

Effect of gas flow rate on the electrical and optical properties of Al-embedded ZnO thin films prepared by radio frequency sputtering

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ZnO has been recognized as a promising material that can be used in various semiconductor devices. In this study, to obtain the high performance transparent conductive oxide(TCO), we have deposited Al layers between the ZnO thin film layers on the glass substrates at the same conditions by RF sputtering and post-annealing. Also ZnO thin films were prepared by radio frequency (RF) sputtering on the glass substrate at room temperature using a ZnO target in oxygen or nitrogen mixed Ar gas environment. Amount of inserted Al metal is 1.4 weight percentage (1.4 wt%). As-deposited films were post-annealed in nitrogen atmosphere at 400°C and then investigated electrical and optical properties. By Hall-effect measurement, the resistivity of the Al layer inserted ZnO films was decreased from 1.51×10^{-1} to $8.04 \times 10^{-3} \Omega\text{cm}$. The transmittance is above 80% in the visible light region in all fabricated samples..