## 2017 IEEE Workshop on **Microelectronics and Electron** Devices (WMED 2017)

Boise, Idaho, USA 21 April 2017



**IEEE Catalog Number: CFP17564-POD ISBN**:

978-1-5386-3910-8

## Copyright $\odot$ 2017 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:
 CFP17564-POD

 ISBN (Print-On-Demand):
 978-1-5386-3910-8

 ISBN (Online):
 978-1-5386-3909-2

ISSN: 1947-3834

## 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



## **Table of Contents**

Welcome to IEEE WMED 2017	v
WMED 2017 Organizing Committee	vi
WMED 2017 Technical Program	vii
WMED 2017 Keynote Address and Talk, Invited Tutorials and Talks	X
Keynote Adress	
Go Big or Go Home: The First Transatlantic Telegraph Cable and the Birth of Electrical  Engineering	X
Keynote Talk	
EUV Source: Technology and Performance	xi
Ted Taylor, ASML	
Invited Tutorials	
Modeling Hierarchies for Modern MOSFETs: Drift Diffusion to Quantum Transport	xii
Dr. Sanjay Banerjee, Microelectronics Research Center University of Texas at Austin	
Circuit and System Design Techniques for Ultra Energy-Efficient Multi-Gb/s I/O  James Jaussi, Intel Corporation	xiii
Invited Talks	
The Impact of New "Emerging" Memories on the Compute Memory Hierarchy	xiv
Memory will Drive Tomorrow's Computing Innovation: Why Market Forces Are Demanding New Memory	ry-
Centric Architectures	•
Steve Pawlowski, Micron Technology, Inc.	
Semiconductor Chip, Package and System Reliability Challenges	xvi
Devices, Circuits and Systems in CMOS for Terahertz Applications	.xvii
Special Topics Virtual Fabrication - Changing the Trajectory of Chip Manufacturing	xviii
Artificial Intelligence and its Impact on Our Society	xix
X-ray Radiation Induced Effects in Selected Chalcogenide Glasses and CBRAM Devices	
Based on Them  Maria Mitkova, Kasandra Wolf, George Belev, Mahesh Ailavajhala, Dmitri A. Tenne, Hugh Barnaby, and Michael N. Kozicki	XX

Contributed Paper Sessions Simulation of the Frequency Comb Induced by a Periodically Excited Tunnel Junction in Silicon	1
Chen Zhu, Petru Andrei, and Mark Hagmann	I
Advances in Flexible Hybrid Electronics Reliability	
Polyoxometalate Hybrid Nano-Building Blocks for Extreme Ultra-violet Photoresists	9
New Silicon Frontiers: Physically Flexible System-on-a-Chip	13
A Coding Scheme for Nucleic Acid Memory (NAM)	17
A 150GHz High Gain Amplifier Based on Over Neutralization Technique and Marchand Balun Matching Networks in 65nm CMOS	20
Poster Session Adjoint Method to Optimize Power Transistors	26
Metrology of DNA Arrays by Super-Resolution Microscopy	27
Increased Versatility for Carrier Profiling of Semiconductors by Scanning Frequency Comb  Microscopy (SFCM)  Timothy Birch and Mark J. Hagmann	29
Possibility of Carrier Profiling Semiconductors by Terahertz Spectroscopy with Terahertz Radiation Generated in a Scanning Tunneling Microscope	30
Development of a Multifunction Prototype for the Carrier Profiling of Semiconductors by Scanning Frequency Comb Microscopy	31
Development of a Scanning Tunneling Microscope for the Carrier Profiling of Semiconductors by Scanning Frequency Comb Microscopy	32
Electrical Characteristics of Nanocrystalline Silicon Resistive Memory Devices	33
Physical Adsorption and Surface Diffusion of DNA Origami onto Boron-Implanted Silicon	•=
Substrates  Sadao Takabayashi, Shohei Kotani, Juan Flores-Estrada, Jennifer E. Padilla, Lizandra C. Godwin, Elton  Graugnard, Wan Kuang, Scott Sills, and William L. Hughes	35
Author Index	37