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Fabrication of Free-standing Graphene Oxide Films using a Facile Approach Toluene Swollen Paraffin Peeling and Green Reduction of These Films into Highly Conductive Reduced Graphene Oxide films

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Abstract

Free-standing films of graphene oxide (GO) are regarded as potential materials for numerous applications in different fields. However, fabricating macroscopic free-standing GO films with high throughput is a bottleneck in large-scale application of these films. Here we introduce a method suitable for the mass-scale fabrication of free-standing GO films by exploring paraffin film (Parafilm M®) as a sacrificial substrate. The method involves deposition of GO on a paraffin film and peeling of the paraffin film after swelling it with toluene to obtain free-standing film of GO. Furthermore, the GO films were reduced into highly conductive RGO films using a green reducing agent ascorbic acid. A strategy of treating GO films with $CuSO_4$ solution prior to reduction is also designed to avoid the possible disintegration of GO films in ascorbic acid solution. A detailed comparative study on the properties of RGO films prepared via thermal and

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