Preparation and Characterization of Graphene Nanosheets Produced by Various Pre-treatments

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A novel method is proposed to produce graphene nanosheets. The pristine graphite was directly exfoliated by formic acid, acetate acid, and strong inorganic acid/thermal treatments. A stable graphene aqueous dispersion was obtained by chemical modification of graphite oxide nanosheets. The total duration for oxidation and production of graphite oxide colloid was significantly shortened due to the use of exfoliated graphite nanoplatelets with large surface area. The graphene nanosheets were studied by X-ray diffraction, atomic force microscopy, and thermogravimetric analyses. As a result, pre-treatment of the graphite with acetate acid produced the best graphite oxide nanosheets, and the chemical modification of the graphite oxide nanosheets led to produce highly stable graphenes.