Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Full Recovery of PFET NBTI and NFET PBTI of high-k metal gate MOSFETs with high temperature bake[1] ANASTASIOS KATSETOS, JAMES STATHIS[2], FERNANDO GUARIN — High-k metal gate MOSFET devices exhibit Bias Temperature Instability (BTI) degradation mechanisms. The p-channel Field Effect Transistor (PFET) has NBTI which results in threshold voltage (Vt) decrease and drive current (Ion) decrease when the gate is biased negatively with respect to the channel. The n-channel Field Effect Transistor (NFET) has PBTI which results in threshold voltage (Vt) increase and drive current (Ion) decrease when the gate is biased positively with respect to the channel. The amount of NBTI and PBTI is process dependent and depends on temperature, gate voltage, time and gate oxide thickness. PBTI has stronger dependence on voltage than NBTI and NBTI has stronger temperature dependence than PBTI. However, with a high temperature (370 °C) bake, full recovery of both NBTI and PBTI is achieved and the devices behave like unstressed devices on repeated BTI stress.

[1]IBM Systems and Technology Group, S/C R&D Center, 2070 Rt 52, Hopewell Junction, NY 12533.
[2]IBM T.J. Watson Research Center Yorktown Heights, NY 10598

Anastasios Katsetos

Date submitted: 26 Nov 2008 Electronic form version 1.4