

Preparation of graphene using solvent dispersion method and its functionalization

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Abstract

Graphene, a one atom thick layer of carbon atoms with a two-dimensional honeycomb lattice, has drawn a lot of attention during the last past few years due to its unique properties.¹ Graphene holds the promise in a range of applications from electronic devices, composites to biological applications.² However, a prerequisite is to obtain high quality graphene in a large scale. Several approaches have been developed, including mechanical,¹ epitaxial,³ reduction of graphene oxide,² or solvent dispersion of graphite.⁴ Among these methods, solvent dispersion of graphite seems to be the simplest approach to prepare dispersible and defect-free graphene sheets. However, the graphene sheets in these solvents tend to precipitate due to strong π - π interactions. Chemical functionalization of graphene through non-covalent or covalent approaches is expected to improve the stability and processability of dispersed graphene, and may also introduce new properties, which is useful in tuning the properties of graphene for various applications.

In this presentation, the preparation of solvent dispersed graphene⁴ will be discussed together with approaches to covalent,^{5,6} or non-covalent functionalization with porphyrin,⁵ organometallic precursor,^{7,8} etc. using cycloaddition or beam deposition methods.

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