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Local electronic structure and ferromagnetic interaction in La(Co,Ni)O_3 MENG-JIE HUANG, PETER NAGEL, DIRK FUCHS, HILBERT VON LOEHNEYSEN, MICHAEL MERZ, STEFAN SCHUPPLER, Karlsruhe Institute of Technology, Germany — Perovskite-related transition-metal oxides exhibit a wide range of properties from insulating to superconducting as well as many peculiar magnetic phases, and cobaltites, in particular, have been known for their proximity to spin-state transitions. How this changes with partial substitution by Ni is the topic of the present study. The local electronic structure and the ferromagnetic interaction in $La(Co_{1-x}Ni_x)O_3$ has been studied by x-ray absorption (XAS) and x-ray magnetic circular dichroism (XMCD). XAS clearly indicates a mixed-valence state for both Co and Ni, with both valences changing systematically with Ni content, x. While the gradual spin-state transition of Co^{3+} from low-spin (LS) to high-spin (HS) is preserved for low x it is suppressed in the high Ni-content samples. Regarding the spin configuration of Ni we find it stabilized in a "mixed" spin state, unlike the purely LS state of Ni in $LaNiO_3$. XMCD identifies the element-specific contributions to the magnetic moment and interactions. In particular, we find that it must be the coexistence of the HS state in both Co^{3+} and Ni^{3+} that induces t_{2g}-based ferromagnetic interaction via the double-exchange mechanism.

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