Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Colossal permittivity induced by lattice mirror reflection symmetry breaking in $Ba_7Ir_3O_{13+x}$(0 $\leq$x$\leq$ 1.5) epitaxial thin films[1] LUDI MIAO, Tulane University, YAN XIN, Florida State University, HUIWEN ZHU, HONG XU, SIJUN LUO, DIYAR TALBAYEV, Tulane University, T.N. STANISLAVCHUK, A.A. SIRENKO, New Jersey Institute of Technology, ZHIQIANG MAO, Tulane University — Materials with colossal permittivity (CP) at room temperature hold tremendous promise in modern microelectronics as well as high-energy-density storage applications. Despite several proposed mechanisms that lead torecent discoveries of a series of new CP materials such as Nb, In co-doped TiO_2 and $CaCu_3Ti_4O_{12}$ ceramics, it is imperative to find other approaches which can further guide the search for new CP materials. In this talk, we will demonstrate a new mechanism for CP: the breaking of mirror reflection symmetry of lattice can cause CP. This mechanism was revealed in a new layered iridate $Ba_7Ir_3O_{13+x}$ (BIO) thin film we recently discovered. Structural characterization of BIO films show that its mirror reflection symmetry is broken along *b*-axis, but preserved along *a*- and *c*-axes. Dielectric property measurements of BIO films at room temperature show a CP (10^3-10^4) along the in-plane direction, but a much smaller permittivity (10- 20) along the *c*-axis, in the 10^2- 10^6 Hz frequency range. Such unusually large anisotropy in permittivity testifies to the significant role of the structural in-plane mirror reflection symmetry breaking in inducing CP.

[1]This work is supported by DOD-ARO under Grant No. W911NF0910530

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Date submitted: 15 Nov 2013 Electronic form version 1.4