Effect of Strontium Substitution on the Structural and Magnetic Properties of La_2CoMnO_6 Double Perovskite System

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***Abstract*—**Doping at rare earth site by divalent alkaline-earth ions in the double pervoskite system has noticed a variety of magnetic and electronic orders with spatially correlated charge spin and orbital degree of freedom. In the present report, we aim to study the effect of Sr^{2+} ions on the structural and magnetic properties of solid solution La_2CoMnO_6 (LCMO) double perovskite (DP) system. The powder X-ray diffraction pattern and the data analysis using the Rietveld refinement shows that LCMO sample is a monoclinic perovskite crystal structure with space group $P2_1/n$. While for $La_{1.7}Sr_{0.3}CoMnO_6$ sample, the structure is refined as a rhombohedra with space group R-3. Through the careful tuning of Sr composition in LCMO system, the local spin moments and the charge carriers can in turn be coupled strongly to give change to the structure. A thermally induced structural phase transformation is observed at room temperature for the value Sr= 0.3. The main cause of such a lattice transformation is a change of the respective ionic sizes of the constituent ions, or the tolerance factor of the system. Raman shift also evidences the structural transformation. AC magnetic measurements indicate the presence of multiple magnetic transitions arising from the competing magnetic interactions between Co and Mn in the LCMO DP system.

Keywords: oxide materials, solid state reaction, X-ray diffraction, Ac-susceptibility.

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References

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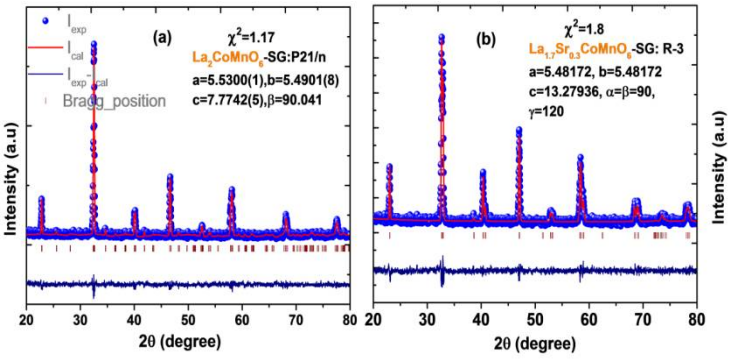

Fig. 1: Show the Rietveld refinement of the XRD pattern of $La_{2-x}Sr_xCoMnO_6$ (x=0, 0.3)

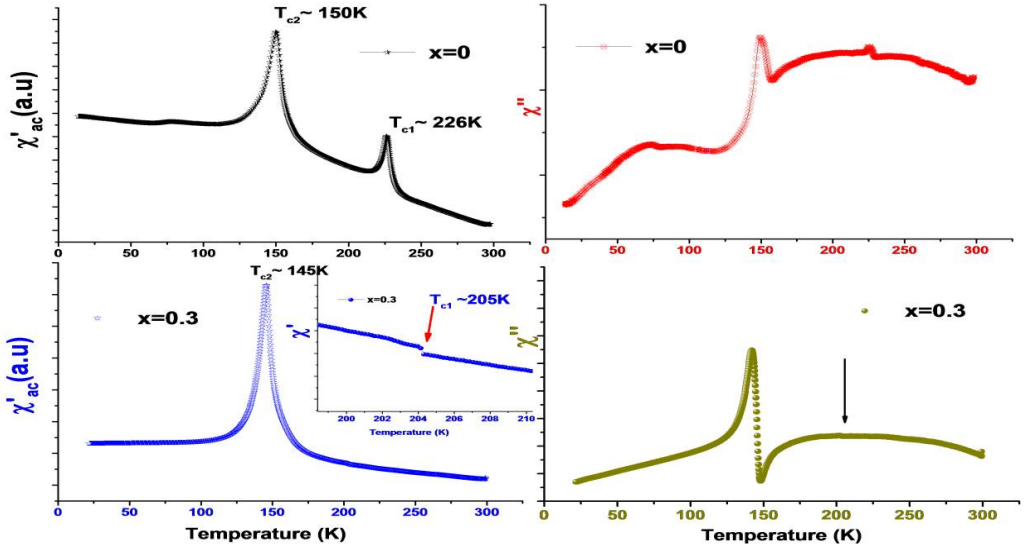

Fig. 2: Show Real and Imaginary part of AC magnetic susceptibility as a function of temperature at the 70Hz frequency of $La_{2-x}Sr_xCoMnO_6$ (x=0, 0.3)