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Influence of Y-Doped on Structural and Optical Properties of ZnO Thin Films Prepared by Sol-Gel Spin-Coating Method

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Zinc oxide (ZnO) based transparent oxide semiconductors have been studied due to their high transmittance and electrical conductivity. Pure ZnO have unstable optical and electrical properties at high temperatures but doped ZnO thin films can have stable optical and electrical properties. In this paper, transparent oxide semiconductors of Y-doped ZnO thin films prepared by sol-gel method. The ionic radius of Y^{3+} (0.90 Å) is close to that of Zn^{2+} (0.74 Å), which makes Y suitable dopant for ZnO thin films. The Sn-doped ZnO thin films were deposited onto quartz substrates with different atomic percentages of dopant which were Y/Zn = 0, 1, 2, 3, 4, and 5 at.%. These thin films were pre-heated at 150°C for 10 min and then annealed at 500°C or 1 h. The structural and optical properties of the Y-doped ZnO thin films were investigated using field-emission scanning electronmicroscopy (FE-SEM), X-ray diffraction (XRD), UV-visible spectroscopy, and photoluminescence (PL).

Keywords: Zinc oxide, Yttrium, Sol-gel method, Spin-coating, Photoluminescence