

## The International Debate On role Of Polymer Coil Comformation For Exfoliation And Stabilization Of Pristine Graphene In Water Media

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Compared to chemically modified graphene, pristine graphene displays better properties especially in electric and mechanic fields. However, due to the hydrophobic surface of graphene and Van der Waals forces occurring between layers, graphene can be only slightly dispersed in high boiling point solvents and aggregation can be easily formed during storage. Instead of using environmentally disastrous organic solvent or surfactant, polymer stabilizers can assist the layered materials to disperse in low boiling point solvents with a higher nanosheet concentration and a better stability. Appropriately, exfoliated graphene stabilized by polymers is an ideal starting material for composite preparation. In this study, we chose water, an ecofriendly solvent in which graphene is almost insoluble and polyvinyl alcohol (PVA) as stabilizer for its good solubility in water. By a simple liquid phase exfoliation (LPE) of graphite in PVA solution, a high content of dispersed graphene can be obtained. The experimental results also show that graphene concentration is variable with polymer concentration. In optimized conditions, a dispersion at molecular scale

with a graphene content in polymer matrix can reach up to 80wt.%. We provided a better understanding in the stabilization mechanisms of graphene solution by polymer intermediates. Here the interaction parameter of polymer-surface and the molar weight of polymer are two parameters determining the facility of the polymer adsorption. These parameters can be used to select the suitable combination of 2D materials/ polymer/ solvent. We believe that this work establishes a theoretical support and a principle in materials choice for 2D materials-polymer composite application.

### Biography

Ying HUO has completed her bachelor's degree in Material Chemistry from Inner Mongolia University for Nationalities in China and her master studies in Chemical Engineering from Sun Yat-sen University in China. At present she is studying for the third year of her Ph.D in three laboratories: Mateis of INSA de Lyon, LTDS of École Centrale de Lyon, LMI of Université Lyon 1. She published 2 papers in reputed journals and 1 Chinese patent.