Magnetoelectricity in two-dimensional manganites

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$NaMnO_2$ belongs to the family of ABO_2 type complex oxides. In this two- dimensional rock-salt type of structure, layers of monovalent Na and trivalent Mn that alternate one another, provide a paradigm where polymorphism and geometrical frustration (Fig. 1) have remarkable impact on the physical properties of the materials [1].
Two polymorphs of $NaMnO_2$ have been identified by transmission electron microscopy (TEM). In the present study we demonstrate that due to the inherent polymorphism, the magnetic ground state (Fig. 1) of the quasi- 1D spin system in the α-polymorph evolves through complex modulated structures to a quasi- 2D magnet for the β-polymorph [2].
Furthermore, we examined possible coupled phenomena in these compounds through a series of magneto-dielectric measurements. The results at both low and high frequencies demonstrate the unique potential of such manganite lattices to generate spatial regions with symmetry- breaking pinning sites that favour coupled degrees of freedom. The above lead us to believe that when structural complexity arises from spin-frustration, magnetoelectricity may be stabilised in otherwise collinear magnetic systems.

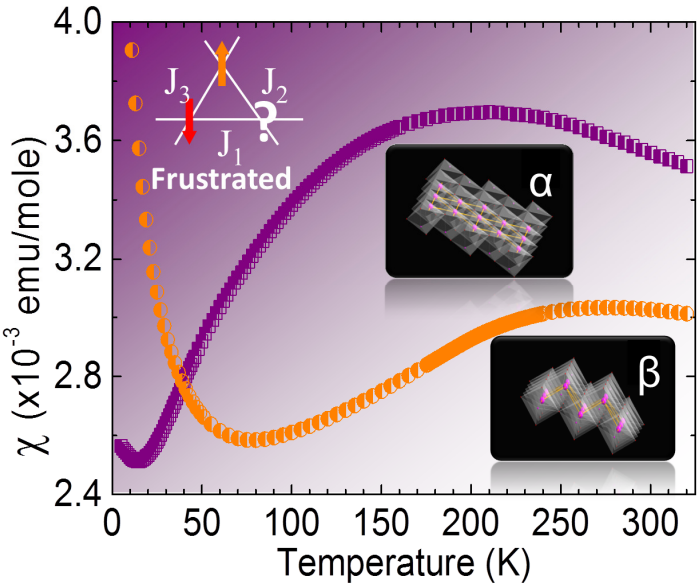

Figure 1: dc magnetic susceptibility of the two- polymorphs.

References

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