Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Phase diagram and skin effect of the relaxor ferroelectric $(1-x)\mathbf{Pb(Mg_{1/3}Nb_{2/3})O_3}+x\mathbf{PbTiO_3}$ PETER GEHRING, DANIEL PHELAN, EFRAIN RODRIGUEZ, National Institute of Standards and Technology, ZUO-GUANG YE, Simon Fraser University — We revisit the phase diagram of the relaxor ferroelectric PMN-xPT using neutron powder diffraction to test suggestions that defects in the oxygen stoichiometry and/or strain affect the ground state crystal structure. Two identical sets of PMN-xPT powders were prepared with $x = 0.10$, 0.20, 0.30, and 0.40. One set was annealed in air at 873K for 2h. For a given composition and temperature the same structural phase is observed in each set, thus indicating that the effects of strain and oxygen vacancies are minimal. But the distortions measured in the annealed samples are consistently smaller than those in the as-grown samples. In addition, the average grain size of the annealed samples is approximately twice that of the as-grown samples (1.2 ± 0.6 microns vs 0.6 ± 0.3 microns). This result is consistent with a skin effect in which Ti-poor bulk crystals show significantly smaller distortions than do powders of the same composition. The diffraction patterns for both the as-grown and annealed samples with compositions $x = 0.10$ and $x = 0.20$ are best refined using the monoclinic Cm space group, which agrees with recent speculation by Singh et al., Phys. Rev. B **74**, 024101 (2006).

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Date submitted: 03 Nov 2011 Electronic form version 1.4