

Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

In-situ photovoltage shift measurements of hafnium oxides and silicates grown on Si(100) using femtosecond photoelectron spectroscopy
DAEYOUNG LIM, IBM T. J. Watson Research Center, RICHARD HAIGHT, IBM T. J. Watson Research Center — Femtosecond laser based photoelectron spectroscopy was used as an in-situ monitor of band bending in Si (100) substrates during various stages of hafnium oxide growth and post-deposition anneal. A fraction of the 800 nm laser pulse is directed onto the sample as a pump pulse, which flattens the existing band bending in the Si substrate. The remaining 800 nm light is focused into bursts of Ar gas to generate high order, odd multiple harmonics used as an in-situ probe of band bending. Photovoltage measurements reveal an abrupt onset of charging during the annealing of hafnium oxides and silicates, deposited on thin SiON interlayer oxides grown on lightly doped Si (100) substrates. Core level photoemission and transmission electron microscopy were used to correlate the observed charge injection at elevated temperatures with structural and chemical changes in the SiON and HfO₂ dielectric layers.

Richard Haight
IBM T. J. Watson Research Center

Date submitted: 29 Nov 2004

Electronic form version 1.4