

Structural, optical and sensing behavior of neodymium-doped vanadium pentoxide thin films

In this study, nanocrystals of vanadium pentoxide (V_2O_5) thin films were manufactured by chemical spray pyrolysis technique. A precursor solution of 0.05 M VCl_5 was prepared using distilled water. Neodymium (Nd)-doped vanadium oxide films were fabricated, increasing the neodymium chloride by ratios of 0, 3, 5, 7 and 9% in separate solutions. These precursor solutions have been utilized to grow films of undoped V_2O_5 and doped with Nd on the p-type Si (111) porous silicon (PS) and glass substrates at temperatures of 250 °C. The structural, optical, electrical and gas sensing properties were studied. The analysis of the structural and optical properties of the thin films shows the effect of doping rates on the characteristics of vanadium oxide. The X-ray diffraction investigation resulted in a polycrystalline nature of the orthorhombic structure with the preferred direction of (010) with nano-grain sizes. Atomic ...