

Abstract Submitted  
for the MAR14 Meeting of  
The American Physical Society

**The structure of oxygen-annealed  $\text{La}_{1.9}\text{Ca}_{1.1}\text{Cu}_2\text{O}_6$  superconductor** HEFEI HU, YIMEI ZHU, RUIDAN ZHONG, JOHN SCHNEELOCH, TIANSHENG LIU, GENDA GU, JOHN TRANQUADA, JOHN HILL, Brookhaven National Laboratory, SIMON BILLINGE, Columbia University, Brookhaven National Laboratory — Effect of annealing under high oxygen pressure on  $\text{La}_{1.9}\text{Ca}_{1.1}\text{Cu}_2\text{O}_6$  (2126) is studied and structure change at the nanometer scale is investigated by using transmission electron microscopy (TEM) and electron energy loss spectroscopy (EELS). The as-grown single crystal is non-superconducting, which is thought to be due to oxygen deficiency. With annealing under a high oxygen pressure, superconductivity is induced with  $T_c \sim 53$  K. While the as-grown 2126 shows homogenous structure at a large scale, after oxygen annealing, the sample develops a secondary phase  $\text{La}_{2-x}\text{Ca}_x\text{CuO}_4$ (214) at nanometer scale, which is evidenced by electron diffraction patterns together with EELS analysis. The content of 214 phase is estimated to be around 20% based on the analysis of scanning TEM images. Magnetization measurements indicate that the 214 phase is also superconducting. Chemical change of the remaining 2126 phase after oxygen annealing will also be discussed.

Hefei Hu  
Brookhaven National Laboratory

Date submitted: 15 Nov 2013

Electronic form version 1.4