Electroactive Carbon Nanotube and Graphene-based Materials: Processing into Macroscopic Electrode Materials of Different Shapes

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Abstract

Carbon nanotubes and graphene are fundamental nanoscale objects exhibiting a series of exceptional physical and chemical properties. Being lightweight, mechanically and thermally robust of high environmental stability, electrically conducting, and having a very high surface, makes them promising candidates for the development of novel electroactive electrode materials of special interest for applications in electrochemical sensing, energy storage and artificial muscles. Of uppermost interest for this purpose is their assembly into different macroscopic shapes ranging from thin coatings towards fibers.

We here present our latest advances in the processing of carbon nanotubes [1] and graphene [2, 3] and respective composites using intrinsically conducting polymers [4]. Focus lays on the development of stable and homogeneous dispersions and their processing into different macroscopic forms ranging from supported films and coatings to fibers and free-standing paper-like materials thus underlining the wide range of potential technological applications for these functional materials

References

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[4] C. Vallés, P. Jiménez, E. Muñoz, A.M. Benito, W.K. Maser, J. Phys. Chem. C **115** (2011) 10468

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Figures:

Figure 1: Polianiline Composite Dispersions: a) Emeraldine base with CNTs, b) Emeraldine Salt with reduced graphene oxide (RGO), c) Emeraldine Base with graphene oxide (GO).

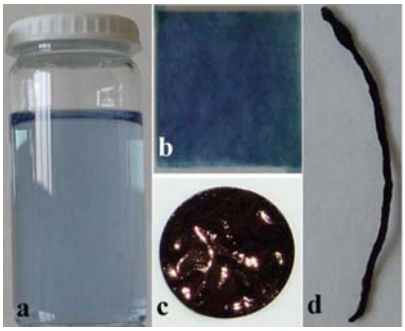

Figure 2: Processing of polyaniline (emeraldine base)-CNT/RGO dispersions into b) coatings, c) free-standing films and d) fibers

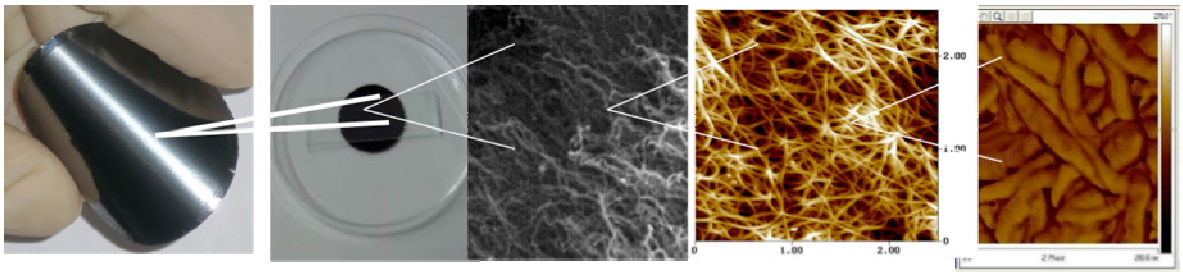

Figure 3: Processing of CNT into free-standing paper-like materials

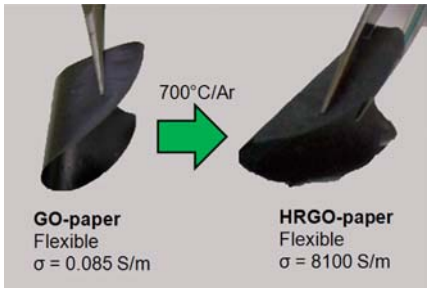

Figure 4: Processing of GO paper-like material into flexible conductive RGO paper-like material.