PO1009

Thermochromic effect in Sm0.5Ca0.5MnO3 thin films elaborated by DC magnetron co-sputtering

Alexis Boileau[1], Fabien Capon[2], Jean-François Pierson[3], Silvère Barrat[3], Patrick Laffez[4]

[1]Institut Jean Lamour-Université Lorraine, nancy, France [2]Institut Jean Lamour, Université de Lorraine, Nancy, France [3]Institut Jean Lamour, Université Lorraine, Nancy, France [4]Université F. Rabelais Tours, IUT de Blois, LEMA, Blois, France

Alexis.Boileau@ijl.nancy-universite.fr

$Sm_{0.5}Ca_{0.5}MnO_3$ thermochromic thin films were synthesised using DC reactive sputtering and subsequent annealing in air. The experimental device was equipped with a two magnetrons system associated with a rotating substrate holder for the production of uniform thin amorphous films. The constitutive elements of the perovskite were deposited at room temperature from two metallic targets (Sm-Ca composite and Mn) onto {100} undoped silicon substrate. The chemical stoichiometry of the as-deposited films was checked by energy dispersive X-ray spectroscopy.
Infrared transmittance spectra of $Sm_{0.5}Ca_{0.5}MnO_3$ were recorded for temperatures ranging from 77 K to 470 K by a Nicolet 6700 FTIR spectrometer in the wavelength range 1.42 to 25 microns. In order to assess the optical gap, additional transmittance analyses were performed in the Visible-Near Infrared range from 0.9 micron up to 3 microns. Upon heating, the optical transmission was correlated to the electrical properties decreasing in the infrared domain showing a thermochromic effect in this optical region. The metal-insulator transition temperature was found at room temperature for the specimen tested and the jump in resistance at the transition was several orders of magnitude. Finally, the transmittance spectra were compared with the reflectivity spectra in the same wavelengths domain.

Keywords
perovskites
manganites
thermochromism
magnetron sputtering
metal-insulator transition