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| Title: | Number-Resolved Single-Photon Detection with Ultralow Noise van der Waals Hybrid |
| Authors: | Maliakal, S. (/jspui/browse?type=author&value=Maliakal%2C+S.) |
| Keywords: | Van der Waals heterostructures Single photon detection Graphene Optoelectronics |
| Issue Date: | 2018 |
| Publisher: | Wiley-VCH Verlag |
| Citation: | Advanced Materials, 30(2) |
| Abstract: | Van der Waals hybrids of graphene and transition metal dichalcogenides exhibit an extremely large response to optical excitation, yet counting of photons with single-photon resolution is not achieved. Here, a dual-gated bilayer graphene (BLG) and molybdenum disulphide (MoS ₂) hybrid are demonstrated, where opening a band gap in the BLG allows extremely low channel (receiver) noise and large optical gain ($\approx 10^{10}$) simultaneously. The resulting device is capable of unambiguous determination of the Poissonian emission statistics of an optical source with single-photon resolution at an operating temperature of 80 K, dark count rate 0.07 Hz, and linear dynamic range of ≈ 40 dB. Single-shot number-resolved single-photon detection with van der Waals heterostructures may impact multiple technologies, including the linear optical quantum computation. |
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