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Variable angle spectroscopic ellipsometry of graphene-based films

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The interaction of graphene oxide (GO) with magnetron-sputtered metals is a promising research area.
The optical properties of GO dip–coated on magnetron sputtered titanium, silver and gold thin films were studied by means of Variable Angle Spectroscopic Ellipsometry (VASE).
The potential of combining the attractive materials characteristics of GO films and magnetron sputtered silver films for Surface Enhanced Raman Scattering and metamaterials applications was also discussed. In addition, a silver/GO/gold sandwich structure was explored, in which the GO film is inserted between magnetron sputtered gold and silver thin films. Under laser excitation at low intensity, enhancement effects occur in the so-called 'hot-spots', (i.e. spatially localized surface plasmon resonances where the electric field of the laser may generate huge local enhancements of Raman scattering).
Moreover, the optical properties of less studied graphene-based thin films are discussed.
Graphene nanoplatelets (GNPs) thin films were studied using VASE and our results indicate that GNPs thin films have a lower optical density in comparison to other graphene-based materials films. The optical properties of a Chemical Vapor Deposition (CVD)-grown monolayer graphene sample, transferred from a copper substrate onto SiO_2/Si, were studied in a broad energy range using VASE. Furthermore, we report a VASE characterization of the surface of CVD-grown bilayer and trilayer graphene samples on SiO_2/Si and polyethylene terephthalate (PET) substrates. The study of the optical properties of single- and few-layer graphene on PET could be useful in the light of novel graphene-based flexible and stretchable electronics applications.

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