sample Preparation

(1) CdS Nanowire Growth

Single-crystalline CdS NWs were synthesized by a CVD method.[1-3] The CdS powder source was placed at the center of the alumina tube, and catalyst-patterned substrates were placed at the downstream position of the source material. After the evacuation of the tube (10^{-6} torr), the furnace was rapidly heated to 650 °C under a constant Ar flow rate of 300 sccm. When the temperature was reached at 650 °C, the tube was evacuated to a base pressure of 10^{-3} torr, and then, the tube was kept at this temperature for 40 minutes. After 40 minutes, the tube was cleaned with high-purity Ar gas, and then, the tube was slowly cooled down.

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2. Supplementary Figures

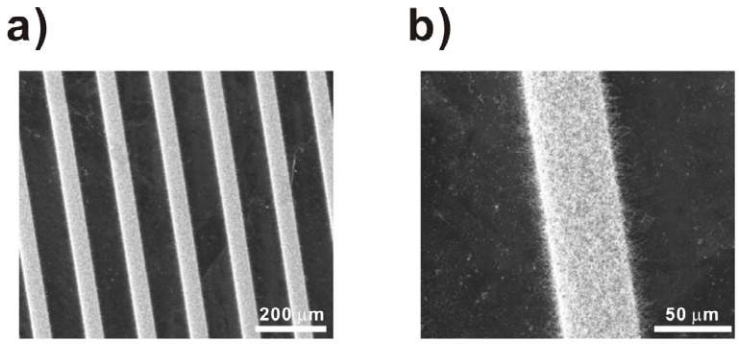

Fig S1. SEM images showing CdS nanowires (NWs) grown selectiely on specific regions of graphene substrates. Here, we first patterned an 8 nm-thick Au film on the graphene. Then, the vacuum furnace was used to grow NWs selectively on the regions with Au film.

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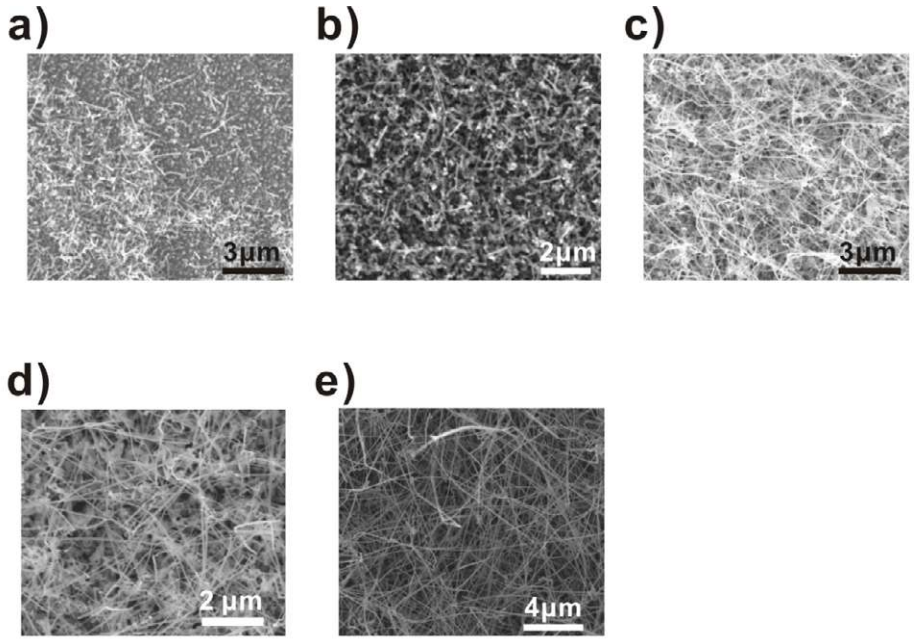

Fig S2. SEM images of CdS NWs grown for a) 30 min, b) 35 min, c) 40 min, d) 45 min and e) 60 min on graphene substrates with Au catalyst film.

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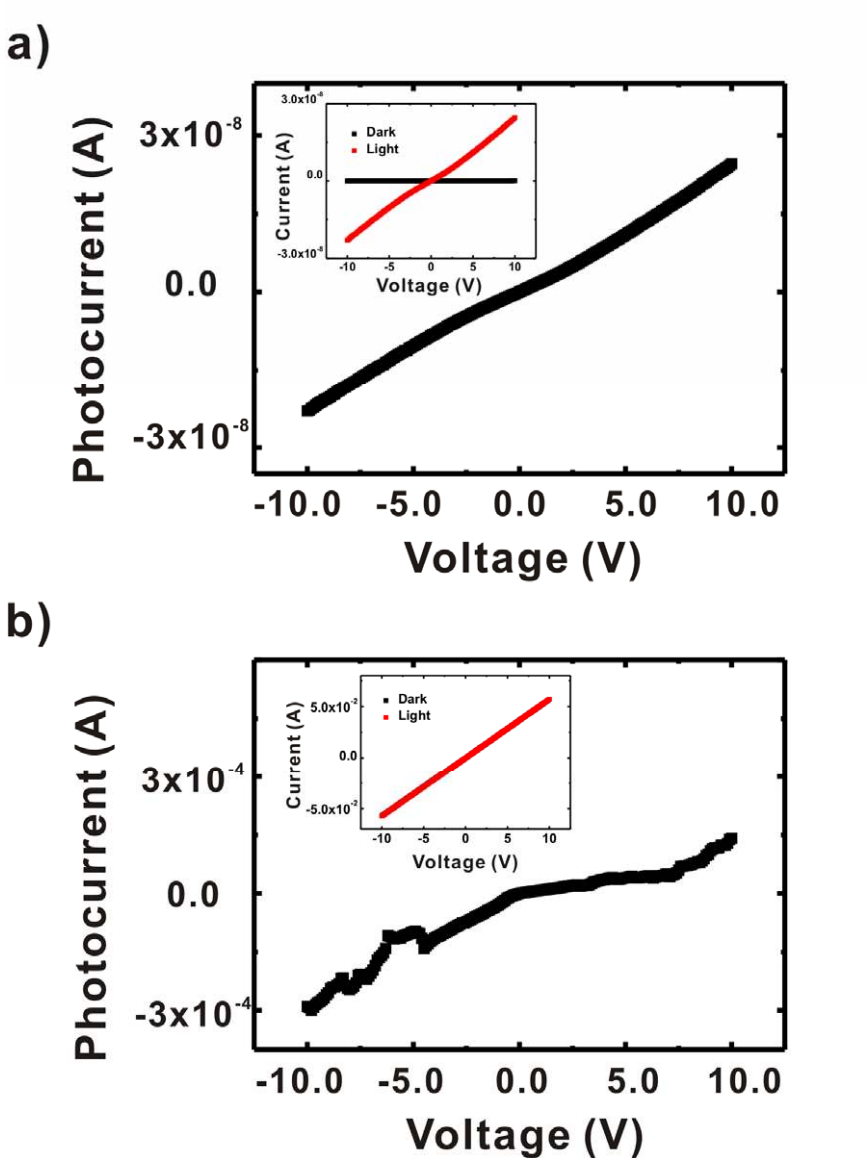

Fig S3. a) Photocurrent of photoconductive channels based on CdS NW networks. Here, the CdS NW networks were grown on SiO_2 substrates without graphene. The absolute photoresponsivity was estimated as 6.54×10^{-9} A/W, 5.47×10^{-8} A/W and 7.02×10^{-7} A/W at 0.1, 1.0 and 10.0 V, respectively. The inset shows I-V characteristics with or without light exposure. b) Photocurrent of photoconductive channels based on graphene. The absolute photoresponsivity was estimated as 1.20×10^{-5} A/W, 1.13×10^{-4} A/W and 2.02×10^{-3} A/W at 0.1, 1.0 and 10.0 V, respectively.

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References

1. T. Gao, Q. H. Li, T. H. Wang, *Appl. Phys. Lett.* **2005,** 86, 173105.
2. J. S. Jie, W. J. Zhang, Y. Jiang, X. M. Meng, Y. Q. Li, S. T. Lee, *Nano Lett.* **2006,** 6, 1887.
3. Y. W. Wang, G. W. Meng, L. D. Zhang, C. H. Liang, J. Zhang, *Chem. Mat.* **2002,** 14, 1773.