

2024 Austrochip Workshop on Microelectronics (Austrochip 2024)

**Vienna, Austria
25-26 September 2024**



**IEEE Catalog Number: CFP24AUS-POD
ISBN: 979-8-3315-1618-5**

**Copyright © 2024 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:	CFP24AUS-POD
ISBN (Print-On-Demand):	979-8-3315-1618-5
ISBN (Online):	979-8-3315-1617-8
ISSN:	2689-8152

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

Table of Contents	ii
Message from the Chairs	iv
Committees	v
Conference Supporters	vi
Program	viii
Keynotes	ix
Keynote 1: Semiconductor Reliability: Future Trends, Challenges, and Opportunities	ix
Keynote 2: 2D Materials for Quantum Space Applications	x
Tutorials	xi
Tutorial 1: Semiconductor Fabrication at Multiple Time and Length Scales	xi
Tutorial 2: Cryogenic CMOS Technologies for Quantum Computing Systems	xii
Tutorial 3: Radiation Effects in Integrated Circuits	xii
Tutorial 4: Open-Source Design of Integrated Circuits	xiii
Session A1: Noise Challenges, Defect Analysis and Advances in Semiconductor Technology	1
Evaluation of the Robustness of the Defect-Centric Model for Defect Parameter Extraction from RTN Analysis	2
Impact of Random Telegraph Noise on the Precision of a Sub 20 ps Cyclic Vernier Time-to-Digital Converter	6
Field-Free Magnetization Switching in SOT-MRAM Devices with Noncollinear Antiferromagnets	10
Simulation of SAF-Enhanced Multilayered STT-MRAM Structures	14
Session A2: Modeling and Reliability of Semiconductor Devices	18
Modeling the Impact of Interface and Border Traps on Hysteresis in Encapsulated Monolayer MoS ₂ based Double Gated FETs	19
TCAD Simulations of Radiation Damage in 4H-SiC	23
Influence of hole injection on associated recovery phenomena in GaN-based GITs subjected to hot electron trapping	27
A rapid reliability assessment method for fine wire bonds in power electronic packages	31
Session B1: FPGA-Based Signal Processing and Circuit Design Tools	35
Digital Filter on FPGA for Neuronal Spike Detection recorded by a CMOS-based Microelectrode Array	36
Synchronizing Independent Ring Oscillators on an FPGA	40
An easy to use Python framework for circuit sizing from designers for designers	44
Extensive Comparison of Blind I/Q Imbalance Estimator Hardware Requirements	48
Session B2: Low-Power Circuits for Biomedical and High-Speed Applications	52
An 0.877-µW Ultra-Low-Power Impulse-Radio Ultra-Wide-Band Transmitter for Biomedical Applications	53
Linearization Technique for CMOS Differential and Active Resistor Structures	57
A 6.6V Switch for SPAD Gating up to 1000MHz in 0.35µm BiCMOS Technology	61
Low-Power 50 Gbps Driver Circuit for High-Capacitance Electro-Absorption Modulators in 130nm SiGe BiCMOS Technology	65
Session C1: Advances in Fault Injection, IoT, and GPU Workload Management	69
HYDRA: Injecting Electrical Faults in an Automotive Power Distribution Network	70
Machine Learning in Context of IoT/Edge Devices and LoLiPoP-IoT Project	74

Towards Software-Based Vendor-Independent Preemption for Hardware Accelerated Workloads	78
Session C2: Radiation Sensing, Precision Timing, and Design Automation	82
Towards Silicon Carbide Monolithic Active Pixel Radiation Sensors	83
Random Delay Generator for Stochastic On-Chip Calibration of Sub-20 ps Custom CMOS TDCs	87
Design Automation of a 2GHz Dynamic Comparator using the CCC Framework	91
Author Index	95