Influence of annealing temperature on the nanostructure TiO$_2$-SnO$_2$ prepared by electron gun method on the glass substrate and the aluminum/glass

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Abstract
TiO$_2$-SnO$_2$ thin films were coated on glass and Al/glass substrates by electron gun method. In coating process, the vacuum was $1.5 \times 10^{-5}$ torr. Then, films were annealed at 450, 500 and 550 °C. The crystallographic structure and film morphology were investigated by means of XRD and SEM. The electrical (I-V) and optical properties were studied by the two point props system and UV/Vis/NIR spectrophotometer. The results showed the films under 550 °C were crystalline. The thickness and grain size were 350 and 50 nm respectively. The electrical conductivity in the sample with Al/glass substrate under 550 °C was better than the other samples. When temperature increased, the energy gap decreased from 4.05 to 4.03 eV for direct cases.

Keywords: thin film, electron gun, substrate, annealing process

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