

## A study of the synthetic methods and properties of graphenes

## REVIEW ARTICLE

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**Abstract** Graphenes with varying number of layers can be synthesized by using different strategies. Thus, single-layer graphene is prepared by micromechanical cleavage, reduction of single-layer graphene oxide, chemical vapor deposition and other methods. Few-layer graphenes are synthesized by conversion of nanodiamond, arc discharge of graphite and other methods. In this article, we briefly overview the various synthetic methods and the surface, magnetic and electrical properties of the produced graphenes. Few-layer graphenes exhibit ferromagnetic features along with antiferromagnetic properties, independent of the method of preparation. Aside from the data on electrical conductivity of graphenes and graphene-polymer composites, we also present the field-effect transistor characteristics of graphenes. Only single-layer reduced graphene oxide exhibits ambipolar properties. The interaction of electron donor and acceptor molecules with few-layer graphene samples is examined in detail.

**PACS** [81.05.Tp Fullerenes and related materials](#)  
[75.60.Ej Magnetization curves, hysteresis, Barkhausen and related effects](#)  
[73.61.Wp Fullerenes and related materials](#)  
[81.15.Gh Chemical vapor deposition \(including plasma-enhanced CVD, MOCVD, etc.\)](#)  
[61.48.-c Structure of fullerenes and related hollow molecular clusters](#)  
[75.50.Ee Antiferromagnetics](#)

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