Nanographene Favors Interactions with the Electron Acceptor Rather Than the Electron Donor in a Planar Fused Push-Pull Conjugate

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Abstract: Dispersions of preexfoliated nanographene (NG) and fused electron donor–acceptor tetraphthalfulvalene–perylenediimide (TTF–PDI) enable multifunctional, noncovalently functionalized NG. They were characterized by complementary spectroscopic and microscopic techniques. The design strategy of the chromophoric and electroactive molecular conjugate renders a large and planar π-extended system with a distinct localization of electron-rich and electron-poor parts at either end of the molecular conjugate. Within the in-situ formed nanohybrid, the conjugate was found to couple electronically with NG preferentially through the electron accepting PDI rather than the electron donating TTF and to lead to p-doping of graphene.

Introduction: Molecular films of graphene have the potential for the much needed breakthroughs in nanoelectronic devices.[1] Non-covalent functionalization of graphene does not disrupt the extended π-conjugation. Incorporation of intercalators in the form of redox- and/or photoactive building blocks enables the usage of electron donor-acceptor (D–A) interactions. Accordingly, the non-covalent functionalization of nanographene (NG) or graphene sheets with either aromatic electron donors or acceptors, as demonstrated in the case of carbon nanotubes, is widely exploited in contemporary research.[2] Herein, we report the exfoliation of graphite through intercalation and immobilization of a planar and extended π-conjugated D–A 1 (Scheme 1) onto its basal plane and the resultant nanohybrids have been characterized by complementary spectroscopic and microscopic techniques.[3]

REFERENCE

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