Special Issue of IEEE Transactions on Device and Material Reliability

High-κ Dielectric Reliability

Reliability is becoming one of the main hurdles to implementation of high-κ gate dielectrics. This special issue of TDMR will focus on recent progress in reliability evaluation of high-κ devices and materials. V_{th} instability and transient trapping, breakdown, NBTI / PBTI, high field vs. low field stressing, interpretation of electrical data, defect creation, defect theory, and electron spin resonance identification of defects are all reviewed. The problem of accelerated testing and lifetime extrapolation of high-κ is addressed and the question of whether conventional reliability models developed for SiO_2 are applicable to high-κ systems is a major theme. This **March 2005** special issue (papers available now online, final issue in mid-May) will be of great interest to anyone working with high-κ materials or advanced MOS devices. Invited papers include:

Review on High-κ Dielectric Reliability Issues
G. Ribes, J. Mitard, M. Denais, S. Bruyere, F. Monsieur, C. Parthasarathy, E. Vincent, G. Ghibaudo, ST Microelectronics

Validity of Constant Voltage Stress Based Reliability Assessment of High-κ Devices
B.H. Lee, R. Choi, J. Sim, S. Krishnan, J. Peterson, G.A. Brown, and G. Bersuker, *Sematech*

BTI Characteristics and Mechanisms of Metal Gated HfO_2 Films with Enhanced Interface/Bulk Process Treatments
Sriram Kalpat, H.H. Tseng, M. Ramon, M. Moosa, D. Tekleab, P.J. Tobin, D.C. Gilmer, R.I. Hegde, C. Cappasso, C. Tracy, and B.E. White, Jr., *Freescale*

Threshold Voltage Instabilities in High-κ Gate Dielectric Stacks
S. Zafar, A. Kumar, E. Gusev, and E. Cartier, *IBM*

Special Reliability Features for Hf-Based High-κ Gate Dielectrics
T.P. Ma, H. Bu, X. Wang, L. Song, W. He, and M. Wang, H. Tseng and P. Tobin, *Yale & Freescale*

Point Defects in ZrO_2 High-κ Gate Oxide
J. Robertson, K. Xiong, B. Falabretti, *Cambridge*

Conduction Band-Edge States Associated with the Removal of d-state Degeneracies by the Jahn-Teller Effect
Gerry Lucovsky, C.C. Fulton, Y. Zhang, Y. Zou, J. Luning, L. Edge, J.L. Whitten, R.J. Nemanich, H. Ade, D.G. Schlom, J.L. Freeouf, and V.V. Afanase'v, *NC State, Stanford Synchotron Radiation Lab, Penn State University, Oregon Graduate Institute, University of Leuven*

Magnetic Resonance Studies of Trapping Centers in High-κ Dielectric Films on Silicon
P.M. Lenahan and J.F. Conley, Jr., *Penn State University & Sharp Labs of America*

Guest Editors

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