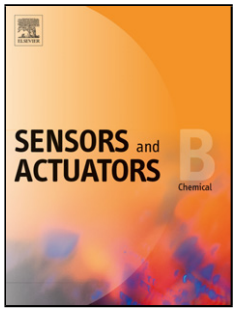

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Highly hydrogen sensitive micromachined sensors based on aerosol-assisted chemical vapor deposited ZnO rods

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Highlights

- Gas microsensors based on ZnO rods with exposed {100} surfaces are fabricated.
- ZnO rods are integrated into the device via a VS mechanism enable using AACVD.
- Test of sensors show enhanced functionality to H_2 related to other reductive gases.
- Results show the formation of an accumulation layer at the ZnO during H_2 exposure.
- H_2 sensing involves modulation of O_V and formation of intermediate energy levels at ZnO.

Abstract

Chemoresistive gas microsensors with highly hydrogen sensitive zinc oxide rods dominated by exposed {100} surfaces are fabricated. The hexagonal rod structures are integrated into micromachined transducing platforms without the need for substrate pre-treatment, *via* a vapor-solid mechanism enabled using an aerosol-assisted chemical vapor deposition method. The microsensors demonstrate an enhanced functionality towards hydrogen, with greater sensor responses (between 200% and 1800%) compared to other gases including ethanol, carbon monoxide, acetone, and toluene, and with low interferences among these reductive gases. The improved functionality of these systems towards hydrogen is attributed to the formation of an accumulation layer at the zinc oxide rods after hydrogen exposure, which includes a mechanism