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Nanostructured Metal-Oxide Based Hydrogen Gas Sensor Prepared by Magnetron Sputtering

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Hydrogen is an inexhaustible and transportable source of energy. It consists of a potential begins to be a restorative for clean energy generation. In various areas of industry, more accurate, faster and more selective detection of hydrogen gas is needed. It can be used for monitoring and control hydrogen concentration. The safe transportation, storage demand, reliable and fast hydrogen gas sensors are required. Nanostructures/nanoclusters of metal oxides are suitable candidates for gas sensors due to their large surface volume ratio. This approach provides a practical and direct access to detect the gases.
The sensitivity responses of tungsten oxide nano-structured thin films prepared by reactive DC magnetron sputtering from metallic target were studied. Various metallic oxide clusters (CuO, WO_x) were deposited on the top of the prepared thin films using a gas aggregation chamber cluster source. We demonstrated that sensitivity was enhanced by these clusters. Various deposition parameters were applied (time, temperature, Ar/O_2 ratio) in order to improve the sensitivity. Crystal Structure and surface morphology of as-deposited films were studied by XRD, SEM, and AFM. The sensor response to hydrogen gas in an atmosphere with controlled composition (synthetic air/H_2) was studied at various temperatures for a variety of deposition parameters.

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