Technical Programme – Tuesday, 21 September 2010

Session C: Single Event Effect 1 Mechanisms and Modeling

Chair: R. Marec and S. Rakers

C-1 **Direct Comparison of Charge Collection from Single-Photon and Two-Photon Laser Testing Techniques.**

James Schwank, Matry Shaneyfelt, Paul Dodd, Gyorgy Vizkelethy, Richard Flores, Jeffrey Stevens, Scott Dalton, Scott Swanson : Sandia National Laboratories
Dale McMorrow : Naval Research Laboratory
Veronique Ferlet-Cavrois : ESA/ESTEC
Pascale Gouker : MIT Lincoln Laboratory

The amounts of charge collection by single-photon absorption to that by two-photon absorption laser testing techniques have been directly compared using specially made SOI diodes. Details of this comparison are discussed.

C-2 **Heavy-Ion Induced Threshold Voltage Shifts in Sub 70-nm Charge-Trap Memory Cells.**

Simone Gerardin, Marta Bagatin, Alessandro Paccagnella : DEI - Padova University
Giorgio Cellere : Applied Materials Baccini
Angelo Visconti, Eugenio Greco : Numonyx, R&D, Technology Development

We investigate threshold voltage shifts induced by heavy ions in sub 70-nm charge-trap cells and compare the results with floating gate memories. These devices are expected to substitute current NAND memories in the near term.

C-3 **Impact of Process Variations on SRAM Single Event Upsets.**

Amy Kauppila, Bharat Bhuva, Jeff Kauppila, Lloyd Massengill, Tim Holman : Vanderbilt University

Process variations affect the single event (SE) hardness of SRAM cells. Monte-Carlo simulations show this effect and can be used to quantify the significance of process parameter shifts on SRAM SE upset rates.

C-4 **Impact of the Radial Ionization Profile on SEE Prediction for SOI Transistors and SRAMs Beyond the 32 nm Technological Node.**

Melanie Raine, Marc Gaillardin, Sylvain Girard, Jean-Etienne Sauvestre : CEA, DAM, DIF
Guillaume Hubert, Laurent Artola : ONERA
Arnaud Bournel : CNRS, Universite Paris-Sud

The relative contribution of the radial ionization profile on SEE prediction is investigated using MUSCA SEP3, in comparison with the classical approach considering the ion track as a series of punctual charges.

C-5 An Analytical Model of the Propagation Induced Pulse Broadening (PIPB) Effects on Single Event Transient in Flash-based FPGAs.

Luca Sterpone : Politecnico di Torino

An analytical model for the characterization of PIPB effects concerning the SETs propagation within logic and routing resources of Flash-based FPGAs is developed. Experimental results comparing the model with electrical fault injection demonstrate its effectivenes.

C-6 Post SEGR and SEB Investigation of Device Parameters as Indicators of the Mechanisms in Power MOSFET Failure.

Leif Scheick, Gregory Allen, Tetsuo Miyahira, Larry Edmonds, Phillipe Adell : JPL/CIT
Luis Selva

Single Event Gate Rupture and Single Event Burnout mechanisms are investigated through analyzing device parameters after experiencing an event. Observed changes show strong correlation to event type, ion impact location, and site of damage.

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Posters for Session C

PC-1 14 MeV Neutrons SEU Cross Sections in Deep Submicron Devices Calculated Using Heavy Ion SEU Cross Sections.

Avner Haran, Joseph Barak, Leo Weissman, David David, Eitan Keren : Soreq NRC

An analytical model is developed to calculate neutron induced SEU cross-section in deep submicron devices from heavy ion SEU cross-section. The model is applied to SEU from 14 MeV neutrons and compared with experimental results.

PC-2 Impact of Resistive-Open Defects on SRAM sensitivity to Soft Errors.

Paolo Rech, Jean-Marc Galliere, Patrick Girard, Luigi Dilillo : LIRMM
Frederic Wrobel, Frederic Saigne : IES

We investigate resistive-open defect impact on SRAM radiation induced error rate through SPICE simulations. We show how it is important to consider dynamic test in order to estimate the correct SRAM radiation sensitivity.

PC-3 Comparison between single collection and multi collection on SEU induced by protons on nanometric SRAM cells.

Gnima Toure, Guillaume Hubert, Sophie Duzellier : ONERA
Karine Kastellani-Coulie, Jean-Michel Portal : IM2NP

This paper presents a new approach to study the multi collection in SRAM 90nm technology from Xilinx. It compares the relative influence of NMOS and P-MOS sensitive zones within the cell by SPICE simulations.

PC-4 Circuit effect on Collection Mechanisms involved in Single Event Phenomena: Application to the Response of a NMOS Transistor in a 90nm SRAM Cell.

Karine Castellani-Coulié, Gnima Toure, Jean-Michel Portal, Olivier Ginez,
Hassen Aziza : IM2NP
Austin Lesea : Xilinx

Different SEU simulation approaches are studied corresponding to "current collection"/"current injection". It is shown that by not accounting for voltage variations induced in the circuit by the particle generation, "current injection" overestimates the current.

PC-5 Accurate Modeling of Single Event Transients in a SiGe Voltage Reference Circuit.

Kurt Moen, Laleh Najafizadeh, John Cressler : Georgia Institute of Technology
Ashok Raman, Marek Turowski, : CFD Research Corporation

Single event transients are modeled in a SiGe voltage reference using compact model and 3D mixed-mode TCAD simulations. These methods are benchmarked against measurements to assess their effectiveness in modeling SET in SiGe analog circuits.