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Nd magnetic order in $NdFe_xGa_{1-x}O_3$ FERNANDO BARTOLOME, ICMA - CSIC, MARIA PARRA-BORDERIAS, Centro de Astrobiologia - CSIC, JOSE ALBERTO RODRIGUEZ-VELAMAZAN, JUAN BARTOLOME, BURZURI ENRIQUE, FERNANDO LUIS, MARCO EVANGELISTI, ICMA - CSIC — The Nd magnetic order in $NdFe_xGa_{1-x}O_3$ has been studied as a function of Fe content along the whole $0 < x < 1$ range, both experimental and theoretically. In $NdGaO_3$, where Nd-Nd exchange interaction is in isolation, Nd sublattice orders antiferromagnetically at $T_N = 1$ K. In $NdFeO_3$, the Nd sublattice is polarized at low temperatures by Fe-Nd exchange, and a competition between Nd-Nd and Nd-Fe interactions is stablished, but Nd still orders cooperatively at $T_N = 0.95$ K. The evolution of the magnetic ordering of Nd with the Fe content is studied by low-temperature specific-heat, ac susceptibility and neutron scattering measurements. In the Fe-rich side of the phase diagram, Nd order is inhibited by Fe-Nd internal field at very low Ga content, while in the Fe-poor side, Nd order is more robust, reaching the Fe magnetic percolation concentration ($x_c = 0.33$). We have used a mean field model as well as MonteCarlo simulations to clarify the interpretation of the results. The introduction of Ga ions induces discompensation of the ordered ferromagnetic Fe sublattice which strongly inhibits Nd order. However, this is only effective at every temperature if the Fe sublattice is long range ordered, while below Fe percolation, Nd is able to orders at sufficiently low T.

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