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Color Detection Using Chromophore-Nanotube Hybrid Devices XINJIAN ZHOU, THOMAS ZIFER, BRYAN WONG, KAREN KRAFCIK, FRANÇOIS LÉONARD, ANDREW VANCE, Sandia National Laboratories — In this talk, we will present a nanoscale color detector based on a single-walled carbon nanotube functionalized with azobenzene chromophores, where the chromophores serve as photoabsorbers and the nanotube as the electronic read-out. By synthesizing chromophores with specific absorption windows in the visible spectrum and anchoring them to the nanotube surface, we demonstrate the controlled detection of visible light of low intensity in narrow ranges of wavelengths. Our measurements suggest that upon photoabsorption, the chromophores isomerize from the ground state trans configuration to the excited state cis configuration, accompanied by a large change in dipole moment, changing the electrostatic environment of the nanotube. We will also present our all-electron ab initio calculations that are used to study the chromophore-nanotube hybrids and show that the chromophores bind strongly to the nanotubes without disturbing the electronic structure of either species. Calculated values of the dipole moments support the notion of dipole changes as the optical detection mechanism.

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