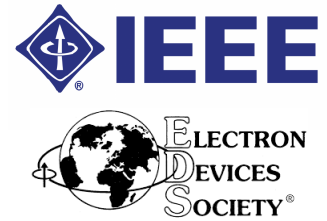


**SISC 2020**

**51<sup>st</sup> IEEE  
Semiconductor Interface  
Specialists Conference**

December 16–18, 2020  
[www.ieeesisc.org](http://www.ieeesisc.org)



**IEEE SISC 2020**

**CONFERENCE PROGRAM**

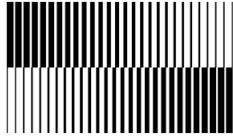
General Chair: John Robertson

Program Chair: Wenjuan Zhu

Arrangements Chair: William Vandenberghe

Ex-Officio: Paul McIntyre

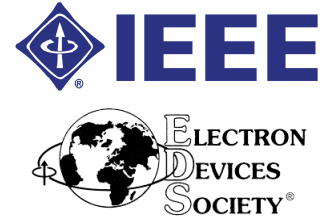
The abstracts reproduced here are for the use of SISC attendees only. Authors are free to publish any of their work presented in this abstract book. To encourage future participants to submit new and unpublished work, conference policy is that these abstracts *may not be referenced*. The presentations themselves, which may be significantly different from the associated abstracts, may be cited “as discussed at the 2020 IEEE SISC.”



**SISC 2020**

**51<sup>st</sup> IEEE  
Semiconductor Interface  
Specialists Conference**

December 16–18, 2020  
www.ieeesisc.org



**Executive Committee**

General Chair

**J. Robertson**  
U. Cambridge  
*UK*

Program Chair

**W. Zhu**  
U. Illinois  
*IL*

Arrangements Chair

**W. Vandenberghe**  
UT Dallas  
*TX*

Ex-Officio

**P. McIntyre**  
Stanford U.  
*CA*

Secretary: **B. Kaczer**, imec, *BELGIUM*

**Technical Program Committee**

**C. Fenouillet-Beranger**, CEA/LETI  
*FRANCE*

**M. Reed**, Yale U.  
*CT*

**J. Franco**, imec  
*BELGIUM*

**J. Rozen**, IBM  
*NY*

**M. Houssa**, U. Leuven  
*BELGIUM*

**K. Shiraishi**, Nagoya U.  
*JAPAN*

**J. Kim**, UT Dallas  
*TX*

**P. Stradins**, NREL  
*CO*

**V. Le**, Intel  
*OR*

**S. Takagi**, U. Tokyo  
*JAPAN*

**M. H. Lee**, NTNU  
*TAIWAN*

**W.-E. Wang**, Samsung  
*TX*

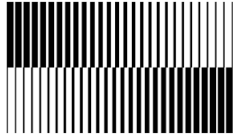
**Y.-J. Lee**, NAR Labs  
*TAIWAN*

**H. Watanabe**, Osaka U.  
*JAPAN*

**E. Pop**, Stanford U.  
*CA*

**J. Wrench**, AMAT  
*CA*

**P. D. Ye**, Purdue U.  
*IN*



**SISC 2020**

**51<sup>st</sup> IEEE  
Semiconductor Interface  
Specialists Conference**

December 16–18, 2020  
www.ieeesisc.org



---

## **SISC Ed Nicollian Award for Best Student Paper**

In 1995, the SISC began presenting an award for the best student presentation, in honor of Professor E.H. Nicollian, University of North Carolina at Charlotte. Professor Nicollian was a pioneer in the exploration of the metal-oxide-semiconductor system, particularly in the area of electrical measurements. His efforts were fundamental in establishing the SISC in its early years, and he served as its technical program chair in 1982. With John Brews, he wrote the definitive book, “MOS Physics and Technology,” published by Wiley Interscience.

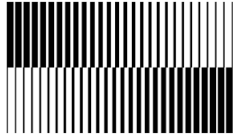
The *SISC Ed Nicollian Award for Best Student Paper* is presented to the lead student author for either an oral or a poster presentation. The winner is chosen by members of the technical program committee at the end of the SISC. The award consists of a plaque, an honorarium, and a permanent mention on the conference web site.

### **2019 SISC Ed Nicollian Award for Best Student Paper**

**Abhinav Gaur**

*imec*

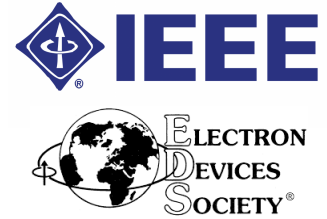
“A novel MX<sub>2</sub> MOS capacitor model to investigate CVD MoS<sub>2</sub> - SrTiO<sub>3</sub> interface”  
with B. Groven, M. Popovici, D. H. C. Lin, I. Asselberghs, M. Heyns, and I. Radu



**SISC 2020**

**51<sup>st</sup> IEEE  
Semiconductor Interface  
Specialists Conference**

December 16–18, 2020  
[www.ieeesisc.org](http://www.ieeesisc.org)



---

**Wednesday Evening Tutorial**

**Wednesday, December 16, 2020, 15:30 PST**

First introduced at SISC 2008, the Wednesday Evening Tutorial aims to provide a good foundation in a topic frequently covered at the conference, particularly benefiting students and newcomers to the field. The Tutorial is free to all registered SISC attendees.

**Prof. Philip Wong, Haitong Li, and Weier Wan, *Stanford University***

**In- and Near-Memory Computing Using 2D/3D Resistive Memories**

# In- and Near-Memory Computing Using 2D/3D Resistive Memories

Haitong Li, Weier Wan and H.-S. Philip Wong

Department of Electrical Engineering and Stanford SystemX Alliance, Stanford University

The growing demands of ubiquitous artificial intelligence (AI) applications call for new energy-efficient hardware solutions that can offer sustainable benefits with technology, architecture, and system advancements. As illustrated in Figure 1, we envision that 3D integrated systems with tight integration of logic and memory, through end-to-end technology-system co-optimization, will be the key enabler going forward [1]. Particularly, high-density, on-chip non-volatile memories (NVMs) play an important role [2], enabling three major features: (1) high-capacity, high-bandwidth on-chip data storage, (2) near-memory computing capabilities with domain-specific accelerators on chip, (3) in-memory computing capabilities utilizing unique device properties. In this tutorial, we will discuss on the essential characteristics of in-memory and near-memory computing using 2D and 3D vertical resistive RAM (RRAM).

We start with a high-level overview and discussion of both application and technology trends towards energy-efficient AI hardware. Then, at device level, we will focus on the RRAM technologies and provide backgrounds from device physics and operations to 3D structures and integration. At circuit and architecture level, we will dive into the basic ideas, designs, and system analysis of leveraging RRAM for near-memory and in-memory computing, using various case studies.

The new design space created by the logic-memory integration with RRAMs and other NVMs on chip can provide new insights and augment domain-specific accelerator optimizations where computations need to be close to memories [3]. Utilizing the device-level and circuit-level properties allows us to move neural network computations into RRAMs [4], and further support brain-inspired learning models with native compute kernels in 3D structures [5].

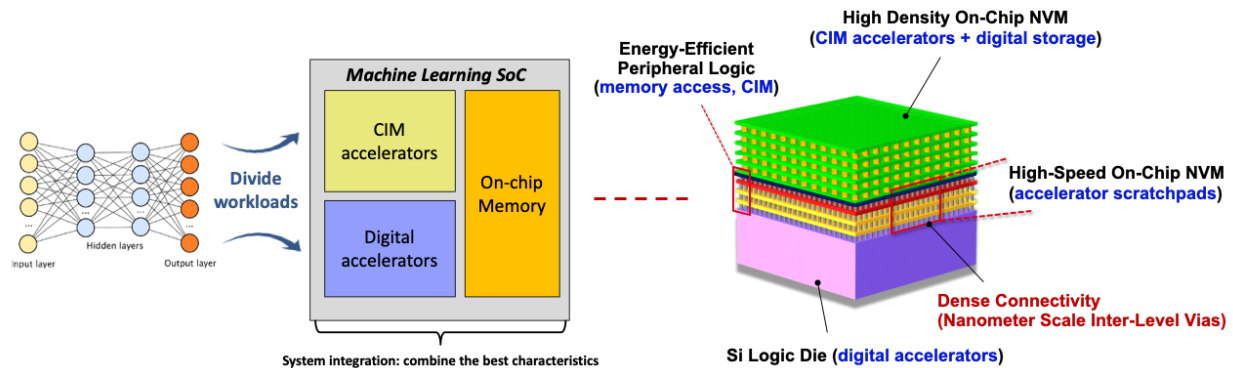
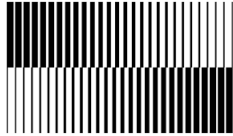


Figure 1. End-to-end technology-system co-optimization with on-chip NVM (e.g., RRAM) for energy-efficient machine intelligence.

## References:

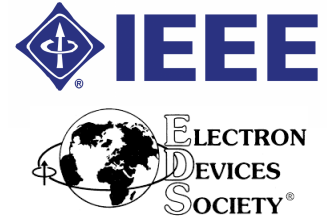
- [1] M.M. Aly, *et al.*, "The N3XT approach to energy-efficient abundant-data computing," *Proc. IEEE*, 2018
- [2] H.-S. P. Wong, *et al.*, "Memory leads the way to better computing," *Nature Nanotech.*, 2015
- [3] H. Li, *et al.*, "On-chip memory technology design space explorations for mobile deep neural network accelerators," *DAC*, 2019
- [4] W. Wan *et al.*, "A 74 TMACS/W CMOS-RRAM neurosynaptic core with dynamically reconfigurable dataflow and in-situ transposable weights for probabilistic graphical models," *ISSCC*, 2020
- [5] H. Li, *et al.*, "Hyperdimensional computing with 3D VRRAM in-memory kernels: Device-architecture co-design for energy-efficient, error-resilient language recognition," *IEDM*, 2016



**SISC 2020**

**51<sup>st</sup> IEEE  
Semiconductor Interface  
Specialists Conference**

December 16–18, 2020  
www.ieeesisc.org



---

## Conference Agenda Overview

### Wednesday, December 16, 2020

<b>Session 1: Ferroelectrics</b> .....	11:00 – 12:50
<b>Session 2: 2D Materials</b> .....	13:15 – 15:10
<b>Session 3: Wednesday Evening Tutorial</b> .....	15:30 – 17:00
<b>Session 4: Advanced Semiconductor Devices</b> .....	17:25 – 19:40

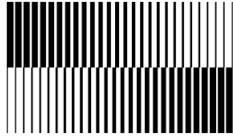
### Thursday, December 17, 2020

<b>Session 5: 2D Materials</b> .....	6:00 – 7:40
<b>Session 6: Interfaces</b> .....	8:05 – 9:25
<b>Session 7: Poster Session I Presentation</b> .....	9:25 – 9:45
<b>Session 7: Poster Session I Discussion</b> .....	10:05 – 11:05
<b>Session 8: Wide Bandgap Materials</b> .....	11:35 – 13:10
<b>Session 9: Advanced Electronics</b> .....	13:35 – 15:10
<b>Session 10: Ferroelectrics</b> .....	15:35 – 16:55
<b>Session 11: Reliability and Stability</b> .....	17:20 – 19:20

### Friday, December 18, 2020

<b>Session 12: Interfaces and Defects</b> .....	6:00 – 7:40
<b>Session 13: Semiconductor Memory</b> .....	8:05 – 9:40
<b>Session 14: Wide Bandgap Materials</b> .....	11:00 – 12:35
<b>Session 15: 2D Materials</b> .....	13:00 – 14:40
<b>Session 16: Wide Bandgap Materials</b> .....	15:05 – 16:40
<b>Session 17: Poster Session II Presentation</b> .....	16:40 – 17:00
<b>Session 17: Poster Session II Discussion</b> .....	17:20 – 18:20

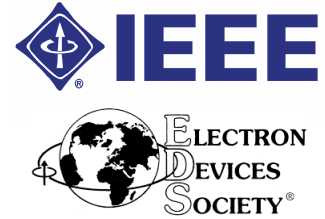
*All times are PST (Pacific Standard Time)*



**SISC 2020**

**51<sup>st</sup> IEEE  
Semiconductor Interface  
Specialists Conference**

December 16–18, 2020  
www.ieeesisc.org



---

**Wednesday, December 16, 2020**

**Session 1: Ferroelectrics**

Session Chair: M. Frank

- 11:00 Introduction
- 11:15 1.1 *Invited* – **Interface Effects on the Reliability of Hafnium Oxide-Based Ferroelectric Memories**, P. C. McIntyre, *Stanford U.*
- 11:50 1.2 – **Ultrathin PVD-Grown In<sub>2</sub>Se<sub>3</sub> Ferroelectric Semiconductor Field-Effect Transistors**, D. Zheng, M. Si, Z. Zhang, and P. D. Ye, *Purdue U.*
- 12:10 1.3 – **DFT models on interfaces of ferroelectric and antiferroelectric hafnium-zirconium oxides to dielectric oxides and semiconductor**, K. Chae<sup>1,2</sup>, A. C. Kummel<sup>1</sup>, and K. J. Cho<sup>2</sup>, <sup>1</sup>*UCSD*, <sup>2</sup>*UT Dallas*
- 12:30 1.4 – **A Reliability Study of Thickness Dependence of HfO<sub>2</sub>-based 3D-FeRAM Cell**, O. Maher, H. Jiang, Z. Liu, and T. P. Ma, *Yale U.*
- 12:50 Coffee Break

**Session 2: 2D Materials**

Session Chair: P. D. Ye

- 13:15 2.1 *Invited* – **Van der Waals Integration beyond 2D Materials**, X. Duan, *UCLA*
- 13:50 2.2 – **Electronic and Photonic Devices Based on Monolayer Ternary Telluride Heterostructures Synthesized by Chemical Vapor Deposition**, K. Xu, J. Kang, Z. Hao, and W. Zhu, *UIUC*
- 14:10 2.3 – **Magnetism and Magnetic Dopant Solubility in Transition Metal Dichalcogenides**, R. Younas<sup>1</sup>, G. Zhou<sup>1</sup>, S. Tawari<sup>2</sup>, M. L. Van de Put<sup>2</sup>, W. G. Vandenberghe<sup>2</sup>, and C. L. Hinkle<sup>1</sup>, <sup>1</sup>*U. Notre Dame*, <sup>2</sup>*UT Dallas*
- 14:30 2.4 – **Interface Chemistry Study of Ni and Ag contacts on MoS<sub>2</sub>**, X. Wang, S. Yeoul Kim, and R. M. Wallace, *UT Dallas*
- 14:50 2.5 – **Improved Low-Temperature Growth of 3D Semiconductors Using 2D Intermediate Layers**, G. Zhou and C. L. Hinkle, *U. Notre Dame*
- 15:10 Coffee Break

*All times are PST (Pacific Standard Time)*

## Session 3: Tutorial

Session Chair: W. Zhu

15:30 – 17:00 *Tutorial – In- and Near-Memory Computing Using 2D/3D Resistive Memories*, H.-S. P. Wong, H. Li, and W. Wan, *Stanford U.*

## Session 4: Advanced Semiconductor Devices

Session Chair: Y. Lee

17:25 4.1 *Invited – Progress and issue in oxide semiconductors*, H. Hosono<sup>1,2</sup>, <sup>1</sup>*Tokyo Institute of Technology, Japan*, <sup>2</sup>*National Institute for Materials Science, Japan*

18:00 4.2 – **Nanoscale comparison of bias dependent carrier distributions in mechanically exfoliated WSe<sub>2</sub>/SiO<sub>2</sub> and suspended WSe<sub>2</sub> by scanning nonlinear dielectric microscopy**, K. Takano, K. Yamasue, T. Kato, T. Kaneko, and Y. Cho, *Tohoku U., Japan*

18:20 4.3 – **Tellurium Nanowire Gate – All-Around MOSFETs for Sub-5 nm Applications**, Y. Yin<sup>1</sup>, J. Robertson<sup>2</sup>, and Y. Guo<sup>1,2</sup>, <sup>1</sup>*Wuhan U., China*, <sup>2</sup>*Cambridge U., UK*

18:40 4.4 – **Neuromorphic characteristics of MoS<sub>2</sub>-based CBRAM using thin Ti layer for future artificial intelligence applications**, S. Maikap<sup>1,2</sup>, S. Ginnaram<sup>1</sup>, M. Seal<sup>1</sup>, and A. Senapati<sup>1</sup>, <sup>1</sup>*Chang Gung U., Taiwan*, <sup>2</sup>*Keelung Chang Gung Memorial Hospital, Taiwan*

19:00 4.5 – **Negative Differential Resistance in Photocurrent Across a Vertical van der Waals Heterostructure Driven by Energy Transfer**, M. Dandu and K. Majumdar, *IIS Bangalore, India*

19:20 4.6 – **Surface electronic structure of strained Si<sub>1-x</sub>Ge<sub>x</sub> layers grown on Ge(001) and Si(001)**, H. W. Wan<sup>1</sup>, Y. T. Cheng<sup>1</sup>, C. K. Cheng<sup>1</sup>, C. P. Cheng<sup>2</sup>, J. Kwo<sup>3</sup>, T. W. Pi<sup>4</sup>, and M. Hong<sup>1</sup>, <sup>1</sup>*National Taiwan U., Taiwan*, <sup>2</sup>*National Chiayi U., Taiwan*, <sup>3</sup>*National Tsing Hua U., Taiwan*, <sup>4</sup>*National Synchrotron Radiation Research Center, Taiwan*

19:40 End

**Thursday, December 17, 2020**

## Session 5: 2D Materials

Session Chair: W. Vandenberghe

6:00 Introduction

6:05 5.1 *Invited – Insulators for 2D Nanoelectronics: Expectations vs. Reality*, Y. Y. Illarionov<sup>1,2</sup>, T. Knobloch<sup>1</sup>, and T. Grasser<sup>1</sup>, <sup>1</sup>*TU Wien, Austria*, <sup>2</sup>*Ioffe Institute, Russia*

6:40 5.2 – **300 mm wafer level WS<sub>2</sub> p-MOS capacitor Characterization, Simulation, and Analysis**, V. Mootheri<sup>1,2</sup>, A. Gaur<sup>1,2</sup>, A. Okuyama<sup>3</sup>, Q. Smets<sup>1</sup>, T. Schram<sup>1</sup>, I. Asselberghs<sup>1</sup>, M. Heyns<sup>1,2</sup>, I. Radu<sup>1</sup>, and D. H. C. Lin<sup>1</sup>, <sup>1</sup>*imec, Belgium*, <sup>2</sup>*U. Leuven, Belgium*, <sup>3</sup>*Sony Semiconductor Solutions, Japan*

7:00 5.3 – **Band Alignment at Monolayer WS<sub>2</sub>/SiO<sub>2</sub> Interface: Impact of the Layer Transfer**, G. Delie<sup>1</sup>, D. Chiappe<sup>2,3</sup>, I. Asselberghs<sup>2</sup>, C. Huyghebaert<sup>2</sup>, I. Radu<sup>2</sup>, S. Banerjee<sup>2</sup>, B. Groven<sup>2</sup>, S. Brems<sup>2</sup>, and V. V. Afanas'ev<sup>1</sup>, <sup>1</sup>*U. Leuven, Belgium*, <sup>2</sup>*imec, Belgium*, <sup>3</sup>*ASM Microchemistry, Finland*

*All times are PST (Pacific Standard Time)*



- 7:20 5.4 – **Stoner ferromagnetism in cadmium dihalides**, R. Meng<sup>1</sup>, M. Houssa<sup>1</sup>, K. Iordanidou<sup>2</sup>, V. V. Afanas'ev<sup>1</sup>, and A. Stesmans<sup>1</sup>, <sup>1</sup>*U. Leuven, Belgium*, <sup>2</sup>*U. Oslo, Norway*
- 7:40 Coffee Break

## Session 6: Interfaces

Session Chair: A. Stesmans

- 8:05 6.1 – **Liquid-Gated Silicon Nanowire Field-Effect Transistors Covered with Ultrathin Diamond-Like Tetrahedral Amorphous Carbon**, N. Boichuk<sup>1</sup>, Y. Kutovyi<sup>1</sup>, J. Lie<sup>1</sup>, G. Beltramo<sup>1</sup>, V. Wehnacht<sup>2</sup>, and S. Vitusevich<sup>1</sup>, <sup>1</sup>*Forschungszentrum Jülich, Germany*, <sup>2</sup>*Fraunhofer Institute, Germany*
- 8:25 6.2 – **Alternatives to Ga in In-Ga-Zn-O<sub>4</sub> amorphous oxide semiconductors**, Z. Zhang<sup>1</sup>, Y. Guo<sup>2</sup>, and J. Robertson<sup>1</sup>, <sup>1</sup>*Cambridge U., UK*, <sup>2</sup>*Swansea U., UK*
- 8:45 6.3 – **Ab-initio Calculation of Quantum Tunneling Property of Thin Oxide Josephson Junctions Using Density Functional Theory and Machine-Learning**, C. E. Kim, K. G. Ray, and V. Lordi, *Lawrence Livermore National Laboratory*
- 9:05 6.4 – **Origin of Apparent Fermi Level De-Pinning of Metal Silicides/Si Interfaces**, J. Robertson<sup>1</sup>, Z. Zhang<sup>1</sup>, and Y. Guo<sup>2</sup>, <sup>1</sup>*Cambridge U., UK*, <sup>2</sup>*Swansea U., UK*

## Session 7: Poster Session I

Session Chair: W. Vandenberghe

- 9:25 7.1 – **Impact of termination on Fermi level pinning at rare-earth arsenide/GaAs interfaces**, Z. Zhang<sup>1</sup>, Y. Guo<sup>2</sup>, and J. Robertson<sup>1</sup>, <sup>1</sup>*Cambridge U., UK*, <sup>2</sup>*Swansea U., UK*
- 9:26 7.2 – **Mobility of Near Surface InGaAs/InP Quantum Wells**, L. Södergren, N. S. Garigapati, and E. Lind, *Lund U., Sweden*
- 9:27 7.3 – **Fast Low Temperature Oxidation of 4H-SiC**, G. Fleckl, G. Pfusterschmied, and U. Schmid, *TU Wien, Austria*
- 9:28 7.4 – **Study on Ti:AlO<sub>x</sub> as high-κ dielectric for MISHEMTs**, S. Seidel, A. Schmid, N. Siebrath, and J. Heitmann, *TU Bergakademie Freiberg, Germany*
- 9:29 7.5 – **On the origin of stochasticity in Cu/SiO<sub>2</sub>/W CBRAM devices: model and experimental study**, F. Maudet<sup>1</sup>, V. Deshpande<sup>1</sup>, and C. Dubourdieu<sup>1,2</sup>, <sup>1</sup>*Helmholtz-Zentrum Berlin, Germany*, <sup>2</sup>*Free U. Berlin, Germany*
- 9:30 7.6 – **Modification of chemical oxide passivation of silicon by ultrahigh-vacuum low-temperature treatments**, Z. J. Rad<sup>1</sup>, K. Chen<sup>2</sup>, J.-P. Lehtiö<sup>1</sup>, I. Mack<sup>2</sup>, E. Vuorinen<sup>1</sup>, V. Vähänissi<sup>2</sup>, M. Kuzmin<sup>1</sup>, M. Punkkinen<sup>1</sup>, P. Laukkanen<sup>1</sup>, H. Savin<sup>2</sup>, and K. Kokko<sup>1</sup>, <sup>1</sup>*U. Turku, Finland*, <sup>2</sup>*Aalto U., Finland*
- 9:31 7.7 – **Humidity-mediated oxidation of hexanethiol-passivated Ge(100) surfaces**, S. Garvey<sup>1</sup>, A. Serino<sup>2</sup>, J. D. Holmes<sup>1</sup>, N. Draeger<sup>2</sup>, and B. Long<sup>1</sup>, <sup>1</sup>*U. College Cork, Ireland*, <sup>2</sup>*Lam Research*
- 9:32 7.8 – **Electron spin relaxation and coherence of Pb-centers at the Si/SiO<sub>2</sub> interface in Silicon nanowires**, M. Fanciulli<sup>1,2</sup>, M. Belli<sup>2</sup>, and R. de Sousa<sup>3</sup>, <sup>1</sup>*U. Milano-Bicocca, Italy*, <sup>2</sup>*IMM-CNR, Italy*, <sup>3</sup>*U. Victoria, Canada*
- 9:33 7.9 – **Electrical measurements of gate-controlled diodes and MOS capacitors irradiated with <sup>60</sup>Co-γ**, P. Asenov, P. Assiouras, A. Kyriakis, and D. Loukas, *NCSR Demokritos, Greece*

*All times are PST (Pacific Standard Time)*

- 9:34 7.10 – **Fabrication of Biologically Sensitive Si Nanowire Field-Effect-Transistors applied to Electrical Label-Free DNA Hybridization Detection**, R. Midahuen<sup>1</sup>, T. Magis<sup>1</sup>, V. Mathieu<sup>1</sup>, F. Laulagnet<sup>1</sup>, J. A. Dallery<sup>3</sup>, B. Previtali<sup>1</sup>, V. Stambouli<sup>2</sup>, and S. Barraud<sup>1</sup>, <sup>1</sup>CEA-LETI, France, <sup>2</sup>CNRS, France, <sup>3</sup>VISTEC Electron Beam, Germany
- 9:35 7.11 – **Effect of Electron Affinity on ALD MI2M Resonant Tunneling Rectifiers**, S. B. Tekin, N. Sedghi, S. Hall, P. R. Chalker, and I. Z. Mitrovic, *U. Liverpool, UK*
- 9:36 7.12 – **Metal/HfO<sub>2</sub>/SiO<sub>x</sub>/Si and Metal/HfO<sub>2</sub>/Metal memory cell stacks**, S. Kalem<sup>1</sup>, S. B. Tekin<sup>2</sup>, E. Kaya<sup>3</sup>, E. Jalaguier<sup>4</sup>, R. Roelofs<sup>5</sup>, S. Yildirim<sup>6</sup>, and O. Yavuzcetin<sup>7</sup>, <sup>1</sup>Bahcesehir U., Turkey, <sup>2</sup>U. Liverpool, UK, <sup>3</sup>TUBITAK-BILGEM, Turkey, <sup>4</sup>CEA-LETI, France, <sup>5</sup>ASM, Belgium, <sup>6</sup>Istanbul U., Turkey, <sup>7</sup>U. Wisconsin
- 9:37 7.13 – **How ALD gas phase chemistry changes the oxidation state and conductivity of TiO<sub>2</sub> thin films**, A. Babadi and P. C. McIntyre, *Stanford U.*
- 9:38 7.14 – **Toward electronic isolation of immune cells from blood for COVID immunity testing**, S. Yosinski, P. Han, Z. A. Kobos, R. Chaudhury, J. S. Lee, T. M. Fahmy, and M. A. Reed, *Yale U.*
- 9:39 7.15 – **Precursor Comparison for Selective Low Resitivity Selective Ru Atomic Layer Deposition**, V. Wang, M. Breeden, and A. C. Kummel, *UCSD*
- 9:40 7.16 – **Selective Pulsed Chemical Vapor Deposition of TiO<sub>2</sub>/Al<sub>2</sub>O<sub>3</sub> Nanolaminates on Si and SiO<sub>2</sub> in Preference to SiCOH**, J. Huang, Y. Cho, and A. C. Kummel, *UCSD*
- 9:41 7.17 – **Bias-Enhanced Atomic Layer Annealing for the Deposition of High-Quality Aluminum Nitride Thin Films On Silicon**, A. J. McLeod, S. T. Ueda, and A. C. Kummel, *UCSD*
- 9:42 7.18 – **High Tunneling Electroresistance Ratio in Ferroelectric tunneling Junctions based on Hafnium Zirconium Oxide**, H. Ryu and W. Zhu, *UIUC*
- 9:43 7.19 – **The role of dielectric screening and remote phonon scattering in monolayer MoS<sub>2</sub>**, M. L. Van de Put<sup>1</sup>, G. Gaddemane<sup>2</sup>, S. Gopalan<sup>1</sup>, and M. V. Fischetti<sup>1</sup>, <sup>1</sup>UT Dallas, <sup>2</sup>imec, Belgium
- 9:44 7.20 – **Effect of Deposition Temperature on 5 nm Ferroelectric Hf<sub>0.5</sub>Zr<sub>0.5</sub>O<sub>2</sub> Capacitors**, Z. Yu, F. Huang, W. Tsai, and P. C. McIntyre, *Stanford U.*
- 9:45 7.21 – **Effect of WRITE pulse width on data retention properties of ferroelectric Hf<sub>0.5</sub>Zr<sub>0.5</sub>O<sub>2</sub> MIM capacitors**, J. Mohan<sup>1</sup>, S. J. Kim<sup>2</sup>, H. Hernandez-Arriaga<sup>1</sup>, Y. C. Jung<sup>1</sup>, C. D. Young<sup>1</sup>, S. R. Summerfelt<sup>3</sup>, and J. Kim<sup>1</sup>, <sup>1</sup>UT Dallas, <sup>2</sup>Kangwon National U., Korea, <sup>3</sup>Texas Instruments
- 9:45 – 10:05 Coffee Break and Setup Gather Town
- 10:05 – 11:05 Poster Discussion at Gather Town

## Session 8: Wide Bandgap Materials

Session Chair: J. Rozen

- 11:35 8.1 *Invited* – **Discovery and transistor applications of polarization-induced 2D hole gases at polar semiconductor heterojunctions**, D. Jena, R. Chaudhuri, S. Bader, K. Nomoto, and H. Xing, *Cornell U.*
- 12:10 8.2 – **Capacitance and Transport Properties of GaN/ScAlN/GaN Heterostructure Barrier Diodes**, T. Maeda, J. Casamento, K. Nomoto, H. G. Grace, and D. Jena, *Cornell U.*
- 12:30 8.3 – **Electronic properties of epitaxial NbN/GaN interfaces**, J. G. Wright<sup>1</sup>, G. Khalsa<sup>1</sup>, T. Yu<sup>2</sup>, V. Strocov<sup>2</sup>, H. G. Xing<sup>1</sup>, and D. Jena<sup>1</sup>, <sup>1</sup>Cornell U., <sup>2</sup>Paul Scherrer Institute, Switzerland

*All times are PST (Pacific Standard Time)*

- 12:50 8.4 – **Why an Ideal GaN Fe-HEMT is Hard to Achieve?**, Z. Lin, M. Si, J. Noh, X. Lyu, and P. D. Ye, *Purdue U.*
- 13:10 Coffee Break

## Session 9: Advanced Electronics

Session Chair: J. Wrench

- 13:35 9.1 *Invited* – **Reliability Physics of Post-Moore Era Electronic Devices**, M. A. Alam, *Purdue U.*
- 14:10 9.2 – **Deposition Mechanism of Sub 1nm EOT Bilayer Gate Oxides on Inert Carbon Surfaces Via Lateral growth of Al<sub>2</sub>O<sub>3</sub> Nucleation Layers**, Z. Zhang<sup>1</sup>, C. Kuo<sup>1</sup>, J. Spiegelman<sup>1</sup>, H. Kashyap<sup>1</sup>, G. Pitner<sup>2</sup>, M. Passlack<sup>2</sup>, Q. Lin<sup>3</sup>, H.-S. P. Wong<sup>3</sup>, A. C. Kummel<sup>1</sup>, and P. Bandaru<sup>1</sup>, <sup>1</sup>*UCSD*, <sup>2</sup>*TSMC*, <sup>3</sup>*Stanford U.*
- 14:30 9.3 – **Selective Pulsed CVD of HfO<sub>2</sub>/TiO<sub>2</sub> Nanolaminate for Nanoscale Patterning**, Y. Cho, J. Huang, C. Ahles, and A. C. Kummel, *UCSD*
- 14:50 9.4 – **Uncovering High Mobility Post-Cu Interconnect Materials Through Screening Thousands of Candidate Materials**, E. R. Antoniuk, A. Ramdas, and E. J. Reed, *Stanford U.*
- 15:10 Coffee Break

## Session 10: Ferroelectrics

Session Chair: P. McIntyre

- 15:35 10.1 – **Charging-induced Stabilization of Ferroelectric Orthorhombic HfO<sub>2</sub> Phase; Key Growth Processes based on First-principles Study**, T. Nakayama<sup>1</sup>, K. Arai<sup>1</sup>, Y. Shiraishi<sup>1</sup>, R. Nagasawa<sup>1</sup>, M. Araidai<sup>2</sup>, and K. Shiraishi<sup>2</sup>, <sup>1</sup>*Chiba U., Japan*, <sup>2</sup>*Nagoya U., Japan*
- 15:55 10.2 – **Crystalline Phase Formation and Transition Kinetics in Ferroelectric HfO<sub>2</sub> Thin Films**, T. Cui<sup>1</sup>, M. Li<sup>2</sup>, S. S. Lee<sup>3</sup>, Y. Fan<sup>1</sup>, T. Fister<sup>3</sup>, J. Liu<sup>1</sup>, P. Fenter<sup>3</sup>, and X. Li<sup>1</sup>, <sup>1</sup>*Shanghai Jiao Tong U., China*, <sup>2</sup>*Rutgers U.*, <sup>3</sup>*Argonne National Laboratory*
- 16:15 10.3 – **Remnant Polarization and Junction Current Enhancement of Ferroelectric HfZrO<sub>2</sub> with Molybdenum Capping Electrode**, K.-Y. Hsiang<sup>1,2</sup>, K.-T. Chen<sup>1,3</sup>, C.-Y. Liao<sup>1</sup>, T.-M. Wu<sup>1</sup>, J.-H. Liu<sup>1</sup>, S.-H. Chang<sup>1</sup>, F.-C. Hsieh<sup>1</sup>, S.-H. Chiang<sup>1</sup>, H. Liang<sup>1</sup>, Y.-D. Lin<sup>4</sup>, P.-C. Yeh<sup>4</sup>, C.-Y. Wang<sup>4</sup>, H.-Y. Yang<sup>4</sup>, P.-J. Tzeng<sup>4</sup>, S. T. Chang<sup>3</sup>, Y.-T. Tang<sup>5</sup>, and M. H. Lee<sup>1</sup>, <sup>1</sup>*National Taiwan Normal U., Taiwan*, <sup>2</sup>*National Chiao Tung U., Taiwan*, <sup>3</sup>*National Chung Hsing U., Taiwan*, <sup>4</sup>*Industrial Technology Research Institute, Taiwan*, <sup>5</sup>*Taiwan Semiconductor Research Institute, Taiwan*
- 16:35 10.4 – **Possibility of Above 20-nm-Thick Hf<sub>x</sub>Zr<sub>1-x</sub>O<sub>2</sub>/ZrO<sub>2</sub> and Hf<sub>x</sub>Zr<sub>1-x</sub>O<sub>2</sub>/HfO<sub>2</sub> Bilayers for High Polarization and Breakdown Voltage**, T. Onaya<sup>1,2,3,4</sup>, T. Nabatame<sup>2</sup>, M. Inoue<sup>2</sup>, Y. C. Jung<sup>3</sup>, H. Hernandez-Arriaga<sup>3</sup>, J. Mohan<sup>3</sup>, H. S. Kim<sup>3</sup>, N. Sawamoto<sup>5</sup>, T. Nagata<sup>2</sup>, J. Kim<sup>3</sup>, and A. Ogura<sup>1,5</sup>, <sup>1</sup>*Meiji U., Japan*, <sup>2</sup>*NIMS, Japan*, <sup>3</sup>*UT Dallas*, <sup>4</sup>*JSPS, Japan*, <sup>5</sup>*MREL, Japan*
- 16:55 Coffee Break

## Session 11: Reliability and Stability

Session Chair: S. Takagi

- 17:20 11.1 – **Nanoscale Evaluation of DC Bias Stress Induced Interface Defect Density of a High- $\kappa$ /SiO<sub>2</sub>/Si Gate Stacks using Time-Resolved Scanning Nonlinear Dielectric Microscopy**, K. Suzuki, K. Yamasue, and Y. Cho, *Tohoku U., Japan*
- 17:40 11.2 – **Revision of conductance method for evaluating interface state density at MFIS interfaces**, T.-E. Lee, Z. Lin, K. Toprasertpong, M. Takenaka, and S. Takagi, *U. Tokyo, Japan*
- 18:00 11.3 – **Origin of low channel mobility of 4H-SiC(0001)/SiO<sub>2</sub> MOSFETs: Impact of interfacial carbon-carbon defects**, Z. Wang<sup>1</sup>, Z. Zhang<sup>2</sup>, Y. Guo<sup>1</sup>, and J. Robertson<sup>2</sup>, <sup>1</sup>Wuhan U., China, <sup>2</sup>Cambridge U., UK
- 18:20 11.4 – **Microscopic capacitance-voltage characteristics measurement of a SiO<sub>2</sub>/SiC MOS structure by time-resolved scanning nonlinear dielectric microscopy**, K. Yamasue and Y. Cho, *Tohoku U., Japan*
- 18:40 11.5 – **ALD-TiN metal gate on in-situ prepared Al<sub>2</sub>O<sub>3</sub>/Y<sub>2</sub>O<sub>3</sub>/n-GaAs with high-temperature thermal stability and low interface state density**, Y. H. Lin<sup>1</sup>, J. Liu<sup>1</sup>, Y. J. Hong<sup>1</sup>, H. W. Wan<sup>1</sup>, L. B. Young<sup>1</sup>, J. Kwo<sup>2</sup>, and M. Hong<sup>1</sup>, <sup>1</sup>National Taiwan U., Taiwan, <sup>2</sup>National Tsing Hua U., Taiwan
- 19:00 11.6 – **Enhanced Reliability and Uniformity for Ge pMOSFET with Low Temperature Supercritical Fluid Treatment**, D.-B. Ruan<sup>1</sup>, K.-S. Chang-Liao<sup>1</sup>, J.-S. Li<sup>1</sup>, Z.-Q. Hong<sup>1</sup>, G.-T. Liu<sup>1</sup>, and P.-T. Liu<sup>2</sup>, <sup>1</sup>National Tsing Hua U., Taiwan, <sup>2</sup>National Chiao Tung U., Taiwan
- 19:20 End

## Friday, December 18, 2020

### Session 12: Defects and Interfaces

Session Chair: C. Fenouillet-Beranger

- 6:00 Announcements
- 6:05 12.1 *Invited* – **Discovery and Understanding of Single-Atom Memory Effect in 2D Atomic Sheets**, D. Akinwande, *UT Austin*
- 6:40 12.2 – **Static charge formation in Si/high- $\kappa$  material interfaces**, J.-P. Lehtiö<sup>1</sup>, Z. J. Rad<sup>1</sup>, S. Granroth<sup>1</sup>, M. Yasir<sup>1</sup>, M. Punkkinen<sup>1</sup>, R. Punkkinen<sup>1</sup>, H.-P. Hedman<sup>1</sup>, J. P. Rueff<sup>2</sup>, P. Laukkanen<sup>1</sup>, and K. Kokko<sup>1</sup>, <sup>1</sup>U. Turku, Finland, <sup>2</sup>SOLEIL Synchrotron, France
- 7:00 12.3 – **Nature of Mobility Reducing Defects in SiC MOSFETs**, J. Robertson<sup>1</sup>, Z. Zhang<sup>1</sup>, and Y. Guo<sup>2</sup>, <sup>1</sup>Cambridge U., UK, <sup>2</sup>Swansea U., UK
- 7:20 12.4 – **Enhancing the Quality of Low Temperature SiO<sub>2</sub> by Atomic Hydrogen Exposure for Excellent NBTI Reliability**, J. Franco<sup>1</sup>, J.-F. de Marneffe<sup>1</sup>, A. Vandooren<sup>1</sup>, Y. Kimura<sup>1</sup>, L. Nyns<sup>1</sup>, Z. Wu<sup>1,2</sup>, A.-M. El-Sayed<sup>3</sup>, M. Jech<sup>3</sup>, D. Waldhoer<sup>3</sup>, D. Claes<sup>1,2</sup>, H. Arimura<sup>1</sup>, L.-Å. Ragnarsson<sup>1</sup>, V. V. Afanas'ev<sup>2</sup>, A. Stesmans<sup>2</sup>, N. Horiguchi<sup>1</sup>, D. Linten<sup>1</sup>, T. Grasser<sup>3</sup>, and B. Kaczer<sup>1</sup>, <sup>1</sup>imec, Belgium, <sup>2</sup>U. Leuven, Belgium, <sup>3</sup>TU Wien, Austria
- 7:40 Coffee Break

*All times are PST (Pacific Standard Time)*

## Session 13: Semiconductor Memory

Session Chair: A. Kummel

- 8:05 13.1 *Invited* – **65K-RRAM-Array Analog Conductance Relaxation Characterization For Neural Network Inference**, W. Wan and H.-S. P. Wong, *Stanford U.*
- 8:40 13.2 – **Atomic-Layer-Deposited Nanometer Thick In<sub>2</sub>O<sub>3</sub> 1T1R FET with High I<sub>ON</sub>/I<sub>OFF</sub> > 10<sup>10</sup> at V<sub>GS</sub>=0 V, Large Memory Window > 10 V and Deep Sub-60 mV/dec Subthreshold Slope**, M. Si, Z. Lin, X. Lyu, and P. D. Ye, *Purdue U.*
- 9:00 13.3 – **Modeling of Temperature Distribution in 2D MoS<sub>2</sub>-based Non-volatile Resistance Switching Devices**, Y. Huang, X. Wu, R. Ge, D. Akinwande, and J. C. Lee, *UT Austin*
- 9:20 13.4 – **Erase Behavior of Charge Trap Flash Memory Devices using High-k Dielectric as Blocking Oxide Liner**, S. Ramesh, A. Ajaykumar, J. Bastos, L. Breuil, A. Arreghini, L. Nyns, J.-Ph. Soulié, L.-Å. Ragnarsson, F. Schleicher, N. Jossart, J. Stiers, G. Van den bosch, and M. Rosmeulen, *imec, Belgium*
- 9:40 Coffee Break
- 10:05 – 10:35 TPC Committee Meeting

## Session 14: Wide Bandgap Materials

Session Chair: C. Hinkle

- 11:00 14.1 *Invited* – **Dielectric–Diamond Interfaces**, Y. Yang, Y. Yao, X. Wang, F. A. Koeck, and R. J. Nemanich, *Arizona State U.*
- 11:35 14.2 – **Single and Multi-fin Normally-Off Lateral β-Ga<sub>2</sub>O<sub>3</sub> Transistors on (010) Ga<sub>2</sub>O<sub>3</sub> Substrates with Threshold Voltage Modulation by Fin Width Design**, K. Smith, E. Long, W. Li, K. Nomoto, D. Jena, and H. G. Xing, *Cornell U.*
- 11:55 14.3 – **Dynamic Behavior of Nitrogen-Implanted Ga<sub>2</sub>O<sub>3</sub> in β-Ga<sub>2</sub>O<sub>3</sub> Schottky Barrier Diodes**, W. Li<sup>1,2</sup>, B. Cromer<sup>1</sup>, K. Smith<sup>1</sup>, K. Nomoto<sup>1</sup>, N. Hendricks<sup>3</sup>, A. Green<sup>4</sup>, K. Chabak<sup>4</sup>, D. Jena<sup>1</sup>, and H. G. Xing<sup>1</sup>, <sup>1</sup>*Cornell U.*, <sup>2</sup>*UC Berkeley*, <sup>3</sup>*UCSB*, <sup>4</sup>*Air Force Research Laboratory*
- 12:15 14.4 – **Anomalously Low Dynamic On-resistance in Ga<sub>2</sub>O<sub>3</sub> Trench-MOS Schottky Barrier Diodes: Role of Sidewall Interface Trapping**, W. Li, K. Nomoto, Z. Hu, D. Jena, and H. G. Xing, *Cornell U.*
- 12:35 Coffee Break

## Session 15: 2D Materials

Session Chair: T. Gougousi

- 13:00 15.1 – **Magnetic order and critical temperature of substitutionally doped monolayer TMDs**, S. Tiwari<sup>1,2</sup>, M. L. Van de Put<sup>1</sup>, B. Soree<sup>2</sup>, and W. G. Vandenberghe<sup>1</sup>, <sup>1</sup>*UT Dallas*, <sup>2</sup>*imec, Belgium*
- 13:20 15.2 – **Telluride Superlattices Grown by Chemical Vapor Deposition: Toward Spatial Modulation of Bandgaps**, Z. Hao and W. Zhu, *UIUC*
- 13:40 15.3 – **Demonstration of High Edge Conduction in Tellurene Nanoribbon Transistor**, Z. Zhang, C. Niu, M. Si, J. Li, G. Qiu, and P. D. Ye, *Purdue U.*
- 14:00 15.4 – **Contact Engineering with Self-assembled Monolayers in MoTe<sub>2</sub> Transistors**, Z. Zhao, S. Li, Y. Diao, C. Schroeder, and W. Zhu, *UIUC*

*All times are PST (Pacific Standard Time)*

- 14:20 15.5 – **A Computational Study of Hole Transport in Hexagonal Boron Nitride Monolayers**, M. M. Khatami<sup>1,2</sup>, M. L. Van de Put<sup>2</sup>, M. K. Moravvej-Farshi<sup>1</sup>, and W. G. Vandenberghe<sup>2</sup>, <sup>1</sup>*Tarbiat Modares U., Iran*, <sup>2</sup>*UT Dallas*
- 14:40 Coffee Break

## Session 16: Wide Bandgap Materials

Session Chair: R. Nemanich

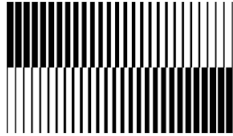
- 15:05 16.1 *Invited* – **MOCVD based dielectrics on GaN: Impact of growth conditions, composition and polarity**, I. Sayed and U. Mishra, *UCSB*
- 15:40 16.2 – **Initial Studies of Bias Temperature Instability of Vertical III-V Nanowire MOSFETs**, M. Hellenbrand<sup>1</sup>, V. Putcha<sup>2</sup>, O.-P. Kilpi<sup>1</sup>, J. Franco<sup>2</sup>, and L.-E. Wernersson<sup>1</sup>, <sup>1</sup>*Lund U., Sweden*, <sup>2</sup>*imec, Belgium*
- 16:00 16.3 – **Atomic Layer Deposition of Hafnium Oxide on InAs: new insight by time-resolved in situ studies**, G. D’Acunto, A. Troian, E. Kokkonen, F. Rehman, Y. P. Liu, E. Lind, J. Schnadt, and R. Timm, *Lund U., Sweden*
- 16:20 16.4 – **Implementing a nanowire-based optoelectronic recurrent neural circuit from the bee brain**, D. O. Winge<sup>1</sup>, S. Limpert<sup>1</sup>, H. Linke<sup>1</sup>, M. T. Borgström<sup>1</sup>, B. Webb<sup>2</sup>, S. Heinze<sup>1</sup>, and A. Mikkelsen<sup>1</sup>, <sup>1</sup>*Lund U., Sweden*, <sup>2</sup>*U. Edinburgh, UK*

## Session 17: Poster Session II

Session Chair: W. Zhu

- 16:40 17.1 – **First-principles calculations on the atomic and electronic structures at the GaN/(Al<sub>2</sub>O<sub>3</sub>)<sub>1-x</sub>(SiO<sub>2</sub>)<sub>x</sub> interfaces**, K. Chokawa, K. Shiraishi, and A. Oshiyama, *Nagoya U., Japan*
- 16:41 17.2 – **Process optimization and thermal stability study for hydrogen-terminated nitrated 4H-SiC(0001) surface**, K. Murata, K. Betsuyaku, and H. Tsuchida, *CRIEPI, Japan*
- 16:42 17.3 – **Explicit Gain Equation for Single Crystalline Silicon Nanowire Photoconductors**, J. J. He and Y. P. Dan, *Shanghai Jiao Tong U., China*
- 16:43 17.4 – **Effect of Nitrogen Impurity Atoms at Fe/MgO Interface on Perpendicular Magnetic Anisotropy Energy**, Y. Ogawa<sup>1</sup>, M. Araidai<sup>1</sup>, T. Endoh<sup>2</sup>, and K. Shiraishi<sup>1,2</sup>, <sup>1</sup>*Nagoya U., Japan*, <sup>2</sup>*Tohoku U., Japan*
- 16:44 17.5 – **Consequential effect of MWA and dielectric insertion on schottky barrier height in Ge MIS structure**, A. Kumar, P. Divya<sup>2</sup>, and W. H. Lee, *National Cheng Kung U., Taiwan*
- 16:45 17.6 – **The study of sub threshold characteristics of 4-H SiC NMOSFET after ionizing dose for space application**, W. Ali, Y. Qingkui, C. Shuang, and W. He, *China Academy of Space Technology, China*
- 16:46 17.7 – **Novel Methods for Effective Design for Reliability Practices in SEMI Industries**, S. P. Panchangam, A. K. Rajendran, K. Gowdaru, and P. Kolgiri, *Lam Research, India*
- 16:47 17.8 – **Atomic Layer Deposited Metal Oxide Bilayers for Metal-Insulator-Semiconductor Photovoltaics**, B. E. Davis and N. C. Strandwitz, *Lehigh U.*

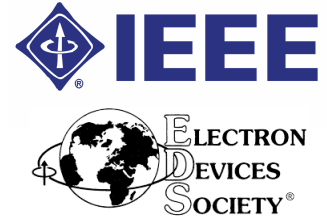
- 16:48 17.9 – **Exploiting Fixed Charge to Control Schottky Barrier Height in Si|Al<sub>2</sub>O<sub>3</sub>|MoO<sub>x</sub> - based Tunnel Diodes**, B. M. Garland, B. E. Davis, and N. C. Strandwitz, *Lehigh U.*
- 16:49 17.10 – **Novel Revelations on Silicon Carbide Wet Oxidation**, G. H. S. Dartora, P. Silveira, and F. C. Stedile, *UFRGS, Brazil*
- 16:50 17.11 – **Critical inspection of semiconductor interfaces via camera-less terahertz 3D imaging**, A. Rahman, *Applied Research & Photonics*
- 16:51 17.12 – **Engineering Ag-based ZnO Thin Films to Reduce V<sub>th</sub> Variability in Filament-type Threshold Switching Selectors for 3D Cross-point Memory Application**, A. Sahota, H. S. Kim, J. Mohan, and Y. C. Jung, *UT Dallas*
- 16:52 17.13 – **The effects of annealing graphene in nitric oxide – doping and etching**, G. K. Rolim, G. V. Soares, H. I. Boudinov, and C. Radtke, *UFRGS, Brazil*
- 16:53 17.14 – **Electron transport in topological semi-metal Molybdenum Phosphide**, S. Kumar and R. Sundararaman, *Rensselaer Polytechnic Institute*
- 16:54 17.15 – **Tunable plasmonic hot carrier dynamics in noble metal alloys**, A. Habib and R. Sundararaman, *Rensselaer Polytechnic Institute*
- 16:55 17.16 – **Electroforming Polarity on Bilayer Self-Selective RRAM for Energy Efficient High-Density Crossbar Array Applications**, Y.-C. Chen, *Northern Arizona U.*
- 16:56 17.17 – **Novel Layered Dielectrics: a First Principles Study of 32 large gap van der Waals materials**, M. Rostami Osanloo, M. L. Van de Put, A. Saadat, and W. G. Vandenberghe, *UT Dallas*
- 16:57 17.18 – **Ferroelectric HZO capacitor with W/TiN bottom electrode with no wakeup**, H. Kashyap<sup>1</sup>, M. S. Kavrik<sup>1</sup>, C. Kuo<sup>1</sup>, T. Weiss<sup>1</sup>, A. Yadav<sup>2</sup>, and A. C. Kummel<sup>1</sup>, <sup>1</sup>UCSD, <sup>2</sup>Applied Materials
- 16:58 17.19 – **Low Resistivity Titanium Nitride Thin Film Fabricated by Atomic Layer Deposition on Silicon**, C. Kuo<sup>1</sup>, V. Wang<sup>1</sup>, Z. Chang<sup>1</sup>, H. Kashyap<sup>1</sup>, D. Alvarez<sup>2</sup>, and A. C. Kummel<sup>1</sup>, <sup>1</sup>UCSD, <sup>2</sup>RASIRC
- 16:59 17.20 – **Synthesis of Atomically Thin Ternary Telluride Alloys via Sodium Chloride**, J. Kang and W. Zhu, *UIUC*
- 17:00 17.21 – **Probing the Thermal Transport in h-BN/MoS<sub>2</sub>/h-BN Heterostructure**, F. Ye<sup>1</sup>, P. X.-L. Feng<sup>1</sup>, and X. Zhang<sup>2</sup>, <sup>1</sup>Case Western Reserve U., <sup>2</sup>Stevens Institute of Technology
- 17:00 – 17:20 Coffee Break and Setup Gather Town
- 17:20 – 18:20 Poster Discussion at Gather Town



**SISC 2020**

# 51<sup>st</sup> IEEE Semiconductor Interface Specialists Conference

December 16–18, 2020  
www.ieeesisc.org



## Author Index

Afanas'ev V. V.	5.3, 5.4, 12.4	Chang S. T.	10.3
Ahles C.	9.3	Chang S.-H.	10.3
Ajaykumar A.	13.4	Chang Z.	17.19
Akinwande D.	12.1, 13.3	Chang-Liao K.-S.	11.6
Alam M. A.	9.1	Chaudhuri R.	8.1
Ali W.	17.6	Chaudhury R.	7.14
Alvarez D.	17.19	Chen K.	7.6
Antoniuk E. R.	9.4	Chen K.-T.	10.3
Arai K.	10.1	Chen Y.-C.	17.16
Araidai M.	10.1, 17.4	Cheng C. K.	4.6
Arimura H.	12.4	Cheng C. P.	4.6
Arreghini A.	13.4	Cheng Y. T.	4.6
Asenov P.	7.9	Chiang S.-H.	10.3
Asselberghs I.	5.2, 5.3	Chiappe D.	5.3
Assiouras P.	7.9	Cho K. J.	1.3
Babadi A.	7.13	Cho Y.	4.2, 7.16, 9.3, 11.1, 11.4
Bader S.	8.1	Chokawa K.	17.1
Bandaru P.	9.2	Claes D.	12.4
Banerjee S.	5.3	Cromer B.	14.3
Barraud S.	7.10	Cui T.	10.2
Bastos J.	13.4	D'Acunto G.	16.3
Belli M.	7.8	Dallery J. A.	7.10
Beltramo G.	6.1	Dan Y. P.	17.3
Betsuyaku K.	17.2	Dandu M.	4.5
Boichuk N.	6.1	Dartora G. H. S.	17.10
Borgström M. T.	16.4	Davis B. E.	17.8, 17.9
Boudinov H. I.	17.13	de Marneffe J.-F.	12.4
Breeden M.	7.15	de Sousa R.	7.8
Brems S.	5.3	Delie G.	5.3
Breuil L.	13.4	Deshpande V.	7.5
Casamento J.	8.2	Diao Y.	15.4
Chabak K.	14.3	Divya P.	17.5
Chae K.	1.3	Draeger N.	7.7
Chalker P. R.	7.11	Duan X.	2.1

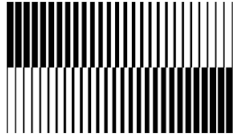


Dubourdieu C.	7.5	Hong Z.-Q.	11.6
El-Sayed A.-M.	12.4	Horiguchi N.	12.4
Endoh T.	17.4	Hosono H.	4.1
Fahmy T. M.	7.14	Houssa M.	5.4
Fan Y.	10.2	Hsiang K.-Y.	10.3
Fanciulli M.	7.8	Hsieh F.-C.	10.3
Feng P. X.-L.	17.21	Hu Z.	14.4
Fenter P.	10.2	Huang F.	7.20
Fischetti M. V.	7.19	Huang J.	7.16, 9.3
Fister T.	10.2	Huang Y.	13.3
Fleckl G.	7.3	Huyghebaert C.	5.3
Franco J.	12.4, 16.2	Illarionov Y. Y.	5.1
Gaddemane G.	7.19	Inoue M.	10.4
Garigapati N. S.	7.2	Iordanidou K.	5.4
Garland B. M.	17.9	Jalaguier E.	7.12
Garvey S.	7.7	Jech M.	12.4
Gaur A.	5.2	Jena D.	8.1, 8.2, 8.3, 14.2, 14.4
Ge R.	13.3	Jiang H.	1.4
Ginnaram S.	4.4	Jossart N.	13.4
Gopalan S.	7.19	Jung Y. C.	7.21, 10.4, 17.12
Gowdaru K.	17.7	Kaczer B.	12.4
Grace H. G.	8.2	Kalem S.	7.12
Granroth S.	12.2	Kaneko T.	4.2
Grasser T.	5.1, 12.4	Kang J.	2.2, 17.20
Green A.	14.3	Kashyap H.	9.2, 17.18, 17.19
Groven B.	5.3	Kato T.	4.2
Guo Y.	4.3, 6.2, 6.4, 7.1, 11.3, 12.3	Kavrik M. S.	17.18
Habib A.	17.15	Kaya E.	7.12
Hall S.	7.11	Khalsa G.	8.3
Han P.	7.14	Khatami M. M.	15.5
Hao Z.	2.2, 15.2	Kilpi O.-P.	16.2
He J. J.	17.3	Kim C. E.	6.3
He W.	17.6	Kim H. S.	10.4, 17.12
Hedman H.-P.	12.2	Kim J.	7.21, 10.4
Heinze S.	16.4	Kim S. J.	7.21
Heitmann J.	7.4	Kimura Y.	12.4
Hellenbrand M.	16.2	Knobloch T.	5.1
Hendricks N.	14.3	Kobos Z. A.	7.14
Hernandez-Arriaga H.	7.21, 10.4	Koeck F. A.	14.1
Heyns M.	5.2	Kokko K.	7.6, 12.2
Hinkle C. L.	2.3, 2.5	Kokkonen E.	16.3
Holmes J. D.	7.7	Kolgiri P.	17.7
Hong M.	4.6, 11.5	Kumar A.	17.5
Hong Y. J.	11.5	Kumar S.	17.14

Kummel A. C.	1.3, 7.15, 7.16, 7.17, 9.2, 9.3, 17.18,	Loukas D.	7.9
	17.19	Lyu X.	8.4, 13.2
Kuo C.	9.2, 17.18, 17.19	Ma T. P.	1.4
Kutovyi Y.	6.1	Mack I.	7.6
Kuzmin M.	7.6	Maeda T.	8.2
Kwo J.	4.6, 11.5	Magis T.	7.10
Kyriakis A.	7.9	Maher O.	1.4
Laukkanen P.	7.6, 12.2	Maikap S.	4.4
Laulagnet F.	7.10	Majumdar K.	4.5
Lee J. C.	13.3	Mathieu V.	7.10
Lee J. S.	7.14	Maudet F.	7.5
Lee M. H.	10.3	McIntyre P. C.	1.1, 7.13, 7.20
Lee S. S.	10.2	McLeod A. J.	7.17
Lee T.-E.	11.2	Meng R.	5.4
Lee W. H.	17.5	Midahuen R.	7.10
Lehtiö J.-P.	7.6, 12.2	Mikkelsen A.	16.4
Li H.	<i>Tutorial</i>	Mishra U.	16.1
Li J.	15.3	Mitrovic I. Z.	7.11
Li J.-S.	11.6	Mohan J.	7.21, 10.4, 17.12
Li M.	10.2	Mootheri V.	5.2
Li S.	15.4	Moravvej-Farshi M. K.	15.5
Li W.	14.2, 14.3, 14.4	Murata K.	17.2
Li X.	10.2	Nabatame T.	10.4
Liang H.	10.3	Nagasawa R.	10.1
Liao C.-Y.	10.3	Nagata T.	10.4
Lie J.	6.1	Nakayama T.	10.1
Limpert S.	16.4	Nemanich R. J.	14.1
Lin D. H. C.	5.2	Niu C.	15.3
Lin Q.	9.2	Noh J.	8.4
Lin Y. H.	11.5	Nomoto K.	8.1, 8.2, 14.2, 14.3, 14.4
Lin Y.-D.	10.3	Nyns L.	12.4, 13.4
Lin Z.	8.4, 11.2, 13.2	Ogawa Y.	17.4
Lind E.	7.2, 16.3	Ogura A.	10.4
Linke H.	16.4	Okuyama A.	5.2
Linten D.	12.4	Onaya T.	10.4
Liu G.-T.	11.6	Oshiyama A.	17.1
Liu J.	10.2, 11.5	Panchangam S. P.	17.7
Liu J.-H.	10.3	Passlack M.	9.2
Liu P.-T.	11.6	Pfusterschmied G.	7.3
Liu Y. P.	16.3	Pi T. W.	4.6
Liu Z.	1.4	Pitner G.	9.2
Long B.	7.7	Previtali B.	7.10
Long E.	14.2	Punkkinen M.	7.6, 12.2
Lordi V.	6.3	Punkkinen R.	12.2

Putcha V.	16.2	Silveira P.	17.10
Qingkui Y.	17.6	Smets Q.	5.2
Qiu G.	15.3	Smith K.	14.2, 14.3
Rad Z. J.	7.6, 12.2	Soares G. V.	17.13
Radtke C.	17.13	Soree B.	15.1
Radu I.	5.2, 5.3	Soulié J.-Ph.	13.4
Ragnarsson L.-Å.	12.4, 13.4	Spiegelman J.	9.2
Rahman A.	17.11	Stambouli V.	7.10
Rajendran A. K.	17.7	Stedile F. C.	17.10
Ramdas A.	9.4	Stesmans A.	5.4, 12.4
Ramesh S.	13.4	Stiers J.	13.4
Ray K. G.	6.3	Strandwitz N. C.	17.8, 17.9
Reed E. J.	9.4	Strocov V.	8.3
Reed M. A.	7.14	Summerfelt S. R.	7.21
Rehman F.	16.3	Sundararaman R.	17.14, 17.15
Robertson J.	4.3, 6.2, 6.4, 7.1, 11.3, 12.3	Suzuki K.	11.1
Roelofs R.	7.12	Södergren L.	7.2
Rolim G. K.	17.13	Takagi S.	11.2
Rosmeulen M.	13.4	Takano K.	4.2
Rostami Osanloo M.	17.17	Takenaka M.	11.2
Ruan D.-B.	11.6	Tang Y.-T.	10.3
Rueff J. P.	12.2	Tawari S.	2.3
Ryu H.	7.18	Tekin S. B.	7.11, 7.12
Saadat A.	17.17	Timm R.	16.3
Sahota A.	17.12	Tiwari S.	15.1
Savin H.	7.6	Toprasertpong K.	11.2
Sawamoto N.	10.4	Troian A.	16.3
Sayed I.	16.1	Tsai W.	7.20
Schleicher F.	13.4	Tsuchida H.	17.2
Schmid A.	7.4	Tzeng P.-J.	10.3
Schmid U.	7.3	Ueda S. T.	7.17
Schnadt J.	16.3	Van de Put M. L.	2.3, 7.19, 15.1, 15.5, 17.17
Schram T.	5.2	Van den Bosch G.	13.4
Schroeder C.	15.4	Vandenberghe W. G.	2.3, 15.1, 15.5, 17.17
Seal M.	4.4	Vandooren A.	12.4
Sedghi N.	7.11	Vitusevich S.	6.1
Seidel S.	7.4	Vuorinen E.	7.6
Senapati A.	4.4	Vähänissi V.	7.6
Serino A.	7.7	Waldhoer D.	12.4
Shiraishi K.	10.1, 17.1, 17.4	Wallace R. M.	2.4
Shiraishi Y.	10.1	Wan H. W.	4.6, 11.5
Shuang C.	17.6	Wan W.	<i>Tutorial</i> , 13.1
Si M.	1.2, 8.4, 13.2, 15.3	Wang C.-Y.	10.3
Siebdrath N.	7.4	Wang V.	7.15, 17.19

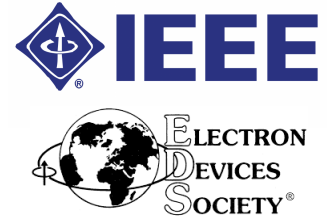
Wang X.	2.4, 14.1	Yasir M.	12.2
Wang Z.	11.3	Yavuzcetin O.	7.12
Webb B.	16.4	Ye F.	17.21
Weihnacht V.	6.1	Ye P. D.	1.2, 8.4, 13.2, 15.3
Weiss T.	17.18	Yeh P.-C.	10.3
Wernersson L.-E.	16.2	Yeoul Kim S.	2.4
Winge D. O.	16.4	Yildirim S.	7.12
Wong H.-S. P.	<i>Tutorial</i> , 9.2, 13.1	Yin Y.	4.3
Wright J. G.	8.3	Yosinski S.	7.14
Wu T.-M.	10.3	Younas R.	2.3
Wu X.	13.3	Young C. D.	7.21
Wu Z.	12.4	Young L. B.	11.5
Xing H.	8.1	Yu T.	8.3
Xing H. G.	8.3, 14.2, 14.3, 14.4	Yu Z.	7.20
Xu K.	2.2	Zhang X.	17.21
Yadav A.	17.18	Zhang Z.	1.2, 6.2, 6.4, 7.1, 9.2, 11.3, 12.3, 15.3
Yamasue K.	4.2, 11.1, 11.4	Zhao Z.	15.4
Yang H.-Y.	10.3	Zheng D.	1.2
Yang Y.	14.1	Zhou G.	2.3, 2.5
Yao Y.	14.1	Zhu W.	2.2, 7.18, 15.2, 15.4, 17.20



**SISC 2020**

**51<sup>st</sup> IEEE  
Semiconductor Interface  
Specialists Conference**

December 16–18, 2020  
www.ieeesisc.org



---

**Affiliation Index**

Aalto U., Finland	7.6
Air Force Research Laboratory	14.3
Applied Materials	17.18
Applied Research & Photonics	17.11
Argonne National Laboratory	10.2
Arizona State U.	14.1
ASM Microchemistry, Finland	5.3
ASM, Belgium	7.12
Bahcesehir U., Turkey	7.12
Cambridge U., UK	4.3, 6.2, 6.4, 7.1, 11.3, 12.3
Case Western Reserve U.	17.21
CEA-LETI, France	7.10, 7.12
Chang Gung U., Taiwan	4.4
Chiba U., Japan	10.1
China Academy of Space Technology, China	17.6
CNRS, France	7.10
Cornell U.	8.1, 8.2, 8.3, 14.2, 14.3, 14.4
CRIEPI, Japan	17.2
Forschungszentrum Jülich, Germany	6.1
Fraunhofer Institute, Germany	6.1
Free U. Berlin, Germany	7.5
Helmholtz-Zentrum Berlin, Germany	7.5
IIS Bangalore, India	4.5
imec, Belgium	5.2, 5.3, 7.19, 12.4, 13.4, 15.1, 16.2
IMM-CNR, Italy	7.8
Industrial Technology Research Institute, Taiwan	10.3
Ioffe Institute, Russia	5.1
Istanbul U., Turkey	7.12
JSPS, Japan	10.4
Kangwon National U., Korea	7.21
Keelung Chang Gung Memorial Hospital, Taiwan	4.4
Lam Research	7.7
Lam Research, India	17.7
Lawrence Livermore National Laboratory	6.3
Lehigh U.	17.8, 17.9

Lund U., Sweden	7.2, 16.2, 16.3, 16.4
Meiji U., Japan	10.4
MREL, Japan	10.4
Nagoya U., Japan	10.1, 17.1, 17.4
National Cheng Kung U., Taiwan	17.5
National Chiao Tung U., Taiwan	10.3, 11.6
National Chiayi U., Taiwan	4.6
National Chung Hsing U., Taiwan	10.3
National Institute for Materials Science, Japan	4.1
National Synchrotron Radiation Research Center, Taiwan	4.6
National Taiwan Normal U., Taiwan	10.3
National Taiwan U., Taiwan	4.6, 11.5
National Tsing Hua U., Taiwan	4.6, 11.5, 11.6
NCSR Demokritos, Greece	7.9
NIMS, Japan	10.4
Northern Arizona U.	17.16
Paul Scherrer Institute, Switzerland	8.3
Purdue U.	1.2, 8.4, 9.1, 13.2, 15.3
RASIRC	17.19
Rensselaer Polytechnic Institute	17.14, 17.15
Rutgers U.	10.2
Shanghai Jiao Tong U., China	10.2, 17.3
SOLEIL Synchrotron, France	12.2
Sony Semiconductor Solutions, Japan	5.2
Stanford U.	1.1, <i>Tutorial</i> , 7.13, 7.20, 9.2, 9.4, 13.1
Stevens Institute of Technology	17.21
Swansea U., UK	6.2, 6.4, 7.1, 12.3
Taiwan Semiconductor Research Institute, Taiwan	10.3
Tarbiat Modares U., Iran	15.5
Texas Instruments	7.21
Tohoku U., Japan	4.2, 11.1, 11.4, 17.4
Tokyo Institute of Technology, Japan	4.1
TSMC	9.2
TU Bergakademie Freiberg, Germany	7.4
TU Wien, Austria	5.1, 7.3, 12.4
TUBITAK-BILGEM, Turkey	7.12
U. College Cork, Ireland	7.7
U. Edinburgh, UK	16.4
U. Leuven, Belgium	5.2, 5.3, 5.4, 12.4
U. Liverpool, UK	7.11, 7.12
U. Milano-Bicocca, Italy	7.8
U. Notre Dame	2.3, 2.5
U. Oslo, Norway	5.4
U. Tokyo, Japan	11.2

U. Turku, Finland	7.6, 12.2
U. Victoria, Canada	7.8
U. Wisconsin	7.12
UC Berkeley	14.3
UCLA	2.1
UCSB	14.3, 16.1
UCSD	1.3, 7.15, 7.16, 7.17, 9.2, 9.3, 17.18, 17.19
UFRGS, Brazil	17.10, 17.13
UIUC	2.2, 7.18, 15.2, 15.4, 17.20
UT Austin	12.1, 13.3
UT Dallas	1.3, 2.3, 2.4, 7.19, 7.21, 10.4, 15.1, 15.5, 17.12, 17.17
VISTEC Electron Beam, Germany	7.10
Wuhan U., China	4.3, 11.3
Yale U.	1.4, 7.14