Characterization of Al-Doped ZnO Transparent Conducting Thin Film Prepared by Off-Axis Magnetron Sputtering

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ABSTRACT

The off-axis sputtering technique was used to deposit Al-doped ZnO (AZO) films on glass substrates at room temperature. For the illustration of the sample position in the sputtering chamber, the value of $r$ is introduced. Here, $r$ is the radius of AZO target and $R$ is the distance between the sample and the center of substrate holder. A systematic study for the effect of deposition parameters on structural, optical, and electrical properties of AZO films has been investigated in detail. As the sample position of $r$ is fixed at 1.8, it is found that the as-deposited AZO film has relatively low resistivity of $2.67 \times 10^{-3} \, \Omega\text{-cm}$ and high transmittance above 80% in the visible region. Additionally, after rapid thermal annealing (RTA) at 600°C with N2 atmosphere, the resistivity of this AZO film can be further reduced to $1.19 \times 10^{-3} \, \Omega\text{-cm}$. This indicates the AZO films prepared by off-axis magnetron sputtering and treated via the appropriate RTA process have great potential in optoelectronic applications.

Keywords: Al-doped ZnO; Transparent conductive oxide; Off-axis magnetron sputtering; Annealing; Electric...

REFERENCES


