Ag/Au Alloy LSPR Engineering by Co-deposition of RF-Sputtering and RF-PECVD

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Abstract

Silver-Gold alloy/diamond like carbon (Ag-Au/DLC) nanocomposite films were prepared by co-deposition of RF-sputtering and RF-PECVD on glass substrates by using acetylene gas and silver-gold target. The deposition process was carried out at room temperature in one minute with the variable parameters of initial pressures and RF powers. X-ray diffraction analysis demonstrated the formation of Ag/Au alloy nanoparticles with a face-centered cubic (FCC) structure. Localized surface plasmon and optical properties of Ag-Au alloy nanoparticles were studied by UV-visible spectrophotometry which showed that increasing RF power and initial pressure cause a redshift in all samples. Moreover, the effect of RF power and initial pressure on the size and shape of nanoparticles were studied by 2D Atomic force microscopy images. Energy dispersive X-ray spectroscopy revealed the formation of Ag-Au/DLC nanoparticles and the percentages of C, Ag, Au and O in all samples. The applied method for Ag/Au alloy preparation is the one step and low-cost method which makes the samples ready for sensing application.

Keywords: AFM, Ag-Au alloy/DLC nanoparticles, LSPR, Optical properties, RF-sputtering and RF-PECVD.