Tutorial B3  
1:30pm-3:15pm

Ultra-Thin Gate Oxide Reliability and Implications for Design

Organizer: John S. Suehle, National Institute of Standards and Technology
Presenter: John S. Suehle, National Institute of Standards and Technology

New observations of a voltage dependent voltage acceleration parameter and non-Arrhenius temperature dependence will be presented. The current understanding of soft breakdown will be discussed and proposed techniques for detecting breakdown presented. The implications of soft breakdown on circuit functionality and the applicability of applying current reliability characterization and analysis techniques to project the reliability of future alternative gate dielectrics will be discussed. An overview of past and present thin oxide reliability characterization techniques will be presented. A special emphasis will be placed on issues relating to the characterizing and understanding of breakdown in current technology ultra-thin gate oxides where excessive tunneling currents and soft breakdown complicate reliability assessment.

Tutorial B4  
3:30pm-5:15pm

Hot Carrier Reliability and Design Considerations

Organizer: Shian Aur, Texas Instruments, Inc.
Presenter: Shian Aur, Texas Instruments, Inc.

In this tutorial, hot carrier effects will be first demonstrated using device I-V characteristics before and after DC stress. Then, the hot carrier mechanism will be reviewed and the hot carrier lifetime prediction methodology be discussed. In circuit operation, device is under AC stress. The circuit hot carrier effects will be discussed in an inverter example. Then, a three-stage inverter chain will be demonstrated to compare the DC and AC stress cases. In real circuits, the circuit performance degradation is the concern, not necessarily the individual transistors. The circuit hot carrier simulator (HOTRON) is used to discuss several circuit examples. The mechanism in HOTRON simulator will be discussed. Some design guidelines for checking the circuit design reliability will be provided.