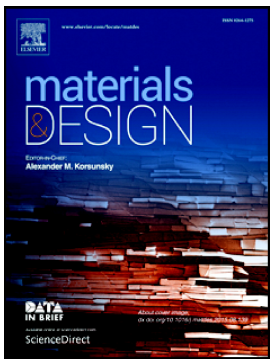

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Effect of Vanadium doping on ZnO sensing properties synthesized by Spray Pyrolysis

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Abstract:

Semiconductor oxides with high sensing capacity remain a real challenge from long ago. Several attempts were considered to enhance the sensor's performance factors and achieve high quality requirements. In the present work, we operated a chemical sensor using intrinsic and vanadium doped zinc oxide. These samples were prepared and deposited using low cost spray pyrolysis technique. The structural data revealed good surface morphology and roughness, confirming the existence of ideal environment for oxidizing / reduction reactions. The addition of 4% vanadium minimized the grain size with a diameter lower than 9 nm. The gas testing measurements showed that vanadium doped ZnO presented higher response compared to pure ZnO. V-doped ZnO confirmed an improvement of the optimal operating temperature which varies from 350°C to 300°C at 100 ppm of acetone, 50 ppm of ethanol and 500 ppm of H_2. Furthermore, V-doped ZnO showed a maximum response reaching 100 at 100 ppm, for 450°C. This high response is attributed to the effect of vanadium impurities that altered ZnO structure which was confirmed by structural data.

Keywords:

V doped ZnO, surface morphology, gas sensors, acetone, working temperature.