Surface-enhanced Raman scattering (SERS) of Methyl Orange on Ag-DLC nanoparticles

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Abstract

In the present study, Ag nanoparticles were synthesized in amorphous hydrogenated carbon films on glass substrates by RF-PECVD and RF-sputtering co-deposition method at the room temperature. Methyl orange was utilized as an analyte with different concentrations on Ag nanoparticles that were embedded in diamond-like carbon (DLC). Ultraviolet–visible (Uv–vis) spectroscopy, XRD analysis, Raman spectroscopy, Atomic Force Microscopy (AFM) and Field Emission Scanning Electron Microscopy (FESEM) were performed to characterize films. Ag-DLC with an average size of less than 14 nm was the active site for surface-enhanced Raman scattering (SERS). Sensitivity of measurements in SERS spectra was increased by these types of thin films. This method of nano-particle synthesis is cost-effective and just requires a one-step synthesis. Such substrates can be used for several times. Moreover, they are useful for biosensors because of their hardness and other properties that may be subsequently referred.

Keywords: Surface-enhanced Raman scattering (SERS), Methyl orange (MO), Diamond-like carbon, Ag nanoparticles.