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The effect of laser irradiation on electrical and structural properties of ZnO thin films

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Abstract

In this paper, ZnO thin film was prepared by sol-gel process on glass substrates. The deposited films were dried at 100 and 240 °C and then annealed at 300, 400 and 500 °C. The two-probe measurement showed that resistance of as-prepared films is very high. The KrF excimer ($\lambda=248$ nm) laser irradiation with 1000 pulses, frequency of 1 Hz and 90 mJ/cm² energy on surface of film resulted in the reduction of the films electrical resistance. X-ray diffraction (XRD) patterns confirmed the improved hexagonal wurtzite structure of film, and AFM and FE-SEM analyses showed regular and spherical grain was formed on the surface. The particle size was increased from ~10 to ~30 nm after laser irradiation. Generally, it was showed that electrical, structural and morphological properties of films improve considerably by laser irradiation.

Keywords: ZnO thin films, transparent conductor oxide, pulsed laser, XRD, AFM

For full article, refer to the Persian section