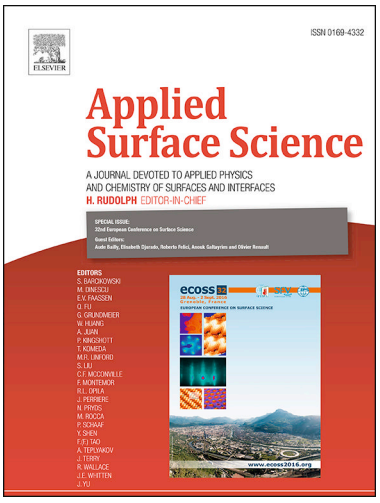

Full Length Article

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Facile Route to Synthesize Porous Hierarchical Co_3O_4/CuO Nanosheets with High Porosity and Excellent NO_x Sensing Properties at Room Temperature

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Abstract

To fabricate sensors that are capable of ultrasensitive detection of NO_x as well as optimize their synthetic route, highly porous and hierarchically structured Co_3O_4/CuO nanosheets were synthesized by a facile hydrothermal-calcination route. The CC2-1 sample synthesized with the 2:1 molar ratio of $Co(NO_3)_2 \cdot 6H_2O$ and $CuCl_2 \cdot 2H_2O$ has the most abundant porosity. Structural measurements found that the size of pore is 3.37 nm, the specific surface area is 24.04 m^2g^{-1}, and the average slice thickness is about 5 nm. This optimum sample presented excellent NO_x sensing performance at room temperature (RT = 21 ℃), which has not only the highest response (14.16 to 1000 ppm), the shortest response time (2 s to 1000 ppm), and the minimum detection limit (0.01 ppm), but also good reversibility and selectivity. The superior property arises from the appropriate CuO ratio and the addition of pore-forming agent $NaHCO_3$, and all together resulted in the unique hierarchical heterojunction structure, endowed with abundant porosity and a large number of defects, which eventually engender the remarkable chemisorbed ability to oxygen species.