

MECHANISM OF TRACE LEVEL H₂S GAS SENSING USING RF SPUTTERED SnO₂ THIN FILMS WITH CuO CATALYTIC OVERLAYER

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ABSTRACT

H₂S gas sensing response characteristics of bare SnO₂ thin films and heterostructures with nanolayer (10 nm) of Cu and CuO are studied. Changes in resistance values, occurring with integration of Cu and CuO nanolayers on SnO₂ is acquired real-time, and compared. Rise in sensor resistance after introduction of Cu and CuO nanolayers on SnO₂ sensing layer is understood to enhance the sensing response characteristics. Formation of space charge region between p-type CuO and n-type SnO₂ and difference in work-function values between catalyst and sensing layer are shown to govern the increased value of starting resistance. Increase in starting resistance and lowering of resistance in presence of H₂S due to spill-over of dissociated H₂S gas molecule are playing crucial role in influencing the sensing response.

Keywords: Thin film, H₂S Gas Sensor, Spillover mechanism, RF Sputter