Contribution ID: 19

Tuning of magnetic properties on CaFeO2.5/SrCoO2.5+δ heterostructures

Friday, 23 May 2014 11:30 (30 minutes)

CaFeO2.5 and SrCoO2.5 show an ordered deficient Perovskite structure and more specifically with a Brownmillerite type framework. Both are electronically insulating and antiferromagnetically ordered (G-type) with a Néel temperature of about 400°C. SrCoO3 can be obtained from SrCoO2.5 by electrochemical oxidation at ambient temperature, which itself shows metallic behaviour and it becomes ferromagnetic. CaFeO2.5 is chemically inert and has been reported to get oxidized only under extreme conditions, i.e. 1100°C and several GPa oxygen partial pressure (Po2).

The present work aims to fabricate heterostructures based on alternating epitaxial thin films of CaFeO2.5 and SrCoO2.5 and to investigate the evolution of their magnetic properties during the selective oxidation of SrCoO2.5 to SrCoO3. The oxidation will be controlled electrochemically.

Magnetic characterization will be investigated by SQUID and neutron reflectivity measurements. We expect interesting magnetic coupling as a function of δ , the orientation of the epitaxial films and temperature.

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Session Classification: Student Sessions