

2018 International Integrated Reliability Workshop (IIRW 2018)

**South Lake Tahoe, California, USA
7-11 October 2018**



**IEEE Catalog Number: CFP18IRW-POD
ISBN: 978-1-5386-6040-9**

**Copyright © 2018 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP18IRW-POD
ISBN (Print-On-Demand):	978-1-5386-6040-9
ISBN (Online):	978-1-5386-6039-3

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

IIRW 2018 Table of Contents

IIRW 2018 Committees	vi
IIRW 2018 Program Schedule	ix
Foreword	xii
Keynote	xiii
IIRW 2018 Call for Papers	xiv
Summaries of Invited Papers	xv

Technical Papers

Self-Heating Effects on Hot Carrier Degradation and Its Impact on Ring-Oscillator Reliability	1
<i>P. Paliwoda, Z. Chbili, A. Kerber, T. Nigam, D. Singh, K. Nagahiro, P. P Manik, S. Cimino, and D. Misra</i>	
New Insights on Device Level TDDDB at GHz Speed in Advanced CMOS Nodes	5
<i>M. Arabi, X. Federspiel, F.Cacho, M.Rafik, A-P.Nguyen, X.Garros, and G.Ghibaudo</i>	
Off-State Impact on FDSOI Ring Oscillator Degradation under High Voltage Stress	10
<i>Jens Trommer, Viktor Havel, Talha Chohan, Furqan Mehmood, Stefan Slesazeck, Gernot Krause, Germain Bossu, Wafa Arfaoui, Armin Mühlhoff, and T. Mikolajick</i>	
FDSOI Mosfet Gate Dielectric Breakdown Vd Dependency	15
<i>Xavier Federspiel, Melissa Arabi, Florian Cacho, Mustapha Rafik, and Antoine Cros</i>	
Correlated Defect Creation in HfO₂ Films	19
<i>Jack Strand and Alexander Shluger</i>	
Distribution Function Based Simulations of Hot-Carrier Degradation in Nanowire FETs	21
<i>Michiel Vandemaele, Ben Kaczer, Zlatan Stanojević, Stanislav Tyaginov, Alexander Makarov, Adrian Chasin, Hans Mertens, Dimitri Linten, and Guido Groeseneken</i>	
Voltage- and Temperature-Dependent Degradation of AlN/GaN High Electron Mobility Transistors	25
<i>Tobias Kemmer, Michael Dammann, Martina Baeumler, Peter Brückner, Helmer Konstanzer, Rüdiger Quay, and Oliver Ambacher</i>	
On the Impact of the Gate Metal Work-Function on the Charge Trapping Component of BTI	31
<i>J. Franco, Z. Wu, G. Rzepa, L. -Å Ragnarsson, H. Dekkers, A. Vandooren, G. Groeseneken, N. Horiguchi, N. Collaert, D. Linten, T. Grasser, and B. Kaczer</i>	
Improved PBTI Reliability in Junction-Less nFET Fabricated at Low Thermal Budget for 3D Sequential Integration	35
<i>Zhicheng Wu, Jacopo Franco, Anne Vandooren, Ben Kaczer, Philippe Roussel, G. Rzepa, T. Grasser, Dimitri Linten, and Guido Groeseneken</i>	

Border Trap Based Modeling of SiC Transistor Transfer Characteristics.....	39
<i>S. E. Tyaginov, M. Jech, G. Rzepa, A. Grill, A. -M. El-Sayed, G. Pobegen, A. Makarov, and T. Grasser</i>	
Cross-Temperature Effects of Program and Read Operations in 2D and 3D NAND Flash Memories.....	44
<i>Cristian Zambelli, Luca Crippa, Rino Micheloni, and Piero Olivo</i>	
Identifying Defects Responsible for Leakage Currents in Thin Dielectric Films.....	48
<i>Ryan J. Waskiewicz, Elias B. Frantz, Patrick M. Lenahan, Sean W. King, Nicholas J. Harmon, and Michael E. Flatté</i>	
Self-Heating Effect in Silicon-Germanium Heterostructure Bipolar Transistors in Stress and Operating Conditions	52
<i>Francesco Maria Puglisi, Marco Ghillini, Luca Larcher, and Paolo Pavan</i>	
Regular Posters	
Reliability of High Speed Photodetector for Silicon Photonic Applications.....	57
<i>F. Sy, Q. Rafhay, C. Besset, G. Beylier, P. Grosse, D. Roy, and J.-E. Broquin</i>	
Multiple Modes of Electromigration Failure in SAC Solder Alloys.....	61
<i>Deborah Noble, Matthew Ring, and J. R. Lloyd</i>	
Gate-to-via Ratio Design for Reliability.....	65
<i>T. L. Tan, P. Zhou, L. Cao, P. Y. Tan, P. Paliwoda, and C. W. Eng</i>	
Aging Control of Power Amplifier using Power Detector	68
<i>R. Lajmi, F. Cacho, V. Knopik, P. Cathelin, J. Lugo, P. Benech, E. Lauga Larroze, S. Bourdel, and X. Federspiel</i>	
Gate Oxide Degradation Assessment by Electrical Stress and Capacitance Measurements	72
<i>Dann Morillon, Pascal Masson, Franck Julien, Philippe Lorenzini, Jerome Goy, Clement Pribat, Olivier Gourhant, Thibault Kempf, Jean-Luc Ogier, Alexandre Villaret, Giada Ghezzi, Nathalie Cherault, and Stephan Niel</i>	
New Electromigration Model and Its Potential Application on Degradation Simulation for FinFET SRAM	76
<i>Rui Zhang, Kexin Yang, Taizhi Liu, and Linda Milor</i>	
Investigation of the Effects of Pulsed Direct Current at Low Frequencies on the Electromigration Lifetime.....	81
<i>Jennifer M. Passage, Sophia Rogalskyj, Nabihah Azhari, Eric Wilcox, and J. R. Lloyd</i>	
Process Optimization in IMD Deposition: A Successful Application of Isothermal Fast Wafer-Level Electromigration	85
<i>G. Yao, Z.G. Han, H. K. Yap, F. P. Yuen, C. P. Tan, P. Y. Tan, P. Paliwoda, and C. W. Eng</i>	
Relevance of Off-State NBTI Degradation in Depletion HVNMOS Transistor for Power Application.....	88
<i>Marc Strasser, Roberta Stradiotto, Stefano Aresu, Katja Puschkarsky, Holger Poehle, and Wolfgang Gustin</i>	
Synaptic Behavior of Nanoscale ReRAM Devices for the Implementation in a Dynamic Neural Network Array	92
<i>Karsten Beckmann, Wilkie Olin-Ammentorp, Sierra Russell, Nadia Suguitan, Chris Hobbs, Martin Rodgers, Nathaniel C. Cady, Garrett S. Rose, and Joseph Van Nostrand</i>	
Fast Power-Temperature Cycling of BEOL Test Structures for Power Devices	96
<i>Matt Ring, Bill Cowell, Darren Moore, and Jeff Gambino</i>	
Aging Investigation of Digital Circuit using In-Situ Monitor.....	100
<i>R. Shah, F. Cacho, R. Lajmi, and L. Anghel</i>	

Open Poster

Lifetime Estimation Using Ring Oscillators for Prediction in FinFET Technology	104
<i>Shu-han Hsu, Kexin Yang, Rui Zhang, and Linda Milor</i>	
Summaries of Tutorials	108
Discussion Group Slides	109
Group Photos	126
Author Index	130