

# Graphene-Based Materials: From Synthesis to Energy Applications

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### Abstract:

Graphene, one atom thick two dimensional layers of sp<sup>2</sup>-bonded carbon, has been emerging as a fascinating material with many unusual physical, chemical and mechanical properties. Thus, much attention has been drawn in technology applications, such as solar cells, hydrogen storage, supercapacitors and batteries. In this talk, first of all, I will introduce the fundamental and properties of graphene. Secondly, I will demonstrate the ways how to synthesis and prepare graphene-based materials. Third, I would like to introduce the corresponding analytic tools to characterize and identify the layer and quality of graphene. Finally, I will show some potential applications of graphene in transistors, touch panels, solar cells, fuels cells and Li-ion batteries. The charge/discharge capacities, columbic efficiency and surface morphology of as-synthesized graphene nanosheets. The sample with larger d-spacing of 0.3407 nm exhibits reversible capacity of ~500 mAh/g and good cycle life, which are superior to those of graphite anode. The enhanced electrochemical performance of graphene nanosheets was resulted from larger d-spacing, lower impedance in the interface and enhanced pore volume. The results indicate that graphene-based material is a good candidate for HEV/EV application.

