Regulation of N-type In2O3 Doping Content on the Conductivity Type of Co3O4 Based Acetone Sensor

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Abstract

Double jets electrospinning method was adopted to fabricate In2O3/Co3O4 nanofibers (NFs). The morphology, structure, chemical composition, and gas sensing properties of the samples are comprehensively characterized. The results show that the addition of In2O3 can improve the response of Co3O4 to acetone. At 200, the response of In2O3/Co3O4 and Co3O4 to 100 ppm acetone is 18.69 and 1.29, respectively. In addition, the doping of Co3O4 has reduced the optimum working temperature of pure In2O3 from 300 to 200. Even more interesting is that the composite of Co3O4 and In2O3 not only enhances the sensing performance, but also leads to a conversion of p-n conductivity type. The phenomenon of the p-n transition is relevant to the proportion of In2O3 and Co3O4. While the enhanced acetone sensing properties of In2O3/Co3O4 NFs may be attributed to the p-n heterojunction between n-type In2O3 and p-type Co3O4 crystalline grains, which promotes the electron migration. The synergistic effects between In2O3 and Co3O4 and the large specific surface area of NFs also have an additional contribution to the improvements of acetone sensing performance.

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