

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Optical second-harmonic generation measurements of porous low-k dielectric materials¹ JOANNA ATKIN, Columbia University, THOMAS SHAW, IBM Yorktown, ROBERT LAIBOWITZ, TONY HEINZ, Columbia University — Low- k dielectric materials based on porous carbon-doped oxides, with relative dielectric constants as low as 2.1, are widely used as thin insulating films in the microelectronics industry. Knowledge of these materials' basic electronic properties, such as energy gaps, barrier heights, and trap states, is essential for modeling their electrical leakage and stability characteristics. We use femtosecond laser pulses to probe the dynamics of charge-carrier transfer processes across Si/LKD interfacial barriers by optical second harmonic generation (SHG). Larger electric fields from multiphoton injection can be developed in Si/LKD systems compared to Si/SiO₂, indicating a significantly higher density of traps in the LKD. This is consistent with previously reported measurements of trap density by photoinjection techniques*. We will also discuss results on the dynamics of discharging and on the dependence of charging phenomena on layer thickness. *J. M. Atkin, D. Song, T. M. Shaw, E. Cartier, R. B. Laibowitz, and T. F. Heinz, *J. Appl. Phys.* **103**, 094104 (2008).

¹Supported by the Semiconductor Research Corporation

Joanna Atkin
Columbia University

Date submitted: 21 Nov 2008

Electronic form version 1.4