CORE-CM SEMINAR
Michigan State University — Department of Chemistry

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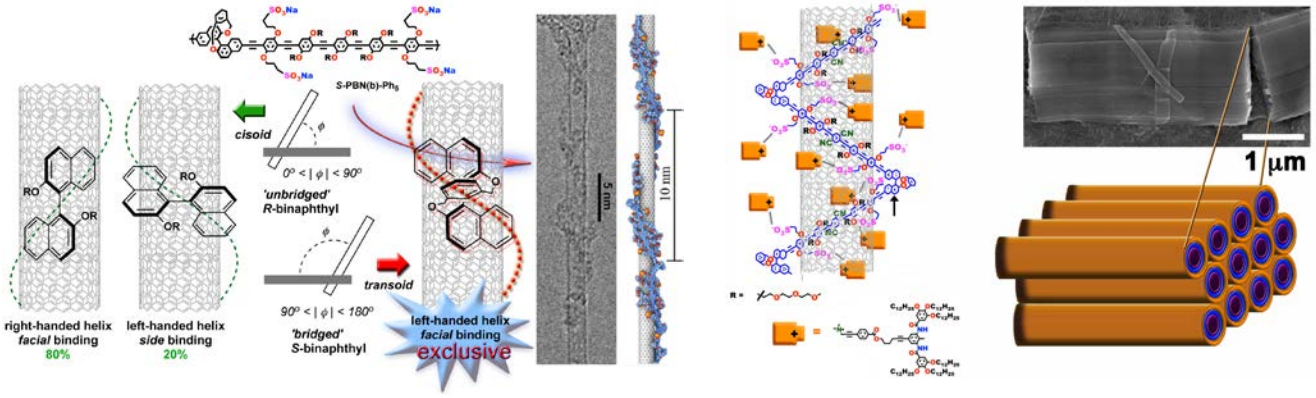
Duke University

Ultrafast Exciton Migration and Charge Transfer Dynamics in Semiconducting Polymer-Carbon Nanotube Superstructures

Semiconducting polymers can be designed that exhibit a single helical screw preference for wrapping single-walled carbon nanotube (SWNT) surfaces. Aryleneethynylene polymers that feature a 2,2'-(1,3-benzyloxy)-*bridged* (b)-1,1'-bi-2-naphthol unit facilitate extensive van der Waals contact of the naphthyl moieities with the nanotube surface, and guarantee a helically wrapped polymer-nanotube superstructures of fixed helical chirality. Such polyanionic [arylene]ethynylene polymers, used in combination with ionic self assembly approaches and nanotubes enriched in the (6,5) chirality, enable for the first time the production of functionalized SWNTs that are fully soluble in organic solvents and capable of assembly into complex hierarchical structures that feature aligned nanotubes at high areal density (2.5 x10^{10} SWNTs cm^{-2}) that maintain the optoelectronic properties characteristic of individualized SWNTs. Polymers based on these structural motifs that feature electron- or hole-accepting motifs along their respective conjugated backbones provide polymer-SWNT superstructures that serve as unique energy conversion assemblies, compositions with which to interrogate mechanistic issues regarding photoinduced charge transfer reactions involving nanoscale objects, and highly organized mesoscopic materials that make possible investigation of transport phenomena in the solid state.



Thursday, February 6, 2014
12:00 PM
Room 1400 – BPS
Professor Jim McCusker – Host