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Photocurrent Spectroscopy of Dye Sensitized Carbon Nanotubes

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Monochiral (7,5) single walled carbon nanotubes (SWCNTs) are integrated into a field effect transistor device in which the built-in electric field at the nanotube:metal contact allows for exciton separation under external light bias. Variable wavelength spectroscopy and 2D surface mapping of devices consisting of 10 −20 nanotubes is performed in the visible, and a strong correlation between the nanotube's second optical transition (S22) and the photocurrent is found. Subsequently, the SWCNTs are non-covalently modified with three different fluorescent dye molecules with off-resonant absorption maxima at 532, 565, and 610 nm. Energy transfer from the dyes onto the SWCNTs allows for the optical properties of the nanotube to be tailored and holds promise for the development of photo-detectors and for applications in photovoltaics and biosensing

Summary

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