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Resonant Energy Transfer from Individual Semiconductor Nanocrystals to Graphene ZHEYUAN CHEN, STEPHANE BERCIAUD, TONY F. HEINZ, LOUIS E. BRUS, Columbia University, New York NY 10027 — Graphene is a promising material for the fabrication of transparent electrodes in photovoltaic devices. In order to evaluate its potential, however, we must understand the mechanism of charge and energy transfer from a light harvesting material to such graphene layers. Here we focus on the latter process and demonstrate strong resonant energy transfer from individual CdSe nanocrystals to graphene layers. We observe resonant energy through the presence of strong quenching (by a factor of nearly 100) of the luminescence of individual CdSe nanocrystals when placed upon a single-layer graphene sheet. The quenching efficiency increases with thickness for few-layer graphene sheets and is found to saturate at a value of ∼600 for bulk graphite. Our results are in good qualitative agreement with a simple theoretical model using the dipole approximation and a tight-binding description of the graphene electronic structure [1].

[1] R.S. Swathi and K.L. Sebastian, *J. Chem. Phys.* **130**, 086101 (2009)

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