

Simultaneous Reduction of Graphene Oxide and Polyaniline: Doping Assisted Formation of a Solid State Charge-Transfer Complex

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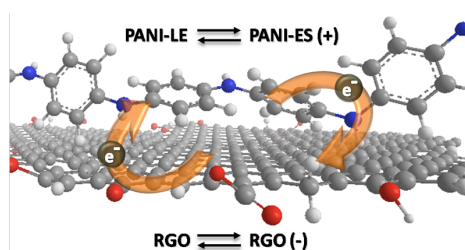
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Formation of a solid state charge-transfer complex is observed upon simultaneous reduction of a graphene oxide – polyaniline (GO-PANI) composite consisting of GO sheets coated by a thin layer of PANI. Controlling the reduction conditions and morphology of (GO-PANI) we synthesized a reduced R(GO-PANI) product, which exhibited an unprecedented donor-acceptor interaction between reduced graphene oxide (RGO) and PANI in the solid state [1]. Here RGO plays a dual role as electron acceptor of reduced PANI (leucoemeraldine, LE) and as stable counterion of the doped state of PANI (emeraldine salt, ES). Hence the doping assisted charge-transfer leads to a partial redox doping of PANI by RGO stabilizing PANI in an atypical intermediate oxidation state between LE and ES. In addition, charge-transfer in R(GO-PANI) is responsible for improved material properties including enhanced conductivity, superior thermal and redox stability, and a remarkably high water dispersibility. These results may enable opportunities for the development of novel functional materials based [2,3] on graphene and intrinsically conducting polymers through improved processing routes [4,5].

References

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Figures



Donor-acceptor interactions in reduced (GO-PANI) charge transfer complex



Water soluble reduced (GO-PANI)