2022 International Conference on IC Design and Technology (ICICDT 2022)

Hanoi, Vietnam
21-23 September 2022

IEEE

IEEE Catalog Number: CFP22412-POD
ISBN: 978-1-6654-5902-0

Copyright © 2022 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:	CFP22412-POD
ISBN (Print-On-Demand):	978-1-6654-5902-0
ISBN (Online):	978-1-6654-5901-3
ISSN:	2381-3555

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

The 2022 IEEE International Conference on IC Design and Technology

Table of Contents ii

Preface vi

Conference Committee vii

Technical Program Committee viii

Keynotes

Opportunities and Challenges of Emerging Memory in the era of all about data x
Myung-Hee Na

Robustness of Automotive Embedded System – EMC & ESD From the Technology to the System xi
Patrice Besse

Computer-aided design of materials and devices in the quantum-technology era xii
Félix Beaudoin

Artificial Intelligence Verification-The Future of Chip Verification xiii
Nitin Kishore

Invited Talks

In-memory computing using emerging technologies: opportunities and challenges xiv
Quang Kien Trinh, Van Phuc Hoang

Beyond 5G: a view from semiconductors materials to systems xv
Luis Andia

SOI CMOS technologies for RF and millimeter-wave communication systems xvi
Jean-Pierre Raskin

From resilience to Resistive Memory variability in Binarized Neural Networks to exploitation of variability in Bayesian Neural Network xviii
Tifenn Hirtzlin, Thomas Dalgaty, Marc Bocquet, Jean-Michel Portal, Jacques-Olivier Klein, Clément Turck, Kamel-Eddine Harabi, Damien Querlioz, Elisa Vianello

Memristor-based Energy-Efficient Neuromorphic Computing xix
Jianshi Tang

Ferroelectric Capacitive Memory for Storage and In-memory Computing xx
Gong Xiao

Direct verification of Quasi-Static Negative Capacitance (QSNC) and its applications xxi
Daewoong Kwon

14-nW Sub-GHz Band Wake up Receiver for IoT applications xxii

Koichiro Ishibashi, Shuto Shibasaki

Edge Intelligence for IoT Wearable Sensors _____ xxiii
Deepu John

Configurable Intelligent Power management IC Solutions _____ xxiv
Harry Trinh

Novel Tunnel- and Ferroelectric-based Devices by Mechanism Engineering for Ultra-Low Power Applications _____ xxv
Qianqian Huang

Monolithic 3D III-V HEMT for future communication and quantum computing _____ xxvi
Sanghyeon Kim

GaN-on-Si Microwave and mm-Wave Devices _____ xxvii
Zhihong Liu

High performace RF devices in an advanced FDSOI process enabling integrated Watt-level power amplifiers for WiFi applications _____ xxviii
Viet T. Dinh

3-levels-stacked $In_xGa_{1-x}As$ Multi-Bridge Channel Field-Effect-Transistors _____ xxix
In-Geun Lee, Hyeon-Bhin Jo, Ji-Hoon Yoo, Jae-Hak Lee, Dae-Hyun Kim

Integration of InGaAs HEMTs with Si CMOS for energy efficient hybrid circuits _____ xxx
Annie Kumar

Tutorials

RISC-V Computer System Designed for Cyber-Security _____ xxxi
Trong-Thuc Hoang, Ba-Anh Dao, Anh-Tien Le, Van-Phuc Hoang and Cong-Kha Pham

Marriage of Ferroelectric Memories and BEOL-compatible Oxide Semiconductors to Empower Future Integrated Circuits _____ xxxii
Gong Xiao

State-of-the-Art Techniques for Hardware Security - From Design Methodologies to On-Chip Intelligent Sensors _____ xxxiii
Massimo Alioto

Smart Cut™: Engineered substrate for device performance enhancement _____ xxxiv
Walter Schwarzenbach

Agile IC design for Energy-Efficient Sensor Nodes for the Internet of Things _____ xxxv
Orazio Aiello

Technical Sessions

Mobile Ionic Field Effect Transistors with Amorphous Dielectrics: Device Demonstration and Modeling _____ 1
Huan Liu, Jiajia Chen, Chengji Jin, Yan Liu, Genquan Han, Xiao Yu

BEOL-compatible Ta/HZO/W FTJ with low operating voltage targeting for low power application _ 5
Leming Jiao, Zuopu Zhou, Zijie Zheng, Yuye Kang, Chen Sun, Qiwen Kong, Xiaolin Wang, Dong Zhang, Gan Liu, Long Liu, Xiao Gong

Interfacial Layer Engineering to Enhance Endurance and Noise Immunity of FeFETs for IMC Applications _____ 8
Yannick Raffel, Sunanda Thunder, Maximilian Lederer, Ricardo Olivo, Raik Hoffmann, Luca Pirro, Sven Beyer, Talha Chohan, Po-Tsang Huang, Sourav De, Thomas Kampfe, Konrad Seidel, Johannes Heitman

Systematic Study on Positive Bias Temperature Instability(PBTI) of ZrO2-based Ge nMOSFETs with Inter _____ 12
Lulu Chou, Xiao Yu, Huan Liu, Yan Liu, Genquan Han, Yue Hao

Oxygen Vacancy Formation in Charged HfO2: An Ab Initio Study _____ 16
Wentai Xia, Jifang Cao, Dong Lui

Machine Learning Method for Accurate Analysis of Complicated Low Temperature Random Telegraph Noise _____ 20
Xinze Li, Yin Sun, Jing Wan, Bing Chen, Ran Cheng, Genquan Han

Sub-0.2 pJ/Access Schmitt Trigger Based 1-kb 8T SRAM Implemented Using 40-nm CMOS Process _____ 24
Shiva Reddy, Ralph Gerard B. Sangalang, Chua-Chin Wang

A Low-Energy 8-bit CLA Realized by Single-Phase ANT Logic _____ 28
Durga Srikanth Kamarajugadda, Oliver Lexter July A Jose, Lung-Jieh Yang, Balasubramanian Esakki, Sivaperumal Sampath, Chua-Chin Wang

Optimising Power-Performance in SOI-based Null Convention Logic _____ 32
Nguyen Le Huy, Paul Beckett

High-Efficient DC-DC Converter Based on Hybrid SI-SC Topology for Portable Devices _____ 36
Nguyen Van Trung, Truong Pham, Thu-Hong Luu, Thuy-Linh Nguyen, Huu-Tho Nguyen, Van-Phuc Hoang, Xuan-Nam Tran, Van-Huan Nguyen, Van-Ha Nguyen

Layout-Configurable and Low-Loss Impedance Matching Circuits Built of Slim CMOS Transmission Lines _____ 40
Hongyu Bao, Yuxin Chu, Sang Lam

A System-on-Chip for IoT Applications with 16-bit Tiny Processor _____ 44
Dang Tuan Kiet, Khai-Duy Nguyen, Nguyen Quang Nhu Quynh, Trong-Thuc Hoang, Cong-Kha Pham

Novel Field-Plate Integrated Mesa-Type InGaAs/InP Avalanche Photodiode _____ 48
Chen Xuanqi, Jishen Zhang, Haiwen Xu, Rui Shao, Yuxuan Wang, Gerui Zheng, Xiao Gong

Innovations in Transistor Architecture and Device Connectivity for Advanced Logic Scaling _____ 51
A. Veloso, G. Eneman, A. De Keersgieter, P. Favia, A. Hikavyy, R. Chen, A. Jourdain, N. Horiguch

Engineered SiC materials for power technologies _____ 55
Walter Schwarzenbach, Severin Rouchier, Guillaume Berre, Romain Boulet, Olivier Ledoux, Enrica Cela, Alexis Drouin, Audrey Chapelle, Sylvain Monnoye, Hugo Biard, Kassem Alassaad, Laurent Viravaux, Nadia Ben Mohamed, Damien Radisson, Gonzalo Picun, Guillaume Lavaitte, Adeline Bouville-Lallart, Jeremy Roi, Julie Widiez, Karine Abadie, Emmanuel Rolland, Franck Fournel, Guillaume Gelineau, Frederic Mazen, Alexandre Moulin, Cécile Moulin, Daniel Delprat, Nicolas Daval, Sidoine Odoul, Christophe Maleville, Philippe Sandri

TCAD-Based Investigation of the Electrical Characteristics of Normally off p-GaN Passivated GaN HEMT _____ 57

Yubo Wang, Fan Li, Xuan Chi, Wen Liu, Guohao Yu, Zhongkai Du, Baoshun Zhang

Wide Lock-in Range CDR with Modified DQFD and Coarse-fine Tuning Technique _____ 61
Tzung-Je Lee, Bo-Hao Liao, Chua-Chin Wang

Comparing the L&S and L-Band Antenna Low-Noise Amplifiers Designed by Multi-Objective Optimization _____ 65
Josef Dobeš, Jan Michal

A Slim Transmission Line Design with Patterned Ground Shields for CMOS mm-Wave Integrated Circuits _____ 69
Hongyu Bao, Jichun Shi, Sang Lam

140-GHz Energy-Efficient OOK Receiver using Self-Mixer-Based Power Detector in 65nm CMOS 73
Nguyen Ngoc Mai-Khanh, Daisuke Yamazaki, Tetsuya Iizuka

3-Dimensional Integration with High Interconnection Density _____ 77
Rino Choi, Ye-eun Hong, Anh Duy Nguyen

Smart Cut Technology: From Substrate Engineering to Advanced 3D Integration _____ 81
Guillaume Besnard, Bich-Yen Nguyen, Christophe Maleville

Enablement of CMOS integrated sensor, harvesting and storage applications by ferroelectric HfO2 84
Wenke Weinreich, Malte Czernohorsky, Maximilian Lederer

Device engineering guidelines for performance boost in IGZO front gated TFTs based on defect control _____ 88
Subhali Subhechha, Nouredine Rassoul, Attilio Belmonte, Hubert Hody, Harold Dekkers, Michiel van Setten, Adrian Chasin, Shamin Houshmand Sharifi, Kaustuv Banerjee, Harinarayanan Puliyalil, Shreya Kundu, Murat Pak, Diana Tsvetanova, Nina Bazzazian, Kevin Vandersmissen, Dmitry Batuk, Jef Geypen, Jeroen Heijlen, Romain Delhougne, Gouri Kar

Investigation of normally-OFF AlGaN/GaN MIS-HEMTs with Al2O3/ZrOx/Al2O3 charge trapping layer _____ 89
Jiachen Duan, Yuanlei Zhang, Ye Liang, Yutao Cai, Wen Liu

GAQ-SNN: A Genetic Algorithm based Quantization Framework for Deep Spiking Neural Networks _____ 93
Duy-Anh Nguyen, Xuan-Tu Tran, Francesca Iacopi

A Novel In-memory Matching Circuit Based on Non-volatile Resistive Memory _____ 97
Quang-Kien Trinh, Quang-Manh Duong, Xuan-Tien Do, Van-Phuc Hoang, Hoang-Gia Vu, Van-Ngoc Dinh, Xuan-Uoc Dao

Modeling and Simulation of MEMS-Based Piezoelectric Energy Harvester _____ 101
Dao Ngoc Tuan, Le Phuoc Thanh Quang, Than Hong Phuc, Tran Thi Tra Vinh, Hoang Huu Duc, Anh Quang Vu Nguyen, Tran The Son

FBW-SNN: A Fully Binarized Weights-Spiking Neural Networks for Edge-AI Applications ____ 105
Van-Ngoc Dinh, Ngoc-My Bui, Van-Tinh Nguyen, Quang-Kien Trinh, Manh Duong Quang

High-speed FPGA-based Design and Implementation of Text Search Processor _____ 109
Binh Kieu-Do-Nguyen, Dang Tuan Kiet, Trong-Thuc Hoang, Katsumi Inoue, Toshinori Usugi, Masanori Odaka, Shuichi Kameyama, Cong-Kha Pham

An Adaptive Hardware Architecture using Quantized HOG Features for Object Detection _____ 113
Nguyen Ngo Doanh, Duy-Hieu Bui, Fawnziu Azmadi Hussin, Xuan-Tu Tran

Author Index _____ 117