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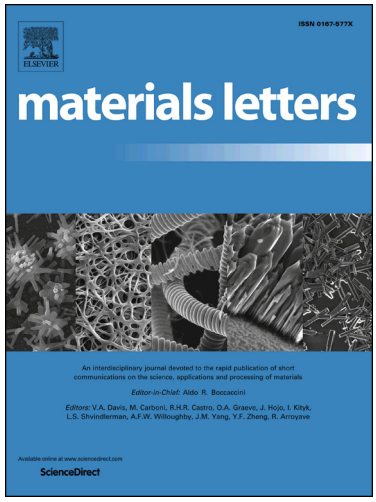

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Effect of structure morphologies on hydrogen gas sensing by ZnO nanotubes

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Abstract

Surface area is an important factor in a nanostructured material based gas sensor. A nanotube has outer as well as inner surfaces, and sensing response can be improved to adopt nanotubes as a gas sensor. Owing to extremely high aspect ratio of the nanotubes, it is difficult for gas molecules to seep into the nanotube; as a result, the sensing response of the nanotube sensor decreases. To improve this problem, porous structured nanotubes are synthesized in this study. Sputtering process is performed on PVA nanowire sacrificial templates with various sputtering power, and the sputtering durations are adjusted to fix the thickness of the nanotube wall to 30 nm. Nonporous ZnO nanotube, porous ZnO nanotube, and porous ZnO film samples are prepared through these procedures. Hydrogen sensing response is examined to study the effects of the morphologies of the nanotubes. The results of these experiments show that the sensing response is improved by 2.5 and 4.2 times as the morphology of the sensor is changed to porous structured ZnO nanotube from nonporous ZnO nanotube or porous ZnO film, respectively. In this study, the morphologies of the nanostructures of these

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