XPS on $La_{0.67}Sr_{0.33}Mn_{1-x}Co_xO_3$ MANGANITES

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9.7 cm

We present the study of the polycrystalline perovskite manganites $La_{0.67}Sr_{0.33}Mn_{1-x}Co_xO_3$ by X-ray photoelectron spectroscopy (XPS). Both valence band and core level spectra were analyzed. Additionally, electric and magnetic measurements in fields up to 12 T were performed. Core level XPS is sensitive to the chemical environment and can give infomation about the oxidation state of the probed ion. The O 1s core level spectra for all the samples present two distinct peaks, one assigned to the lattice oxygen and the other to less electron-rich oxygen species. The Mn 2p core level spectra are almost identical for all investigated samples, which indicates that the Mn^{3+}/Mn^{4+} ratio does not change with the increase of Co concentration. The Co 2p main peaks are situated at about 780 eV ($2p_{3/2}$) and 795.5 eV ($2p_{1/2}$) which indicates that Co is predominantly present as Co^{3+} state. In the region of the valence band, near to the Fermi level, a strong hybridization is found between the Mn 3d states and La 4f, for the compound with x=0. As the concentration of Co increased, the Co 3d states will hybridize as well with the Mn 3d and La 4f states, forming the valence band of the investigated compound. The compounds show semiconducting behavior and negative magnetoresistance. The magnetoresistance of the system does not exceeds 18 % (sample with x=0.7 in 7 T at 195 K) being dominated by intergranular effects, but some intrinsic effects have also to be considered. No feature at the transition of the system from the paramagnetic phase in the cluster glass phase was observed.

13.4 cm

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