Part I Beyond Lucky Electrons

From Atoms to Circuits: Theoretical and Empirical Modeling of Hot Carrier Degradation ................................................................. 3
William McMahon, Yoann Mamy-Randriamihaja, Balaji Vaidyanathan, Tanya Nigam, and Ninad Pimparkar

The Energy Driven Hot Carrier Model ........................................ 29
Stewart E. Rauch and Fernando Guarin

Hot-Carrier Degradation in Decananometer CMOS Nodes: From an Energy-Driven to a Unified Current Degradation Modeling by a Multiple-Carrier Degradation Process ....................... 57
Alain Bravaix, Vincent Huard, Florian Cacho, Xavier Federspiel, and David Roy

Physics-Based Modeling of Hot-Carrier Degradation ....................... 105
Stanislav Tyaginov

Semi-analytic Modeling for Hot Carriers in Electron Devices .......... 151
Alban Zaka, Pierpaolo Palestri, Quentin Rafhay, Raphael Clerc, Denis Rideau, and Luca Selmi

The Spherical Harmonics Expansion Method for Assessing Hot Carrier Degradation ................................................................. 197
Markus Bina and Karl Rupp

Recovery from Hot Carrier Induced Degradation Through Temperature Treatment ................................................................. 221
Gregor Pobegen

Characterization of MOSFET Interface States Using the Charge Pumping Technique ................................................................. 231
Thomas Aichinger and Michael Nelhiebel
Part II  CMOS and Beyond

**Channel Hot Carriers in SiGe and Ge pMOSFETs** .......................... 259
Jacopo Franco and Ben Kaczer

**Channel Hot Carrier Degradation and Self-Heating Effects in FinFETs** . 287
Moonju Cho, Erik Bury, Ben Kaczer, and Guido Groeseneken

**Characterization and Modeling of High-Voltage LDMOS Transistors** .... 309
Susanna Reggiani, Gaetano Barone, Elena Gnani, Antonio Gnudi, Giorgio Baccarani, Stefano Poli, Rick Wise, Ming-Yeh Chuang, Weidong Tian, Sameer Pendharkar, and Marie Denison

**Compact Modelling of the Hot-Carrier Degradation of Integrated HV MOSFETs** ................................................................. 341
Filippo Alagi

**Hot-Carrier Degradation in Silicon-Germanium Heterojunction Bipolar Transistors** ...................................................... 371
Partha S. Chakraborty and John D. Cressler

Part III  Circuits

**Hot-Carrier Injection Degradation in Advanced CMOS Nodes: A Bottom-Up Approach to Circuit and System Reliability** ........... 401
Vincent Huard, Florian Cacho, Xavier Federspiel, and Pascal Mora

**Circuit Reliability: Hot-Carrier Stress of MOS Transistors in Different Fields of Application** .................................................. 445
Christian Schlünder

**Reliability Simulation Models for Hot Carrier Degradation** ............ 477
A.J. Scholten, B. De Vries, J. Bisschop, and G.T. Sasse