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Fabrication of resistance type humidity sensor based on $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$ thick film

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Abstract:

A resistance type humidity sensor has been fabricated from an assembly of $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$ thick film, Ag interdigitated electrodes, and an Al_2O_3 ceramic substrate. The humidity sensing properties were measured using the direct current (DC) analysis method. The results show that the electrical properties of the $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$ thick film are dependent on humidity and applied voltage. At low humidity, the film exhibited low conductivity and behaved as an insulator. However, at high humidity, the conductivity of the film increased due to the enhancement of ion conduction. These outcomes indicate that the measured resistance is highly dependent on the applied bias voltage within the whole humidity range i.e. 20% to 90% relative humidity (RH) at ambient temperature. The response and recovery times as well as sensitivity were determined to be around 2.8 min, 25 min, and 98.2%, respectively. Therefore, it is concluded that $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$ thick film has good humidity sensing properties and has high potential in the application for fabrication of high-performance humidity sensors.

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