

Direct exfoliation of graphene in organic solvents with addition of naphthalene

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Graphene is the strongest and toughest material known to man, and it offers extraordinary electronic, thermal and mechanical properties and is expected to find a variety of applications. Numerous studies have reported the solution-phase dispersion of pristine, unfunctionalized graphene because there are no defects and oxide groups in the pristine graphene, which is essential for its application in the electronics. There have been reports about the adsorption of naphthalene onto multi-walled carbon nanotubes with the pi-pi interaction. We suggest that similar effects may be exploited between the naphthalene and graphene in organic solvents. More importantly, naphthalene sublimates below its melting point due to the intrinsic property of this small molecular compound. Therefore, naphthalene can be easily removed after the liquid-phase exfoliation process, facilitating this method for many applications. Herein, we report a new approach to improving the liquid-phase exfoliation efficiency of graphite in organic solvents. With addition of naphthalene, the graphene yield is significantly increased. Naphthalene intercalates into the graphite and expands the interplanar space between the adjacent graphitic layers during the sonication process.