

عنوان مقاله:

Effects of different gas flow rates and non-perpendicular incidence angles of argon cold atmospheric-pressure plasma jet on silver thin film treatment

محل انتشار:

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نویسندگان:

Department of Physics, Faculty of Science, Arak University - - -

Department of Physics, Faculty of Science, Arak University - - -

(Laser and plasma Research Institute, Shahid Beheshti University (SBU - - -

(Laser and plasma Research Institute, Shahid Beheshti University (SBU - - -

خلاصه مقاله:

Abstract In this study, the influences of variations in the gas flow rate and incidence angles of argon cold atmospheric-pressure plasma jet on the morphology and absorption spectra of silver thin films (60 nm, 80 nm, and 100 nm film thickness) are investigated. To evaluate the surface morphology, atomic force microscopy (AFM) was employed on the silver thin film surface before and after plasma processing. To analyze the effect of plasma treatment on the grain size, the one-dimensional AFM surface profiles of Ag thin films are approximated using a Gaussian function. The absorbance of Ag thin films is measured in wavelength range of 190–1100 nm utilizing UV–Vis absorption spectrometer. Compared to the gas flow rates 0.5 standard liter per minute (SLM) and 2 SLM, surface treatment of Ag thin film with gas flow rate of 1 SLM increased the valley depth, the peak valley height, and the distance between two deepest valleys remarkably. A sequential argon plasma treatment (2-min plasma treatment perpendicular to surface was followed by 2-min plasma processing with non-perpendicular incidence angle of 60°) offers considerable improvement in the uniformity of grains and also changes shape of grains, especially the peak height (about 44 times higher than untreated sample) and area of grains (almost 136 times greater than untreated sample) which can be applicable for optical sensing technology.

کلمات کلیدی:

Non, perpendicular incidence angle of argon cold atmospheric, pressure plasma jet (APPJ), Gas flow rate, Absorption spectra, Surface morphology, Analysis of silver grain size, Gaussian function

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