

CeO₂ epitaxial films by spray MOD

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Abstract

CeO₂ film synthesis has received much attention for applications in many technical fields: optical properties, anti-corrosion, catalysis, fuel cells, buffer layers for coated conductors in superconductivity applications. In this presentation, we describe a machine built to deposit liquid films on a moving substrate by the spray MOD technique using Ce(III)2-ethylhexanoate precursor. This technique is able to produce continuous samples for long length tape applications. The liquid film after being dried and heat treated in a batch furnace is converted to a solid ceramic film. The crystallization and growth of the oxide are characterized by x-ray diffraction (at glazing angle and in a four circle diffractometer) and infrared reflectivity spectroscopy (FTIR). Simulation of the experimental IR spectra with a dielectric function model is used to characterize both thickness and porosity of the films. The nanoceramic growth epitaxially on Ni bi-axially textured tapes and single crystals like SrTiO₃ (100) or Si (100). However the epitaxy achievement depends upon the densification of the film that is itself governed by the pyrolysis step (atmosphere, temperature).

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