COLLEGE OF WILLIAM AND MARY
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TITLE (AND CASE NUMBER) OF INVENTION
METHOD FOR MAKING POLYMER COMPOSITES CONTAINING GRAPHENE SHEETS (0911)

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APPLICATIONS
Electrically conductive materials, high-strength materials, gas barrier materials. The invention provides an inexpensive, efficient method for providing polymer composites containing graphene sheets, and thereby benefitting from improved properties imparted by the graphene.

SUMMARY
We have developed a method of reducing graphene oxide to graphene within a polymer composite. Graphene oxide is mixed with polymers to form polymer composites, which are then reduced in situ to provide graphene-containing polymers. The method described herein allows for large-scale production of graphene sheets at varying concentrations in polymer composites, with potential applications as gas barrier materials, high-strength materials, and electrically conductive materials. Virtually all commercially relevant polymers can be utilized, including polyethylene, polyester, nylon, PVC, and acrylics.

In the patent-pending process, graphite is oxidized, then exfoliated to produce graphene oxide, which is dispersed (using any number of methods) into a polymer matrix. The polymer is heated to a temperature above 150°C to achieve reduction to graphene. This method is easier and cheaper than trying to directly incorporate graphene into a polymer. Additionally, the method facilitates selective incorporation of graphene, for example by inducing reduction in a variable fashion (e.g., lithography) to yield a product having patterned conductivity.
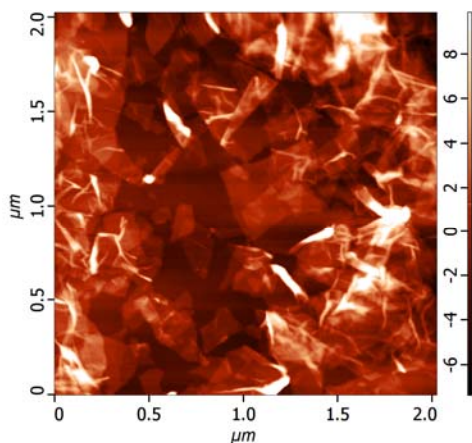
AFM image of graphene nanoparticles that were produced by heat-induced reduction of graphite oxide on a mica surface.
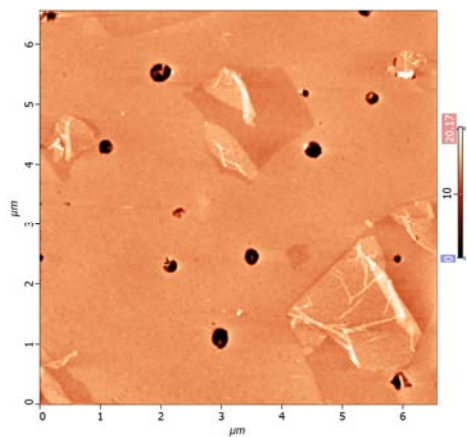
AFM image of several single-layer graphene sheets embedded into a film of polyether imide.

PATENT STATUS
Pending U.S. Patent Application No. 61/182,722

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