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Modulated conduction in single-walled carbon nanotubes using covalently bound chromophore functionalities JASON SIMMONS, Department of Physics, TYLER MARK, Department of Chemical Engineering, GUANGDE CHEN, Department of Chemistry, VICTORIA CAMPBELL, PADMA GOPALAN, Department of Materials Science & Engineering, MARK ERIKSSON, Department of Physics, University of Wisconsin - Madison — Carbon nanotube hybrid materials are widely studied in order to leverage the exceptional thermal and electronic properties for a number of applications. We demonstrate an optically active nanotube-hybrid material by covalently functionalizing single-walled nanotubes with an azo-based chromophore. Upon UV illumination, the conjugated chromophore functionality undergoes a cis-trans isomerization, breaking the conjugation and modulating the conductance of individual functionalized nanotubes. Though there is most likely no direct charge transfer between the chromophore and the nanotube, the isomerization results in a charge redistribution near the nanotube, modifying the local electrostatic environment and causing the change in conductance. Further, the conductance change is reversible; indicating that the chromophore functionalized nanotubes can be used as reversible photo-switches.

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