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Structural, transport, and magnetic properties of narrow bandwidth $Nd_{1-x}Ca_xCoO_{3-\delta}$ and comparisons to $Pr_{1-x}Ca_xCoO_{3-\delta}$ DANIEL PHELAN, CHRISTOPHER LEIGHTON, YUSUKE SUZUKI, SHUN WANG, Dept. of Chem. Eng. and Mat. Sci., University of Minnesota, ASHFIA HUQ, Chem. and Eng. Mat. Div., Oak Ridge Natl. Lab — $Pr_{1-x}Ca_xCoO_{3-\delta}$ (PCCO), has drawn attention due to a 1st-order insulator-metal transition (IMT) that appears on cooling at x=0.5, connected to a shift in electron occupancy between Pr and Co sites. Furthermore, the evolution of the magnetic/transport properties in low-bandwidth (LB) cobaltites is of interest due to anticipated enhancement of magneto-electronic phase separation by suppressed bandwidth. We discuss the structural, magnetic, and transport properties of a second series, $Nd_{1-x}Ca_xCoO_{3-\delta}$ (NCCO, $0 \leq x \leq 0.4$), which, devoid of the unique Pr-O bonding in PCCO, serves as a control for assessing the intrinsic physics of LB cobaltites. Using small-angle neutron scattering, neutron diffraction, and AC/DC magnetometry, a magnetic phase diagram is developed. Common to both systems is development of a metallic ferromagnetic (FM) state with low T_c ($< \sim$60 K for NCCO) upon hole substitution, while at higher temperatures ($\sim$270 K for NCCO), short-range FM is stabilized, likely around O vacancies. Phase separation leads to exchange-spring behavior around T_c. Unique to NCCO is ferrimagnetic ordering ($< \sim$14 K) involving Nd. Absence of a 1st-order IMT in NCCO affirms the influence of Pr-O bonding on the IMT in PCCO.

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