Evolution of magnetic properties of manganites with pressure and doping at Mn-site

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Systematic study of magnetic properties of low tungsten doped CaMn₁₋ₓWₓO₃ (x ≤ 0.1) demonstrates the evolution of weak ferromagnetic-antiferromagnetic ground state with increasing W doping level from the G-type AFM state with a weak FM component for (x = 0 and 0.04 cases) to the C-type AFM associated with orbital ordering (x = 0.1) with no spontaneous magnetic moment. The evidence of exchange bias (EB) effect in CaMn₀.⁹³W₀.₀⁷O₃ appears as shifts along both field and magnetization axes of magnetic hysteresis loops. Systematic studies of magnetic properties of low niobium doped CaMn₁₋ₓNbₓO₃ (x ≤ 0.1) reveal the evolution of the ground state with increasing Nb doping level from the G-type AFM state with a weak FM component for x = 0.02–0.08 to mostly C-type AFM associated with charge ordering and tiny spontaneous FM moment (x = 0.1). Application of the hydrostatic pressure results in a significant increase of magnetization, related to the growth of FM clusters under pressure and significantly suppresses the EB effect observed for CaMn₀.⁹Nb₀.₁O₃.