Chemical, magnetic and orbital order in the substituted double perovskite $\text{Sr}_{(1-x)}\text{Ca}_x\text{Mn}_{0.5}\text{Ru}_{0.5}\text{O}_3$. REBECCA RICCIARDO, Ohio State University, PATRICK WOODWARD, HEATHER CUTHBERT, QINGDI ZHOU, BRENDAN KENNEDY, ZHAOMING ZHANG, MAXIM AVDEEV, LING-YUN JANG — The structural and magnetic properties of $\text{Sr}_{(1-x)}\text{Ca}_x\text{Mn}_{0.5}\text{Ru}_{0.5}\text{O}_3$ have been investigated. $\text{SrMn}_{0.5}\text{Ru}_{0.5}\text{O}_3$ exhibits antiferromagnetic ordering, $T_N \approx 200$ K. Neutron powder diffraction of this perovskite indicates the presence of orbital ordering of the occupied $\text{Mn}^{3+}d_{x2}$ orbitals, stabilizing the spin ordering corresponding to the AFM C-type structure. The substitution of smaller $\text{Ca}^{2+}$ for $\text{Sr}^{2+}$ on the A-site induces a change in the octahedral tilt system, $(a^0a^0c^-)$ to $(a^-b^+a^-)$ forcing a loss of this type of orbital ordering for $x \geq 0.2$. This is accompanied by a crossover to a ferromagnetic ground state with $200K \leq T_C \leq 300K$ even in the absence of long range chemical order. Magnetic data and neutron powder diffraction of $\text{CaMn}_{0.5}\text{Ru}_{0.5}\text{O}_3$ and $\text{Sr}_{0.5}\text{Ca}_{0.5}\text{Mn}_{0.5}\text{Ru}_{0.5}\text{O}_3$ reveal reduced magnetic moments and imply a complex magnetic behavior as well as a complete loss of orbital ordering for $\text{CaMn}_{0.5}\text{Ru}_{0.5}\text{O}_3$. X-ray absorption studies show increased electron transfer from Mn to Ru.

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