growth mode could be achieved using an imposed layer-by-layer interval deposition technique. All BCO and BFO thin films show high crystalline quality with a mosaic spread below 0.04°. Furthermore, reciprocal space maps indicate no monoclinic or rhombohedral distortion up to a film thickness of 35nm. Magnetic measurements demonstrate a weak ferromagnetic phase in both material systems due to spin canting of the antiferromagnetic sublattices. However, we find no evidence of enhanced ferromagnetic properties stemming from epitaxial strain.
This work is supported by the DFG via SPP1157.

MA 15.4 Tue 15:00 Poster A

Scanning tunneling spectroscopy on $La_{0.75}Ca_{0.25}MnO_3$ thin films in external magnetic fields — •Sigrun A. Köster, Thomas Mildner, Vasily Moshnyaga, Bernd Damaschke, and Konrad Samwer — I. Physikalisches Institut, Universität Göttingen, Friedrich-Hund-Platz 1, 37077 Göttingen

Perovskite manganites show the most intriguing and still far from understanding colossal magnetoresistance effect (CMR). The main effect is observed at the temperature induced transition from a ferromagnetic metallic to an insulating behavior. According to the percolation model of Dagotto et al.[1] two different phases, an insulating and conducting one, exist in parallel and lead to a percolative phase transition, the CMR. This coexistence is expected to depend on different material parameters, since the properties of manganites are very sensitive to lattice strain (e.g. Jahn-Teller strain) and disorder. We are able to very precisely tune the microstructure of our samples by the metallorganic aerosol deposition (MAD) technique. In our work we can show by scanning tunneling spectroscopy, that low resistivity and high resistivity regions exist in the samples, depending on the microstructure of the films, temperature and magnetic fields. Our study is aimed at achieving a more detailed picture of these electronic phases. Particularly we concentrated on STS measurements in magnetic fields at the transition temperature. This project was partially supported by the DFG in the course of SFB 602 Project A2.

[1] E. Dagotto, T. Hotta, A. Moreo, Physics Reports 344, (2001)

MA 15.5 Tue 15:00 Poster A

Synthesis, Structure, and Magnetism of the Electron-Doped Cobaltates $La_{1-x}Ce_xCoO_3$ — •Christian Pinta[1,2], Dirk Fuchs[1], Peter Adelmann[1], Thorsten Schwarz[1,2], Peter Schweiss[1], Stefan Mangold[3], and Stefan Schuppler[1] — [1]Forschungszentrum Karlsruhe, Institut für Festkörperphysik, 76021 Karlsruhe, Germany — [2]Universität Karlsruhe, Fakultät für Physik, 76128 Karlsruhe, Germany — [3]Forschungszentrum Karlsruhe, Institut für Synchrotronstrahlung, 76021 Karlsruhe, Germany

Electron doping of lanthanum cobaltate, $LaCoO_3$, with doping levels exceeding minute values had been impossible until recently, when we succeeded in synthesizing epitaxial thin films of the system $La_{1-x}Ce_xCoO_3$ ($0.1 \leq x \leq 0.4$) using pulsed laser deposition. In these thin films, ferromagnetic order is observed within the entire doping range, with the maximum of the Curie temperature, T_C, occurring at $x \approx 0.3$. This results in a magnetic phase diagram similar to that of hole-doped lanthanum cobaltates. The measured spin values suggest an intermediate-spin state of the Co ions which has been also found in the hole-doped system. However, in contrast to the hole-doped material where T_C is well above 200 K, we observe a strong suppression of the maximum T_C to about 22 K. In order to study possible effects of distortions or disorder on T_C, the local spatial and electronic structure of the films was investigated in more detail by x-ray absorption spectroscopy (NEXAFS and EXAFS), illustrating that the material is indeed electron-doped, and showing an increased structural distortion of $La_{1-x}Ce_xCoO_3$ compared to the undoped cobaltates.

MA 15.6 Tue 15:00 Poster A

Growth of $La_{1-x}Ca_xMnO_3$ and $BaTiO_3$ thin films and multilayers using PLD with in-situ RHEED — •Heiko Fasold, Alexander Hirsch, Ralf Koppert, Frank Ludwig, and Meinhard Schilling — Institut für Elektrische Messtechnik und Grundlagen der Elektrotechnik, TU Braunschweig,Hans-Sommer-Straße 66, D-38106 Braunschweig, Germany

Multiferroics, materials with ferroelectric and ferromagnetic properties, are interesting for both basic research and applications. One way to design multiferroic materials for new sensor applications is to grow superlattices with alternating ferromagnetic and ferroelectric layers.

Using Pulsed Laser Deposition (PLD) $La_{1-x}Ca_xMnO_3$ (LCMO) and $BaTiO_3$ (BTO) thin films and multilayers were grown. The growth of the films is monitored by in-situ reflection high energy electron diffraction (RHEED). The characterization is supplemented by X-ray diffraction (XRD) and atomic force microscopy (AFM).

The LCMO films were grown with different calcium concentrations. Optimal growth conditions lead to high quality oriented crystalline magnetic films with a rms roughness less than 1nm for layer thicknesses up to 500 nm. Both LCMO and BTO were deposited on single terminated atomically flat $SrTiO_3$ (100) and $NdGaO_3$ (110) substrates. The influence of substrate and its surface quality on the growth conditions and properties of the thin films is analyzed. Superlattices with alternating LCMO and BTO layers were grown. RHEED intensity oscillations are used to determine and control the thickness of the multilayers.

MA 15.7 Tue 15:00 Poster A

Physical properties and microstructure of $La_{0,67}Ce_{0,33}MnO_3$ thin films — •Christian Stingl, Vasily Moshnyaga, Yuansu Luo, Bernd Damaschke, and Konrad Samwer — I. Physikalisches Institut der Georg-August-Universität Göttingen, Friedrich-Hund-Platz 1, D-37077 Göttingen

In the perowskite manganites $A_{1-x}B_xMnO_3$, the replacement of a trivalent A-ion by a divalent B-ion, which is the case in the majority of the compounds, is usually referred to as *hole-doping*. Cerium has been suggested as a tetravalent substituent to achieve *electron-doping* in PLD thin films of $La_{0,67}Ce_{0,33}MnO_3$ (LCeMO) [1]. However, LCeMO seems to be structurally unstable and the single-phase nature of the PLD films has been questioned [2].

We have therefore tried two other deposition techniques and prepared thin $La_{0,67}Ce_{0,33}MnO_3$ films by magnetron sputtering and MAD (metal-organic aerosol deposition) and investigated their microstructure with TEM. In both cases, a chemical phase separation is observed: The sputtered samples are insulating over a wide temperature range but show an interesting form of self-organized growth, with $\approx$ 10 nm thick cylindrical columns of a Ce-rich phase embedded in a manganite matrix. The MAD samples exhibit ferromagnetic metallic behavior for $T < T_{MI} \approx 260$ K due to self-doping by La vacancies.

[1] C. Mitra et al., J. Appl. Phys. **89** (2000), 524.
[2] T. Yanagida et al., Phys. Rev. B **70** (2004), 184437.

MA 15.8 Tue 15:00 Poster A

Magnetism and Magnetic Microstructure in Heusler Alloy Based Thin Film Systems — •Alexander Kaiser, Diana Rata, Stefan Cramm, and Claus M. Schneider — Institut für Festkörperforschung IFF-IEE, Forschungszentrum Jülich, Germany

Due to high spin polarization at the Fermi level and structural compatibility to compound semiconductors half-metallic Heusler alloys are promising materials for spintronic devices such as magnetic tunnel junctions and spin injection elements. For this study single films and magnetic tunnel junctions of the Heusler alloys Co_2MnSi and Co_2FeSi were sputter-deposited. The films have been magnetically characterized by SQUID and the micromagnetic structure has been studied by photoelectron emission microscopy. By microstructuring the films the influence of a magnetic stray field could be investigated. Ferromagnetic coupling of the $Co_2MnSi/MgO/Co_2FeSi$ trilayers was shown by exploiting the elemental selectivity of the X-PEEM technique.

MA 15.9 Tue 15:00 Poster A

Growth and characterization of Ni_2MnIn Heusler films — •Jan Michael Scholtyssek, Lars Bocklage, Rainer Anton, Ulrich Merkt, and Guido Meier — Institut für Angewandte Physik und Zentrum für Mikrostrukturforschung, Universität Hamburg, Jungiusstr. 11, 20355 Hamburg

Heusler alloys are interesting materials for spintronic devices. We grow thin Ni_2MnIn films by coevaporation of Ni and the alloy MnIn on a variety of substrates including amorphous carbon films and Si_3N_4 membranes for TEM studies as well as on Si and InAs for investigations of the electronic interface structure. The latter is especially interesting because of the predicted halfmetallicity of Ni_2MnIn in the $L2_1$ phase at the interface to InAs [1]. The almost perfect lattice match between InAs and Ni_2MnIn supports highly oriented growth, as we have proven by electron diffraction under grazing incidence [2]. We present morphologic and structural investigations performed during a post growth annealing process in which the sample grown at a substrate temperature of 100 °C is heated up to 400 °C. The formation of the $L2_1$ crystal structure presumably in coexsistence with the B2 phase is observed. Point contact Andreev-reflection spectroscopy on Ni_2MnIn thin films grown on Si and on (110)-surfaces of InAs, perpared by in-situ cleaving of the substrate, yields spin polarizations of up to 34% [3].