

Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms

Studies of lattice structure, electrical properties, thermal and chemical stability of cobalt ion implanted Indium Tin Oxide (ITO) thin films on polymer substrates

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Abstract

The effects of Co⁺ ion implantation on the physical properties of ITO thin films have been investigated in this study. ITO films are used extensively in many applications, such as light emitting diodes (LEDs) and in flexible organic photovoltaic cells (FOPV). The ITO thin films were implanted with Co⁺ ions of energy 100 keV at different fluences. Changes in structural parameters were observed and by analyzing the set of X-ray diffraction patterns obtained, the incorporation of Co⁺ ions into the ITO lattice was confirmed. The modification of the crystallite size was well pronounced due to Co⁺ ion implantation. At a fluence of 1×10^{15} ions/cm², a 55% increase in conductance was observed from I to V measurements and 76% average transmittance from UV–Vis. Isotropic refinements were performed using the average factors obtained from the simulated crystal structures to determine thermal parameters. The implantation of Co⁺ ions into the ITO was also confirmed from RBS results.