

Deposition and Characterisation of Bismuth Oxide Thin Films

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Abstract. Owing to their peculiar characteristics, bismuth oxides are used in various domains, such as microelectronics, sensor technology, optical coatings, transparent ceramic glass manufacturing, etc. Bismuth oxide system exhibit high oxide ionic conductivity and have been proposed as good electrolyte materials for application such as solid oxide fuel cell (SOFC) and oxygen sensor.

Antimony doped and undoped Bi₂O₃ films were deposited onto glass substrate from bismuth nitrate and antimony precursor solutions. As chelating agent polyethyleneglycol (PEG) was used and the above-mentioned precursor solutions were sufficiently viscous.

In the present paper, the formation of different phases belonging to Bi–O system during thermal treatments of the Bi-based films is investigated by means of spectroscopic ellipsometry (SE), polarising microscope observation, X-ray diffractometry (XRD), and infrared spectrometry (IR). The thickness and the porosity of the films were evaluated. These preparation techniques, differing mainly in precursor materials and method of deposition, lead to different quality of the resulting films.