NEUTRON DIFFRACTION STUDIES ON ABO₃ (A=La, Sr, B=Fe, Co, Ni, Cu, Mn, Ti) PEROVSKITE USED IN SOLID OXIDE FUEL CELL (SOFC) AND DOUBLE PEROVSKITE Ba₂YRu₀.₈₅Cu₀.₁₅O₆ SUPERCONDUCTOR

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ABSTRACT

ABO₃(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. La₀.₆Sr₀.₄FeO₃₋δ, La₀.₆Sr₀.₄Fe₀.₈Co₀.₂O₃₋δ, and La₀.₈Sr₀.₂Fe₀.₈Co₀.₂O₃₋δ can be good candidates for the cathodes of SOFCs at intermediate temperature.

The double perovskite Ba₂YRu₀.₈₅Cu₀.₁₅O₆ superconductor and a mixture of 5wt% YBa₂Cu₃O₇₋δ and undoped Ba₂YRuO₆ 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 Ba₂YRuO₆ into undoped Ba₂YRuO₆ and YBa₂Cu₃O₇₋δ is not seen. YBa₂Cu₃O₇₋δ is not stable at the temperature used to prepare the Cu-doped Ba₂YRuO₆ superconductor. These results confirm the presence of superconductivity without CuO₂ planes.