

Effects of Lanthanum and Sodium on the Structural, Optical and Hydrophilic Properties of Sol-Gel Derived ZnO Films; A comparative Study

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Abstract

The technological applications of the transparent ZnO films could be broadened via incorporation of small amounts of some special elements. In this work, the optical and surface properties of the spin coated $Zn_{1-x}M_xO$ films (M= Na or La and $x \leq 0.075$) grown on glass substrates, are reported. According to X-ray diffraction (XRD) results, all films consist of a single phase with a hexagonal structure and the ZnO crystallites are preferentially oriented towards (002) direction. The plane surface of the pure ZnO film turned to be wrinkle network structure after Na and La addition. The reflectance ($R\%$) of the films decreased after Na doping and significantly increased with increasing La content. The optical band gap of pure ZnO is 3.26 eV and red-shifted after Na and La incorporation. The dependence of the refractive index and film's wettability on the structural and morphological changes are reported. The obtained results of these two systems are compared with those of similar materials and some expected applications are explored.

Keywords: ZnO films; Wettability; Wrinkle nanostructure; Refractive index

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