

NEUTRON DIFFRACTION STUDIES ON  $ABO_3$  (A=La, Sr, B=Fe, Co, Ni, Cu, Mn, Ti) PEROVSKITE USED IN SOLID OXIDE FUEL CELL (SOFC) AND DOUBLE PEROVSKITE  $Ba_2YRu_{0.85}Cu_{0.15}O_6$  SUPERCONDUCTOR

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ABSTRACT

$ABO_3$  (A=La, Sr, B=Fe, Co, Ni, Cu, Mn, Ti) perovskites are of great interest due to their mixed electronic and oxygen ion conductivity. They are candidates for the electrodes of SOFCs. This study investigates the effects of substitutions at A sites and/or B sites on the crystal and magnetic structure, oxygen vacancies, and the thermal expansion coefficients at different temperatures and gaseous environment. The oxygen vacancy concentration can relax the perovskite distortion and has a close relationship with the magnetic properties.  $La_{0.6}Sr_{0.4}FeO_{3-\delta}$ ,  $La_{0.6}Sr_{0.4}Fe_{0.8}Co_{0.2}O_{3-\delta}$ , and  $La_{0.8}Sr_{0.2}Fe_{0.8}Co_{0.2}O_{3-\delta}$  can be good candidates for the cathodes of SOFCs at intermediate temperature.

The double perovskite  $Ba_2YRu_{0.85}Cu_{0.15}O_6$  superconductor and a mixture of 5wt%  $YBa_2Cu_3O_{7-\delta}$  and undoped  $Ba_2YRuO_6$  were investigated with the aid of neutron diffraction. The 1:1 B site ordering is observed and long range antiferromagnetic ordering of the Ru sublattice with a type I magnetic structure appears when the temperature is below 38K. The decomposition of Cu-doped  $Ba_2YRuO_6$  into undoped  $Ba_2YRuO_6$  and  $YBa_2Cu_3O_{7-\delta}$  is not seen.  $YBa_2Cu_3O_{7-\delta}$  is not stable at the temperature used to prepare the Cu-doped  $Ba_2YRuO_6$  superconductor. These results confirm the presence of superconductivity without  $CuO_2$  planes.