Increasing graphene's ability to accept electrons by exfoliation.

Abstract: Non-covalent functionalization of graphene is a convenient strategy to keep graphene sheets both exfoliated with single or very few layers and sufficiently reduced with continuous unbroken π-π network facilitating its use in applications in devices. Graphene oxide was reduced using sodium borohydride and functionalized with pyrene-butyrate to obtain exfoliated graphene(EG), the desired form of graphene. In our present work, we show that the ability of graphene to accept and transport electrons increases with exfoliation and reduction. The role of exfoliation and reduction in graphenes ability to accept and shuttle electrons from a tetra-cationic porphyrin, 5,10,15,20-tetrakis(1-methyl-4-pyridinio)porphyrin tetra(*p*-toluenesulfonate) (TMPyP) is discussed. Absorption bleaching and photo-luminensence quenching of TMPyP reveal this process. In addition, photoelectrochemical measurements of TiO_2 films coated with EG-TMPyP on conducting glass electrode demonstrate increased electron transfer between porphyrin and EG.

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