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Giant magneto-elastic coupling in multiferroic hexagonal manganites SEONGSU LEE, Rutgers University, USA, A. PIROGOV, M.S. KANG, K.-H. JANG, SungKyunKwan University, Korea, M. YONEMURA, T. KAMIYAMA, KEK, Japan, S.-W. CHEONG, Rutgers University, USA, F. GOZZO, Paul Scherrer Institut, Switzerland, NAMSU SHIN, Pohang Accelerator Laboratory, Korea, H. KIMURA, Y. NODA, Tohoku University, Japan), J.-G. PARK , SungKyunKwan University, Korea — In order to investigate a possible structural change of $RMnO_3$ at the magnetic transition temperature, we have carried out high-resolution structural studies using neutron diffraction. Here we show that the hexagonal manganites $RMnO_3$ undergo an isostructural transition at T_N with unusually large atomic displacements: two orders of magnitude larger than those seen in any other ordinary materials, resulting in a uniquely strong magneto-elastic coupling. For the first time, we could follow the exact atomic displacements of all the atoms in the unit cell as a function of temperature and found consistency with theoretical predictions based on group theories. We argue that this gigantic magneto-elastic coupling of $RMnO_3$ arises from geometrical frustration, and holds the key to the recently observed magnetoelectric phenomenon in this intriguing class of materials.

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