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Sol-gel synthesis of Pd doped ZnO nanorods for room temperature hydrogen sensing applications

Abstract

A sol-gel spin coating technique was described for the synthesis of Pd doped ZnO nanorods for hydrogen sensing applications. The nanorods were hexagonal in shape, 50-100 nm in diameter and uniform in distribution. They exhibited homogeneous surface morphology, c-axis orientation and excellent crystalline properties. The synthesized nanorods were used to sense and detect hydrogen in a homemade gas chamber. The fabricated sensor successfully detected as low as 40 ppm hydrogen at room temperature with a very low level of power supply (16.16 μA) under a mixed background. Dynamic and repeated responses were observed with a wide range of hydrogen concentrations (40-360 ppm) at 200 °C. The developed sensor was at least 25 fold more sensitive over the literature documented Pd doped ZnO nanorods in detecting hydrogen at ambient temperature. The simplicity, low-cost, high sensitivity and high stability of the sensor materials suggested that the synthesized Pd doped ZnO nanorods could be used in hydrogen and chemical sensing devices where Pd-mediated catalysis is involved.

Keywords

Hydrogen sensors; Pd doped ZnO nanorods; Sol-gel; Spin coating