Magnetic properties and electronic structure of doped multiferroic $Y_xA_{1-x}MnO_3 (A=Ca, Sr, Ba)$ J. Y. Juang, Electrophysics, National Chiao-Tung University, C. C. Hsieh, T. Y. Cheng, J. M. Lee, J. M. Chen, J.-Y. Lin, K. H. Wu, T. M. Uen, Y. S. Gou — We report the magnetic properties, X-ray absorption spectroscopy (XAS) on a series of doped multiferroic materials $Y_xA_{1-x}MnO_3 (A=Ca, Sr, Ba)$. YMnO$_3$ when doped by alkaline-earth metal with various ionic sizes, display dramatic changes in magnetic properties as compared with the parent compound. For Ca-doped sample, the antiferromagnetic (AFM) phase transition appears to take place at a much lower temperature (30 K) as compared to that of undoped one (42 K), which could be Mn-rich. On the other hand, when doped with ions of larger size such as Ba and Sr, the AFM temperature decreased only slightly to around 38 K but with significantly smeared transition. By comparing the XAS results to standard manganese oxide powder, YMnO$_3$ exhibits the dominant Mn$^{+3}$ characteristics obtained from the standard Mn$_2$O$_3$ powder. Although, the undoped-YMnO$_3$ and Sr-, Ba-doped YMnO$_3$ exhibited very similar electronic structure as revealed in the XAS data, the XAS of Ca-doped sample, again, is very different from that of YMnO$_3$. It is surprising to observe that Ca-doping has resulted in most significant modifications in the magnetic property and electronic structure of YMnO$_3$, since Ca$^{+2}$ is having exactly the same ionic size as that of Y$^{+3}$ and is expected to cause minimal distortion on the lattice.

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