

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Imaging the impact of single dopant atoms on the electronic order and disorder of $\text{Bi}_{2+y}\text{Sr}_{2-y}\text{CaCu}_2\text{O}_{8+x}$ ¹ ILIJA ZELJKOVIC, Harvard University, GENDA GU, Brookhaven National Laboratory, JENNIFER HOFFMAN, Harvard University — High- T_c cuprate superconductors display startling nanoscale disorder in essential properties such as critical temperature, pseudogap energy, and even band structure. The underlying cause of this disorder has remained mysterious; theoretical explanations have ranged from chemical inhomogeneity to spontaneous electronic phase separation. We extend the energy range of scanning tunneling spectroscopy, allowing the first-ever direct mapping of both types of interstitial oxygen dopants in $\text{Bi}_{2+y}\text{Sr}_{2-y}\text{CaCu}_2\text{O}_{8+x}$, as well as vacancies at the apical oxygen site. We show that a subset of these dopants are indeed the direct cause of the nanoscale disorder. We further explain how the spatial variations in electronic orders, such as the pseudogap and the charge order, are governed by the disorder in the dopant concentrations, particularly vacancies in the apical oxygen site.

¹We acknowledge the support from NSF Career (DMR-0847433).

Ilija Zeljkovic
Harvard University

Date submitted: 16 Nov 2011

Electronic form version 1.4