



Contribution ID : 61

Type : not specified

Growth and Properties of Strain-tuned SrCoO_x (2.5 ≤ x < 3) Thin Films

Friday, 5 February 2016 09:45 (15)

Controlling material properties by strain is one of the main concepts of thin film growth technology. By altering the order parameter in ferroic materials with which the lattice is coupled, new properties can be achieved, e.g. in perovskite SrCoO_x which was identified as a parent phase of strong spin-phonon coupling materials. Here, we present results on a strain-induced antiferromagnetic-ferromagnetic phase transition in high quality epitaxial SrCoO_x (2.5 ≤ x < 3) (oxygen deficient SrCoO₃) thin films grown on (001) SrTiO₃, (110) DyScO₃ and (001) LaAlO₃ substrates by pulsed laser deposition. Electronic and magnetic properties of the samples were characterized by XAS, XPS, neutron scattering and magnetometry measurements. Our results demonstrate that the ferromagnetism observed in SrCoO_x/SrTiO₃ can be suppressed and changed to antiferromagnetism in SrCoO_x/DyScO₃ through tensile strain. - Further measurements on SrCoO_x/LaAlO₃ are currently on-going.

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Session Classification : Contributed talk