PLASMONIC PROPERTIES OF SUPPORTED METAL NANOPARTICLES

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ABSTRACT

Localized surface plasmon resonance (LSPR) is advantageous property of metal nanoparticles where an incident electromagnetic field induces a collective oscillation of valence band electrons resulting in a strong enhancement of optical extinction and local electric field. This phenomenon is of great interest for applications in many areas, such as non-linear optics, electronics, photovoltaics, catalysis, and sensing.

In this work silver nanoparticles with sizes ranging from 5nm to 15nm are deposited on different substrates by gas aggregation technique using magnetron-based source under high vacuum conditions. Optical transmission spectroscopy is employed to examine the interaction between the incident light and the nanoparticles deposited on transparent substrates, directly observing the effect of LSPR. The samples with nanoparticles deposited on silicon substrates are used to study an enhancement in detection of dyes by Raman spectroscopy.

In the final part of the work, graphene substrates nanostructured by focused ion beam are tested for the formation of nanoparticles arrays and utilization in surface-enhanced Raman spectroscopy (SERS) measurements.

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