Abstract Submitted
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Oxygen Annealing in the Synthesis of the Electron-Doped Cuprates[1] J. S. HIGGINS, Center for Nanophysics and Advanced Materials, University of Maryland, College Park, Maryland, P. L. BACH, University of Santiago de Compostela, Spain, W. YU, Department of Physics, Renmin University of China, Beijing, China, B. D. WEAVER, Naval Research Laboratory, Washington, DC, R. L. GREENE, Center for Nanophysics and Advanced Materials, University of Maryland, College Park, Maryland — Post-synthesis oxygen reduction (annealing) in the electron-doped, high-temperature superconducting cuprates is necessary for the establishment of superconductivity. It is not established what effect this reduction has microscopically on the lattice structure. Several mechanisms have been put forth as explanations; they range from disorder minimization[1], antiferromagnetic suppression[2], and copper migration[3]. Here we present an electronic transport study on electron-doped cuprate $Pr_{2-x}Ce_xCuO_{4\pm\delta}$ (PCCO) thin films in an attempt to better understand the need for this post-synthesis process. Several different cerium doping concentrations of PCCO were grown. Within each doping, a series of films were grown with varying levels of oxygen concentration. As a measure of disorder on the properties of PCCO, several films were irradiated with various doses of 2 MeV protons. Analysis within each series, and among the different dopings, favors disorder minimization through the removal of apical oxygen as the explanation for the necessary post-synthesis annealing process. [1]P. K. Mang, *et al.*, Physical Review Letters, **93** (2):027002, 2004. [2]P. Richard, *et al.*, Physical Review **B**, 70 (6), 064513, 2004. [3]Hye Jung Kang, *et al.*, Nature Materials, 2007.

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