

CVD graphene's doping with Au nanoparticles

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Abstract

Graphene appears to be a promising candidate for many applications that require the use of conductive, transparent and flexible material. Nevertheless, the characteristics of graphene and especially its sheet resistance remain inadequate to meet industrial demands. Chemical doping is used to solve this problem and enable obtaining top quality material.

In this work we present the results of the studies of the influence of CVD graphene's chemical doping with tetrachloroauric acid on transport parameters. CVD graphene was grown on copper foil and subsequently transferred onto high-resistive Si/SiO₂ and PET substrates. The transfer method was based on electrochemical delamination [1]. HAuCl₄ solution of different concentrations was poured over graphene and spin-coated. It was observed that graphene's chemical doping with HAuCl₄ enables to reduce the sheet resistance even below 80 Ω/□.

The morphology of graphene before and after chemical doping was analyzed using AFM and SEM imaging. Raman spectroscopy was employed to characterize the optical properties of graphene films on Si/SiO₂ and PET substrates. XPS spectroscopy was used to study the ratio of the reduction level of Au³⁺ ions to Au⁰ nanoparticles. The electrical properties of graphene samples were measured by the Hall method in van der Pauw geometry.

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References:

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