Modification of graphene properties with plasmonic nanostructures

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Abstract

Graphene, due to its unique mechanical, electric, magnetic and thermal properties, has a great potential for many applications including electronics and sensor technology. When it comes to its applications in optics and photonics, relatively inefficient interaction of graphene with light may become a limiting factor. The solution to this problem may be combination of graphene with plasmonic nanostructures such as noble metal nanoparticles, which could enhance the optical properties of graphene [1].

In this work we present results of the studies on influence of CVD graphene modification with plasmonic nanostructures on its physical properties. The CVD graphene was grown on copper foil and it was transferred onto a high-resistivity Si/SiO_2 substrate with or without noble metal nanostructures deposited on its surface. The preparation of the silver and gold nanoparticles was carried out by reduction of silver and gold salts with $NaBH_4$ [2] and sodium citrate [3], respectively. The hybrid structures with various configurations of graphene and plasmonic nanostructures were fabricated. The structure and morphology of modified graphene were characterized by using Raman spectroscopy and SEM imaging. Optical properties of modified graphene were investigated by using UV-Vis-NIR spectroscopy. The resistance of modified with noble metal nanostructures and unmodified graphene were measured by using a contactless method employing a single-post dielectric resonator operating at microwave frequencies [4].

References

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Figures

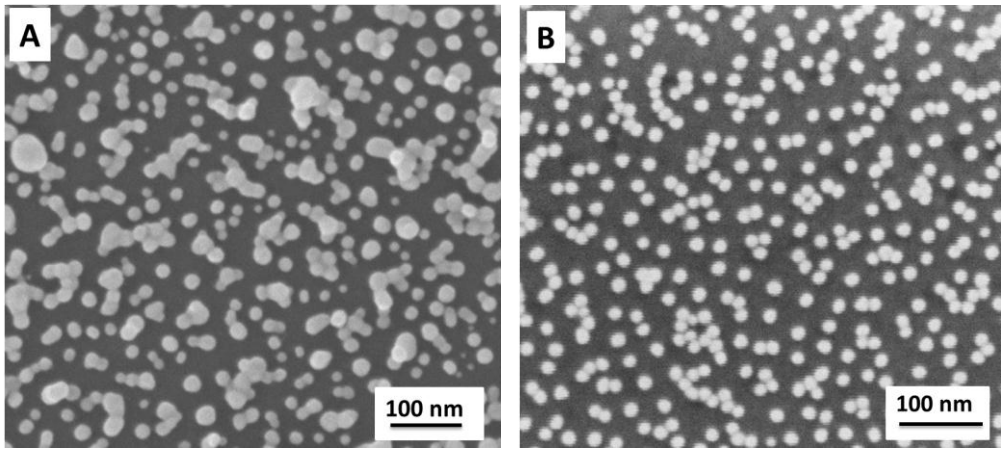

Fig. 1. SEM image of Graphene-Ag particles (A) and Graphene-Au particles (B).