Abstract Submitted
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Structural Study of PMN-xPT by Neutron Diffraction D. PHELAN, P.M. GEHRING, Q. HUANG, NIST, Z.-G. YE, Simon Frasier, C. STOCK, ISIS, G. XU, J. WEN, Brookhaven — Stark differences between x-ray and neutron measurements of the structures of ferroelectric-relaxors PMN-xPT ((1-x)$Pb(Mg_{1/3}Nb_{2/3})O_3$+x$PbTiO_3$) and PZN-xPT (Z=Zn) have been reported [1]. One explanation for these differences is that these crystals have strained surface layers on the order of several tens of μm thick, the crystal structure of which differs from that of the crystal bulk. This phenomenon has been coined the "anomalous skin effect" but has been recently challenged [2] and thus remains controversial. We reinvestigated the skin effect in PMN-xPT by considering the possibility that the oxygen stoichiometry might play a role. Two sets of powders (x=0.1, 0.2, 0.3, and 0.4) were grown, one with and one without oxygen annealing, and high resolution neutron powder diffraction measurements were carried out for both sets. For a given x, both sets of powders have the same structural phase, suggesting that the effects of oxygen annealing are minimal. For x=0.1 and x=0.2 both sets of powders are rhombohedral, which contrasts with the single crystal neutron diffraction measurements. This supports a skin effect in that the grain size of the powders is small enough that the Bragg peaks are dominated by the strained surface layer. References [1] G. Xu et al., Phase Transitions 79, 135 (2006) [2] E. H. Kisi and J.S. Forrester, J. Phys.:Condens. Matter 17, L381 (2005)

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