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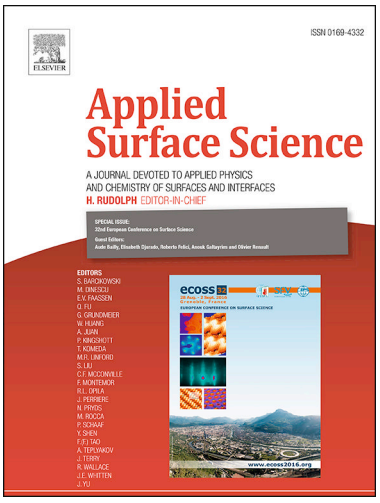

Full Length Article

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Design of superior ethanol gas sensor based on indium oxide/molybdenum disulfide nanocomposite via hydrothermal route

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Abstract

This paper demonstrates an ethanol gas sensor based on indium oxide/molybdenum disulfide (In_2O_3/MoS_2) nanocomposite via hydrothermal route. The microstructure and micromorphology of In_2O_3/MoS_2 nanocomposite were fully characterized by various analytical techniques. The gas-sensing properties of the In_2O_3/MoS_2 composite were investigated upon exposure to different concentrations of ethanol gas from 1 ppm to 50 ppm at the optimum temperature, and compared with the pristine In_2O_3 sensors. Owing to the supporting substrate of specific two-dimensional MoS_2 nanosheets, the sensor based on In_2O_3/MoS_2 composite exhibit superior gas sensing performance towards ethanol, which outstripped that of pure In_2O_3 sensor and have potential applications in the detection of ethanol vapors.

Keywords: Gas sensors; Ultra-sensitive ethanol sensing; Hydrothermal method

1. Introduction

Molybdenum disulfide (MoS_2), as a graphene-liked 2D layered semiconductor, is considered to be a promising candidate due to its extremely large surface-to-volume ratio, and exceptional electrical properties. Compared with graphene which band gap is 0, MoS_2 layered structure with band-gap varies from 1.2 eV (bulk MoS_2) for