

Abstract Submitted
for the NWS09 Meeting of
The American Physical Society

Time-resolved terahertz photoconductivity of insulating cuprates

AMIR FARAHANI, JESSE PETERSEN, Simon Fraser University, RUIXING LIANG, University of British Columbia, J. STEVEN DODGE, Simon Fraser University, SIMON FRASER UNIVERSITY TEAM, UNIVERSITY OF BRITISH COLUMBIA TEAM — We use a visible pump, terahertz probe technique to study the photoconductivity of the undoped cuprates. We use ultrafast optical pulses ($E_{\text{pump}} = 3.1$ eV) to create photocarriers in high quality single crystals of $\text{Sr}_2\text{CuO}_2\text{Cl}_2$ and $\text{YBa}_2\text{Cu}_3\text{O}_6$, and time-domain terahertz spectroscopy to probe the resulting photoconductivity. We observe a rapid onset of photoconductivity followed by a non-exponential relaxation on a picosecond timescale. This dynamics is independent of photocarrier concentration over the range of 0.2 to 1.7 percent excitations per copper atom. Assuming a quantum efficiency of unity, we infer a mobility of ~ 0.2 cm^2/Vs , significantly lower than the Hall mobility in chemically doped systems.¹ As the fluence is increased, there is a weak decrease in the photoconductivity amplitude. We also measured the frequency dependence of the photoconductivity in the terahertz range, and observe an increase in photoconductivity with frequency up to 600 GHz, suggesting polaronic effects.

¹Y. Ando *et al.* PRL **87** 017001 (2001)

Amir Farahani
Simon Fraser University

Date submitted: 09 Apr 2009

Electronic form version 1.4