OPTICAL CHARACTERIZATION OF POROUS SILICON DOPED WITH SILVER NANOPARTICLES

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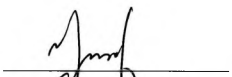

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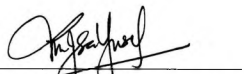

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ABSTRACT

Porous silicon (PS) formed with different size of structures has interest due to its visible photoluminescence (PL) at room temperature. Besides PS with mesoscopic pores doped with the nanosize particles can display many unique properties. In the present work, the optical characterization of Porous Silicon (PS) doped with Silver Nanoparticles (Ag NPs) was investigated. PS layers were fabricated by electrochemical anodisation method with fixed current density of 20 mA/cm^2 and at various anodisation times. The detail characterization of the PS doped with Ag NPs was carried out using Photoluminescence (PL) spectroscopy, Atomic Force Microscopy (AFM) and Field Emission Scanning Electron Microscope (FESEM). From PL spectroscopy analysis, the PL spectra shifted was found in broad red-green peaked range from 600 to 690 nm. The red-green shifted of PL is due to the quantum confinement of silicon nanocrystallites in PS. According to the peak intensity dependence on the etching time result, the maximum intensity was achieved at 792 cnt/sec corresponds to the doped sample at 25 min of etching time. From the analysis of FESEM micrographs, the existence of Ag NPs was clearly observed in the pores. Additionally, the AFM topography shows that the grain size and the roughness obviously increased after PS doped with Ag NPs at etching time 25 minutes. One can observe that the development of PS doped with Ag NPs was related to the PL peak intensity. As a result, the maximum peak intensity for PS doped with Ag NPs can be obtained at etching time 25 minutes.