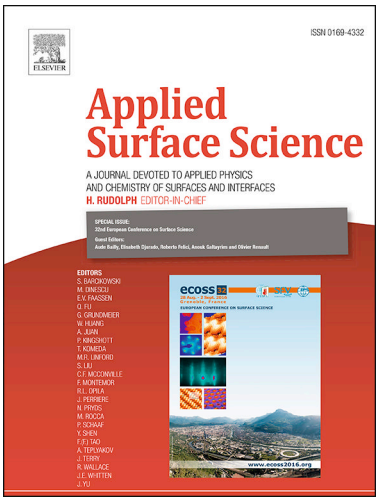
Accepted Manuscript



Full Length Article

Enhanced sensing performance and mechanism of CuO nanoparticle-loaded ZnO nanowires: Comparison with ZnO-CuO core-shell nanowires

Kaidi Diao, Jia Xiao, Zhou Zheng, Xudong Cui

PII: S0169-4332(18)32010-5
DOI: https://doi.org/10.1016/j.apsusc.2018.07.112
Reference: APSUSC 39927

To appear in: *Applied Surface Science*

Received Date: 5 February 2018
Revised Date: 7 July 2018
Accepted Date: 16 July 2018

Please cite this article as: K. Diao, J. Xiao, Z. Zheng, X. Cui, Enhanced sensing performance and mechanism of CuO nanoparticle-loaded ZnO nanowires: Comparison with ZnO-CuO core-shell nanowires, *Applied Surface Science* (2018), doi: https://doi.org/10.1016/j.apsusc.2018.07.112

Enhanced sensing performance and mechanism of CuO nanoparticle-loaded ZnO nanowires: Comparison with ZnO-CuO core-shell nanowires

Kaidi Diao, Jia Xiao, Zhou Zheng, Xudong Cui*

Institute of Chemical Materials, CAEP, Mianyang, 621900, Sichuan, China

*To whom correspondence should be addressed. E-mail: xudcui@gmail.com

Abstract

The synergism of nanocomposite heavily impacts the performance of gas sensing materials, that need to be systematically and deeply investigated to meet the high application requirement. In this work, we present gas sensors developed by ZnO-CuO core-shell nanowires (C-S NWs) and ZnO/CuO NWs (ZnO NWs modified by CuO nanoparticles) synthesized by a facile three-step process. The sensing performances for both structures were investigated toward the oxidizing gas NO_2 and the reducing gas benzene. Results show that compared with pure ZnO NWs, ZnO/CuO NWs exhibits enhanced sensing performance and a n-type response behavior, while ZnO-CuO C-S NWs shows reduced sensing property and a p-type response behavior. The phenomenon is closely associated with the charge transfer at the p-n junctions contributing to adsorb the target gases for materials. Our study indicates that the construction method and their synergism are key factors to the effective design of gas