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Synthesis and structure of high quality graphene prepared via solvothermal exfoliation of intercalated graphite flakes

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Abstract

The large-scale production of graphene via a simple approach is the key factor to be introduced into the industrial applications such as energy conversion, storage materials and optical electronics. In this letter, a rapid and facile approach to synthesize high quality graphene layers with large mass production has been developed. The method depends on the intercalation of graphite flakes with tartaric acid. The treated graphite subjected to a thermal shock at 750 degrees C for 60 s and followed by solvothermal treatment in the presence of isopropanol at 400 degrees C for 2 h. The produced graphene layers have an average thickness of 0.53 nm which depicted the production of a monolayer graphene. The FT-IR and Raman spectroscopy confirmed that the produced graphene layers have very low surface defects compared to reported approaches. The XPS spectra revealed that the surface of the produced graphene layers contains only 6 at% oxygen, which is better than the reduced graphene by conventional methods. This novel approach will open a new avenue for a scalable production of high quality graphene monolayer. (C) 2015 Elsevier Ltd. All rights reserved.

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