

## Effect of Annealing on the Surface Morphology and Current–Voltage Characterization of a CZO Structure Prepared by RF Magnetron Sputtering

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In this study, we investigated the Cu-doped ZnO (CZO) structure. This structure was deposited on the Si and glass substrates using the RF magnetron sputtering technique. Morphological and structural features of CZO thin films (CZO), as-deposited and annealed at temperatures of 200, 400, and 600°C, were characterized by X-Ray diffraction (XRD), scanning electron microscopy (SEM), as well as atomic force microscopy (AFM). CZO film annealed at temperature of 600°C has a sharp peak, good homogeneity, and low surface roughness compared to others. Electrical properties of the MOS structures, which are of CZO interlayer, deposited on *n*-Si substrate, were characterized by  $I(V)$  measurement at room temperature. The fundamental electrical parameters were calculated by analyzing the forward bias  $I(V)$  curves at room temperature. The series resistance  $R_s$  values of the device were also determined using thermionic emission theory and Cheung and Cheung methods. According to experimental results, Au|CZO|*n*-Si MOS structure annealed at 600°C has low  $R_s$  values compared to other investigated MOS structures in the present study. As a result, it was found that CZO structure annealed at 600°C is suitable for innovative and state-of-the-art electronic and optoelectronic device applications.

**Keywords:** CZO, structural properties, surface morphology, RF magnetron sputtering,  $I(V)$  characteristic.

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