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Neutron Diffraction study of Ru doping in $Pr_{0.5}Ca_{0.5}Mn_{1-x}Ru_xO_3$ ($x \leq 0.10$) KANNADKA RAMESHA, ANNA LOBET-MEGIAS, THOMAS PROFFEN, Los Alamos National Laboratory, LUJAN NEUTRON SCATTERING CENTER TEAM — Small amount of Ru substitution (<10 %) for Mn in charge-ordered manganites destroys charge-ordering (CO) and induces ferromagnetic metallic state. To probe the dramatic role played by Ru in preventing the CO state, we have carried out neutron diffraction studies of Pr0.5Ca0.5Mn1-xRuxO3 compounds (x = 0.0, 0.05 and 0.10) in the temperature range 300-10 K. Evolution of lattice parameters with temperature points out that lattice distortion which accompanies charge ordering disappears on Ru doping. Also Ru doping alters the MnO_6 octahedron shape from 4-long/2-short type to 2-long/4-short type that suppresses the antiferromagnetic ordering and hence induces ferromagnetism through double exchange interactions. The local structure of x = 0, 0.05 and 0.10 compositions were analyzed using Pair Distribution Function (PDF) at 295 K and 15 K.

Kannadka Ramesha
Postdoc

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