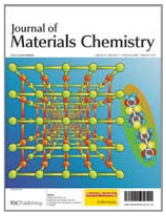
Journal of Materials Chemistry

High impact applications, properties and synthesis of exciting new materials



Hot paper: Stable aqueous dispersions of graphitic nanoplatelets via the reduction of exfoliated graphite oxide in the presence of poly(sodium 4-styrenesulfonate)

1. Could you explain the significance of your article to the non-specialist?

Graphite, an all carbon material, has a layered structure consisting of stacked sheets that are 1-atom thick and in which the C atoms are linked together in a hexagonal framework with sp2 bonding. Delamination of graphite into individual sheets is difficult and has never been achieved before. In the current work, we have discovered a method to produce isolated nanoplatelets in water dispersions and to prevent their agglomeration by coating them with a polymer that has affinity for both the sheets and for water. This strategy may eventually allow for the exfoliation of individual sheets that can be manipulated in water dispersions.

2. What has motivated you to conduct this work?

The in-plane properties of graphite are remarkable (excellent thermal and electrical conductivity as well as outstanding mechanical properties) and one may expect that to hold for individual sheets, or thin 'graphitic nanoplatelets', as well. Such objects would be "chemically tunable" by a full repertoire of organic reactions, allowing for chemical functionalization and subsequent modification with a wide range of functional properties. Provided that they can be obtained by a scalable method and chemically manipulated, such thin sheets and nanoplatelets could serve as a viable and inexpensive alternative to carbon nanotubes for a variety of applications such as fillers for polymer composites or as devices in nanoelectronics (graphite is a commodity material available at dollars per pound).

3. Where do you see this work developing in the future?

We envision the development of a new class of materials.

4. Are there any particular challenges facing future research in this area?

An exciting challenge is the chemical tuning of individual sheets of graphite or of graphitic nanoplatelets to adapt them for a host of applications and to create new functional materials.

Stable aqueous dispersions of graphitic nanoplatelets *via* the reduction of exfoliated graphite oxide in the presence of poly(sodium 4-styrenesulfonate)
Sasha Stankovich, Richard D. Piner, Xinqi Chen, Nianqiang Wu, SonBinh T. Nguyen and Rodney S. Ruoff, *J. Mater. Chem.*, 2006, **16**, 155
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