

# Gas Sensing Characteristics of Nanocrystalline $\text{Ba}_{0.5}\text{Sr}_{0.5}\text{MoO}_4$ Thick Film Prepared by Sol-Gel Method

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Thick-film gas sensors were fabricated from nanocrystalline pure and doped  $\text{Ba}_{0.5}\text{Sr}_{0.5}\text{MoO}_4$  powders; fine and homogeneously sized powders were prepared using chemical methods such as sol-gel technique. X-ray diffraction (XRD) has confirmed the formation of nanocrystalline  $\text{Ba}_{0.5}\text{Sr}_{0.5}\text{MoO}_4$  structure (JCPDS 30–157) for sol-gel powders after annealing. The results obtained from XRD and transmission electron microscope (TEM) show that the powders have nanocrystalline structure and the mean particle sizes of  $\text{Ba}_{0.5}\text{Sr}_{0.5}\text{MoO}_4$  powders with and without CuO are approximately 33 and 21.8 nm, respectively. The gas sensing measurements indicate that the  $\text{Ba}_{0.5}\text{Sr}_{0.5}\text{MoO}_4$  sensors show good response to  $\text{H}_2\text{S}$  and poor response to other reducing gases such as  $\text{H}_2$ , LPG, and CO. The sensitivity was improved by the incorporation of CuO as an additive in  $\text{Ba}_{0.5}\text{Sr}_{0.5}\text{MoO}_4$ . The maximum sensitivity was obtained for  $\text{Ba}_{0.5}\text{Sr}_{0.5}\text{MoO}_4$  with 4 wt% CuO at an operating temperature of 250°C. Also, Pd doping over  $\text{Ba}_{0.5}\text{Sr}_{0.5}\text{MoO}_4$  with 4 wt% CuO decreases the operating temperature from 250 to 200°C while increasing the sensitivity to  $\text{H}_2\text{S}$ .

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