

Visibility enhancement of Graphene on multiple substrates

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In order to take advantage of the enormous potential of graphene for future electronic micro-circuits, nanophotonic assemblies, coatings and other microstructured graphene based devices, it is essential to develop graphene visualization techniques, which reliably and rapidly deliver images of graphene and graphene based structures.

A multitude of optical techniques have been put forward to this end, for example based on the exploitation of refractive index differences. Several imaging methods are based on Raman and Rayleigh scattering, or on fluorescence quenching of dyes by graphene layers. Generally these methods require relatively complex equipment or an optimized substrate coating. Here, we report on two novel and easy to use techniques for the identification of potential graphene flakes.

One technique aims to increase the contrast of the graphene and multilayer graphene structures by reducing background intensity by using immersion microscopy. The second technique exploits hydrophobicity differences between substrate and graphene structures to enhance their visibility. This second method can be employed to quickly and easily visualize graphene and few-layer graphite on a wide variety of substrates without the need for any specific surface modification or preparation. To our knowledge, there is no other currently available method that is capable of readily visualizing graphene flakes on plastic surfaces, untreated dielectrics and uncoated metals.