Abstract Submitted
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Displacement-type ferroelectric transition with magnetic Mn ions in perovskite $Sr_{1-x}Ba_xMnO_3$ HIDEAKI SAKAI, University of St Andrews, JUN FUJIOKA, University of Tokyo, TATSUO FUKUDA, JAEA/SPring8, DAISUKE OKUYAMA, CMRG/CERG, RIKEN, DAISUKE HASHIZUME, RIKEN, FUMITAKA KAGAWA, University of Tokyo, HIRONORI NAKAO, YOUICH MURAKAMI, CMRC-PF, KEK, TAKAHISA ARIMA, University of Tokyo, ALFRED Q.R. BARON, RIKEN/SPring8, YASUJIRO TAGUCHI, CMRG/CERG, RIKEN, YOSHINORI TOKURA, University of Tokyo — Almost all the proper ferroelectrics with a perovskite structure discovered so far have no d-electrons in the off-center transition metal site, as exemplified by $BaTiO_3$ and $Pb(Zr,Ti)O_3$. This empirical d^0 rule is incompatible with the emergence of magnetism and has significantly restricted the variety of multiferroic materials. In this work, we have discovered a displacement-type ferroelectric transition originating from off-center Mn^{4+} ions in antiferromagnetic Mott insulators $Sr_{1-x}Ba_xMnO_3$. As Ba concentration increases, the perovskite lattice shows the typical soft mode dynamics, and the ferroelectricity shows up for $x \geq 0.45$. In addition to the large polarization and high transition temperature comparable to $BaTiO_3$, we demonstrate that the magnetic order suppresses the ferroelectric lattice dilation by $\sim$70% and increases the soft-phonon energy by $\sim$50%, indicating gigantic magnetoelectric effects [1]. This work was supported by the FIRST program on "Quantum Science on Strong Correlation".

[1] H. Sakai *et al.*, Phys. Rev. Lett. **107**, 137601 (2011).

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