MS24-P01 | STRUCTURAL DISORDER AND MAGNETIC CORRELATIONS DRIVEN BY OXYGEN DOPING IN $Nd_2NiO_{4.11}$

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The interplay of chemical doping, structural and electronic complexity in layered Ruddlesden-Popper type non-stoichiometric oxides ($Ln_2MO_{4+\delta}$) is an exciting field of solid state research as this can trigger for example oxygen mobility at room temperature. The complexity of these compounds is both, a challenge and an opportunity to control many active degrees of freedom such as charge, spin and orbital ordering for tailoring new dedicated materials for technological applications.

$Nd_2NiO_{4+\delta}$ is a promising compound showing oxygen mobility close to room temperature. Here we present our results on the $Nd_2NiO_{4+\delta}$ phase with moderate oxygen doping level $\delta \approx 0.11$. By means of X-ray and neutron diffraction as well as macroscopic methods we investigated the structural degree of oxygen order as well as the magnetic ordering phenomena in the temperature range of 2-300 K. This study [1] revealed that the excess oxygen atoms are disordered and, in addition, introduce strong disorder to the apical oxygen site. This favors oxygen diffusion close to room temperature. The magnetic order phenomena at low temperature have been investigated, revealing a region of coexistence of commensurate and incommensurate long-range magnetic order. The possible origin of the incommensurate phase is discussed and the magnetic phase diagram is proposed.

[1] S. Maity et al., submitted to Phy. Rev. Materials