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Magnetic properties of $Na_{1-x}Ca_xMn_2O_5$ (x=0, 0.05, 0.1) multiferroic materials HSIUNG CHOU, S. Y. HUANG, C. C. YU, C. J. YEH, C. W. LEE, Department of Physics and Center for Nanoscience and Nanotechnology, National Sun Yat-sen University, Kaohsiung, Taiwan — Multiferroics in which the ferromagnetism and ferroelectrism coexist has been extensively studied for their potential application in spintronics. $Na_{1-x}Ca_xMn_2O_5$ (x=0, 0.05, 0.1) is formed by standard sol gel technique and annealed at around 1000^oC. X-ray diffraction indicates the compound is composed of $Na_{1-x}Ca_xMn_2O_5$ (115) as the main phase and of $Na_{1-y}Ca_yMn_1O_3$ (113) as the minor phase with a percentage around 3% to 20%. The FC and ZFC curves in a magnetization measurement split below 75K indicating a very complex domain dynamics in which two FM transitions and one AFM transition are observed. The high temperature FM transition occurs at 82K for the parent compound and is enhanced with the Ca doping; while the low temperature FM transition at 40K is independent of the Ca doping. The AFM transition temperature is suppressed from 18.2K to around 5K with the Ca content. The holes that introduced by Ca doping are localized and partially drive the valence of Mn to 4+ which may enhance the double exchange coupling for forming FM phase, therefore, the AFM transition temperature is suppressed and the FM transition temperature is enhanced. As a result of this, the effective moment decreases with the Ca doping.

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