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Effect of manganese substitution in barium titanate ($Mn - BaTiO_3$)[1] RAJASEKARAKUMAR VADAPOO, MUHTAR AHART, Extreme Materials Initiative, Geophysical Laboratory, Carnegie Institution for Science, Washington, DC 20015 USA, R. E. COHEN, Carnegie Institution for Science, Washington, DC USA, Department für Geo- und Umweltwissenschaften, Ludwig-Maximilians-Universitaet, Munich, Germany — Barium titanate single crystals exhibit a very large recoverable nonlinear strain with aging, which is an order higher than the highly strained PZN-PT single crystals.[1] Transition metal dopants improve the electromechanical properties of these classic ferroelectrics and third generation relaxor ferroelectrics.[2] To understand the source of these effects, we systematically investigate the effect of Mn substitution in $BaTiO_3$ using theory [3] and experiments. Mn substituted $BaTiO_3$ ceramics were synthesized by solid state reaction. Mn substitution of up to 4 atomic % showed tetragonal phase and further substitution leads to evolution of hexagonal phase. Raman spectra show increasing Mn substitution reduce the intensity of A1(TO) and B1, E(TO+LO) modes, broaden the E(TO), A1(TO) modes and a new peak evolution at 629 cm^{-1}. Enhanced strain double hysteresis was observed with increase in Mn substitution on electric field. Influence of Mn substitution on dielectric properties will be presented. The enhanced strain properties with aging observed on Mn substituted PIN-PMN-PT crystals is also discussed. References: [1] X. Ren, Nature Mater. 3, 91 (2004). [2] Zhang et al., IEEE Trans. Ultrason.,60, 1572 (2013). [3] J. F. Nossa et al., Phys. Rev. B 91, 214105 (2015).

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