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**Properties and Modeling of Graphene/CdSe Nanoparticle Film/Graphene Tunneling Device Structures** DATONG ZHANG, CHENGUANG LU, Department of Applied Physics and Applied Math, Columbia University, PHILIP KIM, Department of Physics, Columbia University, IRVING P. HERMAN, Department of Applied Physics and Applied Math, Columbia University
— We fabricated graphene/monolayer CdSe nanoparticle film/graphene sandwich device structures through a multi-step procedure. The monolayer CdSe nanoparticle film is formed on a liquid-air surface before transfer onto the bottom graphene layer that had been micro-exfoliated onto a 285 nm $SiO_2$/Si substrate. The top graphene layer is transferred to the targeted area on the CdSe nanoparticle film via a dry transfer technique. Current-voltage measurements across the device suggest tunneling-type transport; the I-V curves are fit by tunneling models with an effective thin insulator with barrier height of about 1.6 eV and a tunneling distance of about 2.8 nm, which matches the nanoparticle dimension. In photoconductivity measurement, the source-drain current is greatly enhanced when the laser is on the junction area. The magnitude of the photocurrent is in agreement with that estimated using the nanoparticle absorption coefficient and laser intensity.

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