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DEPO / Plasma - deposited coatings for optical, electronical and other functionalities

EELS STUDY OF $SMNIO_3$ THIN FILMS DEPOSITED BY MAGNETRON SPUTTERING WITH A SOFT AIR ATMOSPHERE POST-ANNEALING

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Abstract content

A large number of functional oxides crystallize in the structure of the perovskite family. Among these, rare earth nickelates ($ReNiO_3$) exhibit a reversible metal-insulator transition (MIT) at a critical temperature. The latter can be modified according to the stoichiometry and the nature of the rare earth. Because of this, $ReNiO_3$ has an increasing research interest due to the tunability of its remarkable structural, electronic, magnetic and optical properties. In this work, we focus on samarium nickelate ($SmNiO_3$) thin films. This kind of perovskite has a MIT of around 120°C, whereby it looks like a great candidate for a new generation of thermochromic solar absorbers. In previous works, $SmNiO_3$ was classically obtained by oxidation of metallic mixtures at high oxygen pressures with the aim to stabilize the metastable Ni^{3+} oxidation state. Nevertheless, we show that $SmNiO_3$ thin films can be grown as the habitual orthorhombically distorted perovskite structure under atmospheric pressure. These layers were synthesized by a confocal magnetron sputtering deposition system and subsequently annealed under a soft air atmosphere for crystallization. EELS analysis were performed to study the degree of oxidation of the elements. Structural characterization was made by XRD and HRTEM techniques, while electrical and optical properties were determined by four-point probe and FTIR, respectively.

References

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