

From magnetic cluster glass state to giant vertical magnetization shift induced by ferromagnetic cluster growth in $\text{SrFe}_{0.25}\text{Co}_{0.75}\text{O}_{2.63}$

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Transition metal oxides with ABO_3 and A_2BO_4 are known as perovskite-type and K_2NiF_4 type structures respectively. Their ability to undergo reversible oxydo-reductions chemical reaction are technologically very attractive as electrodes in fuel cells (SOFC), as oxygen storage materials in anaerobic processes and as three way catalysts (TWC's). That is why, it is the control of oxygen released and/or up taken that opens ways towards huge change of their physical properties such as metal / insulator transition and/or antiferromagnetic to ferromagnetic transition.

When a single transition metal is introduced on the B crystallographic site, its oxidation state is indeed in direct relationship with the oxygen content. However, when two transition metal cations are introduced on the B crystallographic site, our recent results highlight that their relative oxidation states are closely related to a metal to metal charge transfer giving unexpected oxidation states distribution. Especially, in $\text{SrFe}_{1-x}\text{Co}_x\text{O}_{3-\delta}$ materials, we highlight that the distribution of cobalt and iron oxidation states is heterogeneous [1], indicating that oxidation of cobalt cation requires higher oxidation potential than for the iron ones. Recently, the correlation in between the exhibited paramagnetic to ferromagnetic transition around room temperature and oxidation state distributions has been done [2]. It allow us to better analyse the giant exchange bias like properties exhibited by the $\text{SrFe}_{0.25}\text{Co}_{0.75}\text{O}_{2.63}$ material [3] as seen in the proposed figure.

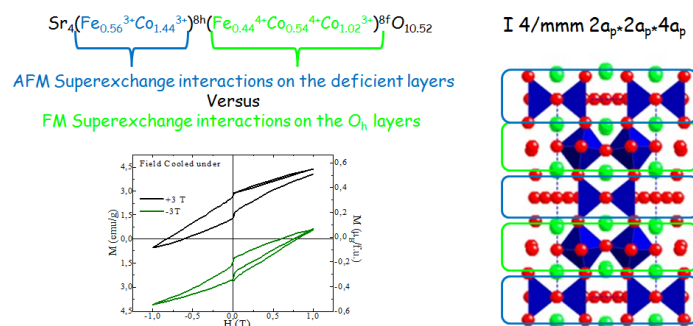


Figure 1 Super-exchange competition shown in the natural layered material resulting giant vertical magnetization shift at 15K

References

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