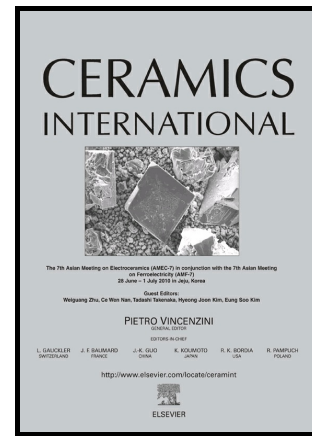


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Eco-friendly Method of Fabricating Indium-Tin-Oxide Thin Films using Pure Aqueous Sol-gel

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Abstract:

An indium-tin-oxide (ITO) thin film with approximately 50 nm thickness was successfully synthesized on glass substrates by using a fully aqueous sol-gel process. The sol was prepared from indium nitrate hydrate and tin fluoride as a precursor. Thermogravimetric analysis confirmed that the sol converted into crystalline ITO at 286 °C. The optical band gap and transmittance of the thin film were observed to increase with annealing temperature and plasma treatment time. X-ray photoelectron spectroscopy and transmittance studies established that the number of oxygen vacancies in the thin film drastically increased with increasing temperature and plasma treatment. The annealing temperature and argon plasma treatment time appear to be key factors in reducing resistivity and increasing the transmittance of the thin film. A considerable decrease in the resistivity of the ITO thin film was observed after Ar plasma treatment. This eco-friendly sol-gel ITO thin film may find potential applications in n-type ohmic electrodes for ink-jet printable electronics.

Keywords

Indium tin oxide, aqueous sol-gel, sheet resistance, transmittance, annealing temperature

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