

Morphology, structure and electrical transport properties of graphite based multilayer thin films

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Abstract

Silver doped graphite multilayer films were grown on silicon substrate by employing a modified pulsed laser ablation (PLA) process. Excimer laser ($\lambda=248\text{nm}$) was used for the deposition of these films. The effects of Ag incorporation on the micro structure as well as on surface morphologies were investigated using Raman Spectroscopy, XRD and AFM. The structural investigation reveals that diamond phase reduces gradually by the incorporation of silver content. It was also observed that Ag doping enhanced the sp^2 fraction in films which is a clear indication of graphitization. The surface analysis revealed that some clustering was observed on the surface which is due to encapsulation of silver nano particles within carbon network. Some elevated textures were also found on surface. A small change in surface roughness was also observed which is ranging from 2.41 nm to 10.1 nm. The optical bandgap (E_g) has been reduced exponentially from 2.11 eV to 1.55 eV. Electrical measurement illustrated that the resistivity also decrease exponentially with an increase in Ag content.