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

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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 SrCoOx 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 SrCoOx (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 SrCoOx/SrTiO3 can be suppressed and changed to antiferromagnetism in SrCoOx/DyScO3 through tensile strain. - Further measurements on SrCoOx/LaAlO3 are currently on-going.

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