

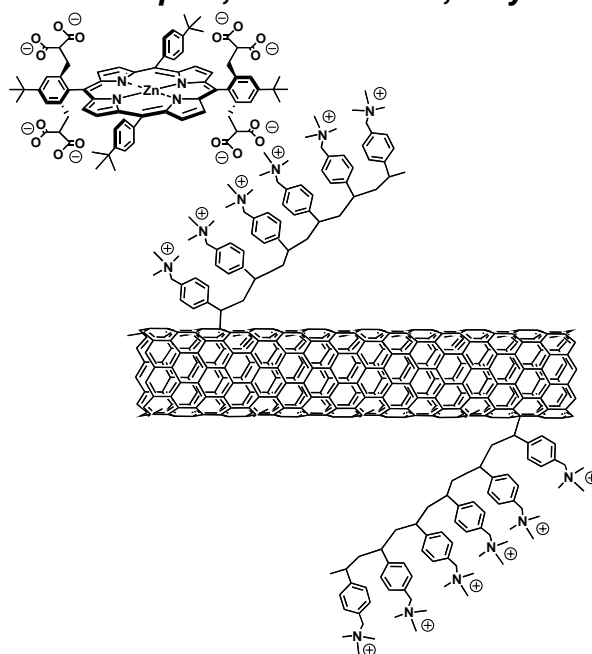
## Interactions in Functionalized Single-Walled Carbon Nanotubes-Polymer / Porphyrin Donor Acceptor Nanohybrids

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Covalently polymer-functionalized SWNT have been synthesized by the reaction of poly((vinylbenzyl)trimethylammonium chloride)  $PVBTA^{n+}$  through free-radical polymerization of the monomer in the presence of SWNT.  $PVBTA^{n+}$  was also non-covalently assembled to the SWNT and a stable SWNT/  $PVBTA^{n+}$  positively charged suspension was obtained. A versatile donor-acceptor nanohybrid has been prepared using electrostatic interactions of covalent SWNT- $PVBTA^{n+}$  or SWNT/  $PVBTA^{n+}$  mixture and porphyrins  $H_2P^{8-}$  or  $ZnP^{8-}$  units in solution and as an electrostatic layer by layer thin film on indium tin oxide (ITO) covered glass support. Several spectroscopic, microscopic, transient and photoelectrochemical measurements were employed to characterize the resulting supramolecular complexes. The photoexcitation of the nanohybrids afforded long-lived radical ion

pairs, having lifetimes as long as 2.2 microseconds. The photocurrent measurements gave maximum internal photon to current efficiencies (IPCE) of 3.31 % and of 5.17 % when the covalently (**SWNT-PVBTA<sup>n+</sup>**) and the non covalently (**SWNT / PVBTA<sup>n+</sup>**) functionalized SWNT respectively were assembled on ITO together with with ZnP<sup>8-</sup>.