CHEMICALLY DERIVED GRAPHENE: ELECTRONIC AND MECHANICAL PROPERTIES

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The promising electronic, mechanical and thermal properties of graphene for high demanding applications call for the need of approaches that provide access to large amounts of graphene monolayers.

Here we report on the electronic and mechanical properties of single graphene sheets obtained via chemical reduction of graphite oxide, a promising route for the large scale production of graphene layers that offers the possibility to assemble them on insulating technological relevant substrates.

Chemically reduced single graphene oxide layers exhibit moderate conductivities due to the presence of defects or residual functional groups remaining after reduction1. This moderate electrical performance can be extraordinarily improved by a CVD process to heal defects contained within the monolayers. In this manner, sheets with two orders of magnitude conductivity enhancement can be obtained2, reaching mobilities that exceed those of the molecular semiconductors currently used in organic electronics.

From the mechanical point of view, AFM indentation experiments on suspended chemically derived layers reveal a Young modulus closely approaching that of pristine graphene3, with their electrical conductivity scaling inversely with the elastic modulus.

References:

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