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Carbon Nanotube CdSe Nanoparticle Hybrid Materials: Synthesis and Optical Properties AUSTIN AKEY, CHENGUANG LU, Columbia University, Department of Applied Physics and Applied Math, WEI WANT, Columbia University, Department of Chemistry, IRVING HERMAN, Columbia University, Department of Applied Physics and Applied Math — Carbon nanotubes present remarkable opportunities for the construction of nanomaterials with unique properties, and for use in sensors and optoelectronic device applications. Chemical attachment of nanoparticles to nanotubes has thus far resulted in low loading; direct nucleation of particles on the tube sidewalls leads to a loss of control over particle size and monodispersity. We report the synthesis of novel heterostructures composed of single-walled carbon nanotubes and chemically attached, monodisperse cadmium selenide nanoparticles. Pyridine is used to strip the ligand shell from the nanoparticles, which are then bound to SWNTs in suspension. The resulting hybrid material is stable and resists aggregation; TEM and SEM characterization shows the nanotubes to be densely covered with nanoparticles. The nanoparticles used range in size from 3.5 to 6.0 nm in diameter, and exhibit strong quantum confinement. Also synthesized were hybrids of carbon nanotubes with core-shell CdSe/ZnS nanoparticles and with CdSe nanorods. The absorption and photoluminescence properties of the hybrid materials are also presented.

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