

DOPING OF COBALTITES AT Co SITES: COMPETITION BETWEEN FERROMAGNETISM AND ANTIFERROMAGNETISM (OR SPINGLASS) AND PHASE SEPARATION

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Oxygen deficient perovskite cobaltites and derivatives of the Ruddlesden and Poepper series can be stabilized by doping at the Co site. It is the case of the Sr-rich perovskites $\text{SrCo}_{1-x}\text{MxO}_{3-\delta}$ (M=Nb, Ru) and the n=2 member RP phases $\text{Sr}_3\text{Co}_{2-x}\text{Nb}_x\text{O}_{7-\delta}$ and $\text{Sr}_3\text{Co}_{2-x}\text{Nb}_x(\text{O}, \text{OH})_{8-\delta}\gamma\text{H}_2\text{O}$. In the former series one observes that there exists a strong competition between ferromagnetism (correlated to Co^{4+} content) and spin glass (due to Nb or Ru for Co substitution). It results in the appearance of a large magnetoresistance. In the second series, the spin glass behavior observed for the pristine non hydrated phase $\text{Sr}_3\text{Co}_{1.9}\text{Nb}_{0.1}\text{O}_{6.65}$ is replaced by weak ferromagnetism or 2D AFM in the hydrated oxyhydroxide $\text{Sr}_3\text{Co}_{1.9}\text{Nb}_{0.1}\text{O}_{4.86}(\text{OH})_{3.04}0.4\text{H}_2\text{O}$. The dramatic effect of water upon the magnetic properties of this RP phase, is explained by a decrease of the cobalt valency. The doping of the 112 ordered oxygen deficient perovskite $\text{EuBaCo}_2\text{O}_{5.5}$ by nickel induces ferromagnetism at low temperature (10K), in the form of ferromagnetic regions embedded in an antiferromagnetic matrix. One observes, magnetization multisteps at 2K whose origin is different from that observed in manganites and is a consequence of the motion of the domain walls inside the ferromagnetic regions in relation with the pinning effect of the latter by nickel.

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