

# Program Key

## Conference Topics

<b>AA</b>	ALD Applications
<b>AF</b>	ALD Fundamentals
<b>ALE</b>	Atomic Layer Etching
<b>AM</b>	ALD for Manufacturing
<b>AS</b>	Area Selective ALD
<b>EM</b>	Emerging Materials
<b>LI</b>	Live Session
<b>NS</b>	Nanostructure Synthesis and Fabrication
<b>TS</b>	Tutorial Session (ALL INVITED SESSION)

# Sunday Morning, June 27, 2021

<b>Tutorial Session (ALL INVITED SESSION)</b> <b>Room Live - Session TS1-SuM</b> <b>ALD/ALE Tutorial Session</b> <b>Moderators:</b> Prof. Seán Barry, Carleton University, Canada, Dr. Scott Clendenning, Intel Corporation, USA		
10:00am	<b>TS1-SuM-1</b> Tutorial Opening Remarks & Welcome, <i>Seán Barry</i> , Carleton University, Canada	
10:05am	<b>INVITED: TS1-SuM-2</b> ALE and ALD: Two Biotopes of a Kind in Atomic-Scale Processing, <i>Fred Roozeboom</i> , Eindhoven University of Technology, TNO-Holst Centre, Netherlands	
10:10am		
10:15am		
10:20am		
10:25am		
10:30am		
10:35am		
10:40am		
10:45am		
10:50am		BREAK
10:55am	<b>INVITED: TS1-SuM-12</b> Fundamentals of Atomic Layer Deposition: An Introduction ("ALD 101"), <i>Riikka Puurunen</i> , Aalto University, School of Chemical Engineering, Finland	
11:00am		
11:05am		
11:10am		
11:15am		
11:20am		
11:25am		
11:30am		
11:35am		
11:40am		BREAK
11:45am	<b>INVITED: TS1-SuM-22</b> Let's Talk Dirty - Battling Impurities in ALD Films, <i>Henrik Pedersen</i> , Linköping University, Sweden	
11:50am		
11:55am		
12:00pm		
12:05pm		
12:10pm		
12:15pm		
12:20pm		
12:25pm		
12:30pm		BREAK
12:35pm	<b>INVITED: TS1-SuM-32</b> Seeing Is Believing: <i>In situ</i> Techniques for Atomic Layer Deposition (ALD) Process Development and Diagnostics, <i>Parag Banerjee</i> , University of Central Florida	
12:40pm		
12:45pm		
12:50pm		
12:55pm		
1:00pm		

# Sunday Morning, June 27, 2021

1:05pm		
1:10pm		
1:15pm		
1:20pm	BREAK	
1:25pm	<b>INVITED: TS1-SuM-42</b> ALD Powder Manufacturing, <i>Arrelaine Dameron</i> , Forge Nano	
1:30pm		
1:35pm		
1:40pm		
1:45pm		
1:50pm		
1:55pm		
2:00pm		
2:05pm		
2:10pm		<b>TS1-SuM-51</b> Closing Remarks & Thank You!, <i>Scott Clendinning</i> , Intel

# Monday Morning, June 28, 2021

<p><b>Live Session</b>  <b>Room Live - Session LI-MoM</b>  <b>Plenary &amp; Awards Live Session</b>  <b>Moderators:</b> Prof. Sean Barry, Carleton University, Canada, Prof. Dr. Stacey Bent, Stanford University, USA, Dr. Jane P. Chang, University of California, Los Angeles, USA, Dr. Scott Clendenning, Intel Corporation, USA, Dr. Thorsten Lill, Lam Research Corporation, USA, Prof. Mikko Ritala, University of Helsinki, Finland</p>	
10:00am	<b>LI-MoM-1</b> Opening Remarks & Welcome, <b>Scott Clendenning</b> , Intel; <i>S. Barry</i> , Carleton University, Canada; <i>J. Chang</i> , University of California, Los Angeles; <i>T. Lill</i> , Lam Research Corp.
10:05am	
10:10am	<b>INVITED: LI-MoM-3</b> Plenary Lecture: Materials & Innovation - Essential Elements that Underpin the Next Industrial Revolution, <b>Todd Younkin</b> , SRC
10:15am	
10:20am	
10:25am	
10:30am	
10:35am	
10:40am	<b>LI-MoM-9</b> Introduction to ALD and ALE Student Finalists, <b>Seán Barry</b> , Carleton University, Canada; <i>J. Chang</i> , University of California, Los Angeles
10:45am	<b>LI-MoM-10</b> ALD Student Award Finalist Talk: Enhanced Surface Adsorption in Electric Field/Potential Assisted Atomic Layer Deposition (EA-ALD) of Ultrathin Ru Film, <b>Yoon Jeong Kim</b> , <i>J. Han, J. Heo, T. Park</i> , Hanyang University, Korea
10:50am	
10:55am	
11:00am	<b>LI-MoM-13</b> ALE Student Award Finalist Talk: Cryo-ALE of Silicon Based Materials, <b>Jack Nos</b> , <i>G. Antoun, T. Tillocher, P. Lefauchaux</i> , GREMI CNRS/Université d'Orléans, France; <i>J. Faguet</i> , Tokyo Electron America Inc.,; <i>K. Maekawa</i> , TEL Technology Center America; <i>R. Dussart</i> , GREMI CNRS/Université d'Orléans, France
11:05am	
11:10am	
11:15am	BREAK
11:20am	<b>LI-MoM-17</b> ALD Student Award Finalist Talk: What Controls the Conformality of Plasma ALD in High-Aspect-Ratio Applications?, <b>Karsten Arts</b> , <i>S. Deijkers, T. Faraz</i> , Eindhoven University of Technology, Netherlands; <i>R. Puurunen</i> , Aalto University, Finland; <i>E. Kessels, H. Knoops</i> , Eindhoven University of Technology, Netherlands
11:25am	
11:30am	
11:35am	<b>LI-MoM-20</b> ALE Student Award Finalist Talk: Modelling Atomic Layer Etching of Thin Film Metal Oxides, <b>Rita Mullins</b> , Tyndall National Institute, University College Cork, Ireland; <i>S. Kondati Natarajan</i> , Synopsys, Denmark; <i>M. Nolan</i> , Tyndall National Institute, University College Cork, Ireland
11:40am	
11:45am	
11:50am	<b>LI-MoM-23</b> ALD Student Award Finalist Talk: Surface Passivation Using Aminosilanes for Area-Selective Atomic Layer Deposition, <b>Kaat Van Dongen</b> , KU Leuven, Belgium; <i>R. Nye</i> , North Carolina State University; <i>D. De Simone, A. Delabie</i> , IMEC, Belgium
11:55am	
12:00pm	
12:05pm	<b>LI-MoM-26</b> ALD Student Award Finalist Talk: Electron-Enhanced Atomic Layer Deposition of Ruthenium Thin Films Using (DMBD)Ru(CO) <sub>3</sub> , <b>Michael Collings</b> , <i>S. George</i> , University of Colorado, Boulder
12:10pm	
12:15pm	

# Monday Morning, June 28, 2021

12:20pm	<b>INVITED: LI-MoM-29</b> Plenary Lecture: Mechanisms of Thermal Atomic Layer Etching, <b>Steven George</b> , University of Colorado Boulder	
12:25pm		
12:30pm		
12:35pm		
12:40pm		
12:45pm		
12:50pm	<b>BREAK</b>	
12:55pm	<b>LI-MoM-36</b> Introduction to 2021 ALD Innovator Awardee Stacey Bent, Stanford University, USA: Up, Down and All Around: Controlling Atomic Placement in ALD, <b>Seán Barry</b> , Carleton University, Canada	
1:00pm	<b>LI-MoM-37</b> ALD Student Award Finalist Talk: Tuning Properties of Vapor Deposited ZIF-8 Thin Films With Preferred Orientation, <b>Marianne Kräuter</b> , Graz University of Technology, Austria	
1:05pm		
1:10pm		
1:15pm	<b>LI-MoM-40</b> ALE Student Award Finalist Talk: Reaction Pathways Leading to Anisotropic Patterning of Cu, <b>Xia (Gary) Sang</b> , <b>M. Martirez</b> , <b>T. Smith</b> , <b>E. Carter</b> , <b>J. Chang</b> , University of California at Los Angeles	
1:20pm		
1:25pm		
1:30pm	<b>LI-MoM-43</b> ALE Student Award Finalist Talk: Thermal Atomic Layer Etching of Cobalt Using $\text{SO}_2\text{Cl}_2$ and $\text{P}(\text{CH}_3)_3$ , <b>Jessica Murdzek</b> , <b>S. George</b> , University of Colorado Boulder	
1:35pm		
1:40pm		
1:45pm	<b>LI-MoM-46</b> ALD Student Award Finalist Talk: Insight into Film Growth Mechanisms in Polyurea Molecular Layer Deposition (MLD) Using New and Combined Precursors, <b>Siyao Wang</b> , <b>R. Nye</b> , <b>G. Parsons</b> , North Carolina State University	
1:50pm		
1:55pm		
2:00pm	<b>LI-MoM-49</b> Closing Remarks & Thank You, <b>J. Chang</b> , University of California, Los Angeles; <b>Thorsten Lill</b> , Lam Research Corp.; <b>S. Barry</b> , Carleton University, Canada; <b>S. Clendinning</b> , Intel	

# Tuesday Morning, June 29, 2021

<p><b>Live Session</b>  <b>Room Live - Session LI-ALD-TuM1</b>  <b>Precursors (AF): ALD Processes Live Session</b>  <b>Moderators:</b> Prof. Jin-Seong Park, Hanyang University, Korea (Republic of), Dr. Tania Sandoval, Technical University Federico Santa Maria, Chile, Dr. Matthias Young, University of Missouri-Columbia, USA</p>		
9:30am	<b>LI-ALD-TuM1-1</b> Welcome, Thank Yous & Session Instructions, <i>Jin-Seong Park</i> , Hanyang University, Korea (Republic of)	
9:35am	<b>INVITED: LI-ALD-TuM1-2</b> Atomic Layer Deposition of Amorphous/Nanocrystalline Phase-Composite Nanolayers, <i>Myung-Mo Sung</i> , Hanyang University, Republic of Korea	
9:40am		
9:45am		
9:50am		
9:55am	<b>LI-ALD-TuM1-6</b> Density Functional Study on ALD Precursors for Hexagonal Boron Nitride Deposition, <i>Naoya Uene, T. Mabuchi</i> , Tohoku University, Japan; <i>J. Yong</i> , Japan Advanced Chemicals Ltd., China; <i>M. Zaitso, S. Yasuhara</i> , Japan Advanced Chemicals Ltd., Japan; <i>T. Tokumasu</i> , Tohoku University, Japan	
10:00am		
10:05am		
10:10am	<b>LI-ALD-TuM1-9</b> A Novel co-Precursor Approach for Atomic Layer Deposition of Various Semiconductor Thin Films, <i>Kok Chew Tan</i> , Soulbrain, Korea (Republic of); <i>J. Jung, C. Yeon</i> , Soulbrain, Korea (Republic of); <i>J. Kim, J. Kim</i> , Soulbrain, Korea (Republic of); <i>S. Kim, T. Eom</i> , Soulbrain, Korea (Republic of); <i>S. Lee</i> , Soulbrain, Korea (Republic of); <i>Y. Park</i> , Soulbrain, Korea (Republic of)	
10:15am		
10:20am		
10:25am	<b>LI-ALD-TuM1-12</b> Tuneable YAlOx Protective Coatings Against Plasma Damage to Meet the Requirements in Future Semiconductor Fabrication Processes, <i>J. Kalliomaki, M. Kaaria, K. Dorai, Tiina McKee</i> , Picosun Oy, Finland	
10:30am		
10:35am		
10:40am	BREAK	
10:45am		
10:50am	<b>INVITED: LI-ALD-TuM1-17</b> ALD of Boron Nitride by Polymer Derived Ceramics chemistry, <i>W. Hao, T. Saboo, C. Journet, Catherine Marichy</i> , Univ Lyon, France	
10:55am		
11:00am		
11:05am		
11:10am	<b>LI-ALD-TuM1-21</b> Process Parameter and Substrate Dependence of Sticking Coefficients in Atomic Layer Deposition Processes, <i>Martin Knaut</i> , TU Dresden, Germany; <i>L. Jäckel</i> , Fraunhofer ENAS, Germany; <i>M. Albert, T. Mikolajick</i> , TU Dresden, Germany	
11:15am		
11:20am		
11:25am	<b>LI-ALD-TuM1-24</b> Volatile Cerium and Ytterbium Precursors for Atomic Layer Deposition: Synthesis, DFT and Application, <i>Parmish Kaur</i> , Ruhr University Bochum, Germany; <i>A. Muriqi</i> , Tyndall National Institute, University College Cork, Ireland; <i>R. Ghiasi</i> , Aalto University, Finland; <i>M. Nolan</i> , Tyndall National Institute, University College Cork, Ireland; <i>M. Karppinen</i> , Aalto University, Finland; <i>A. Devi</i> , Ruhr University Bochum, Germany	
11:30am		
11:35am		
11:40am	<b>LI-ALD-TuM1-27</b> Predicting Precursor Volatility With Machine Learning, <i>Simon D. Elliott, A. Chandrasinghe, A. Chandrasekaran, Y. An, M. Halls</i> , Schrödinger	
11:45am		

# Tuesday Morning, June 29, 2021

11:50am		
11:55am	<b>INVITED: LI-ALD-TuM1-30</b> Surface Chemistry of Deposition and Etch from First Principles Simulations, <i>Michael Nolan</i> , Tyndall Institute, Ireland	
12:00pm		
12:05pm		
12:10pm		
12:15pm	BREAK	
12:20pm		
12:25pm		
12:30pm	<b>INVITED: LI-ALD-TuM1-37</b> Atomic Layer Deposition of Functional Dielectrics and Metals for the Emerging Non-Volatile Memories, <i>Anna Chernikova, M. Kozodaev, R. Khakimov, Y. Lebedinskij, A. Markeev</i> , Moscow Institute of Physics and Technology, Russian Federation	
12:35pm		
12:40pm		
12:45pm		
12:50pm	<b>LI-ALD-TuM1-41</b> Crystallinity Control via Atomic Level Scaffolding, <i>Elham Rafie Borujeny, K. Cadien</i> , University of Alberta, Canada	
12:55pm		
1:00pm		
1:05pm	<b>LI-ALD-TuM1-44</b> Plasma-Enhanced Atomic Layer Deposition of Copper Oxide Semiconductors With Tunable Phase, Oxidation State, and Morphology for P-Type Thin Film Transistors, <i>Julia D. Leneff, J. Jo, O. Trejo</i> , University of Michigan, Ann Arbor; <i>D. Mandia</i> , Argonne National Laboratory, USA; <i>R. Peterson, N. Dasgupta</i> , University of Michigan, Ann Arbor	
1:10pm		
1:15pm		
1:20pm	<b>LI-ALD-TuM1-47</b> Tuning Coercive Field and Polarization in Inherently Ferroelectric HZO Film Deposited Using HfD-04 and ZrD-04, <i>Raisul Islam, M. McBriarty, M. Laudato, R. Clarke, S. Hoang, C. Chen, G. Panaman, K. Littau</i> , EMD Electronics, USA	
1:25pm		
1:30pm		
1:35pm	<b>INVITED: LI-ALD-TuM1-50</b> Ferroelectric Devices: From Applications to Microstructures, <i>Asif Khan</i> , Georgia Institute of Technology	
1:40pm		
1:45pm		
1:50pm		
1:55pm	<b>LI-ALD-TuM1-54</b> Closing Remarks & Thank Yous, <i>Tania Sandoval</i> , Technical University Federico Santa Maria, Chile	

# Tuesday Morning, June 29, 2021

<p><b>Live Session</b>  <b>Room Live - Session LI-ALD-TuM2</b>  <b>ALD Applications (AA) Live Session</b>  <b>Moderators:</b> Prof. Annelies Delabie, IMEC, Belgium, Prof. Jolien Dendooven, Ghent University, Belgium, Prof. Xiangbo Meng, University of Arkansas, USA</p>		
9:30am	<b>LI-ALD-TuM2-1</b> Welcome, Thank Yous & Instructions, <i>Jolien Dendooven</i> , Ghent University, Belgium	
9:35am	<b>INVITED: LI-ALD-TuM2-2</b> ALD Growth of Low Work Function Metal Gate for FinFET Technology, <i>Jinjuan Xiang, C. Zhao</i> , Institute of Microelectronics, Chinese Academy of Sciences, China; <i>Y. Ding</i> , Chemical and Material Engineering, Jiangnan University, China; <i>C. Xu</i> , Nata Opto-electronic Material Co., Ltd., China; <i>L. Du</i> , Chemical and Material Engineering, Jiangnan University, China; <i>J. Li, X. Wang</i> , Institute of Microelectronics, Chinese Academy of Sciences, China	
9:40am		
9:45am		
9:50am		
9:55am	<b>LI-ALD-TuM2-6</b> Atomic Layer Deposition of GeTe/Sb <sub>2</sub> Te <sub>3</sub> Superlattice for Large-Capacity and Low-Power Phase Change Memory, <i>Chanyoung Yoo, E. Park, W. Kim, J. Jeon, W. Choi, B. Park, G. Han</i> , Seoul National University, Korea (Republic of); <i>Y. Lee</i> , Jeonbuk National University, Korea (Republic of); <i>C. Hwang</i> , Seoul National University, Korea (Republic of)	
10:00am		
10:05am		
10:10am	<b>LI-ALD-TuM2-9</b> Atomic Layer Deposited p-type SnO Thin Films with c-axis Preferred Orientation and the Associated Device Applications, <i>Hye-mi Kim, S. Choi, H. Jeong, J. Park</i> , Hanyang University, Korea	
10:15am		
10:20am		
10:25am	<b>LI-ALD-TuM2-12</b> Atomic Layer Deposition of Highly Conductive Co <sub>3</sub> S <sub>8</sub> Thin Films Using Diamine Adducts of Cobalt(II) Halides and H <sub>2</sub> S, <i>Miika Mattinen</i> , Eindhoven University of Technology, Netherlands; <i>T. Hatanpää, K. Mizohata, J. Räisänen, M. Leskelä, M. Ritala</i> , University of Helsinki, Finland	
10:30am		
10:35am		
10:40am	BREAK	
10:45am		
10:50am	<b>INVITED: LI-ALD-TuM2-17</b> ALD-Oxide Materials and Surface Modification for Next-Generation PV Devices, <i>Nathanaelle Schneider</i> , Institut Photovoltaïque d'Ile de France	
10:55am		
11:00am		
11:05am		
11:10am	<b>LI-ALD-TuM2-21</b> Particle Atomic Layer Deposition as an Effective Way to Enhance the Li-S Battery Energy Density, <i>Mato Knez, S. Garcia</i> , CIC nanoGUNE, Spain	
11:15am		
11:20am		
11:25am	<b>LI-ALD-TuM2-24</b> Advanced ALD Technologies Platform to Enable Future Applications and Scaling & Review of Emerging Applications for Sensors, Mems, Energy Harvesters, Transparent Electronics and Coated Powder for Composites, <i>Noureddine Adjeroud</i> , Luxembourg Institute of Science and Technology (LIST), Luxembourg	
11:30am		
11:35am		
11:40am	<b>LI-ALD-TuM2-27</b> Molecular Layer Deposition of Li-Ion Conducting "Lithicone" Solid Electrolytes, <i>E. Kazayk, M. Shin, W. LePage, T. Cho, Neil Dasgupta</i> , University of Michigan, Ann Arbor	
11:45am		
11:50am		



# Tuesday Morning, June 29, 2021

11:55am	<b>INVITED: LI-ALD-TuM2-30</b> Atomic-Level Precision at Large Scale: Opportunities and Challenges of ALD, <i>Fatemeh Hashemi</i> , TNO Science and Industry, the Netherlands	
12:00pm		
12:05pm		
12:10pm		
12:15pm	<b>BREAK</b>	
12:20pm		
12:25pm		
12:30pm	<b>INVITED: LI-ALD-TuM2-37</b> ALD in Photovoltaics: From Extremely Thin to Ultrathin Layers, Physical Insight, and Chemical Methods Development, <i>P. Büttner, D. Döhler, Y. Cao, V. Koch, F. Scheler</i> , Friedrich-Alexander-University Erlangen-Nürnberg (FAU), Germany; <i>C. Painter</i> , Lehigh University; <i>S. Korenko, M. Barr, I. Minguez-Bacho</i> , Friedrich-Alexander-University Erlangen-Nürnberg (FAU), Germany; <i>E. Young</i> , Lehigh University; <i>Julien Bachmann</i> , Friedrich-Alexander-University Erlangen-Nürnberg (FAU), Germany	
12:35pm		
12:40pm		
12:45pm		
12:50pm	<b>LI-ALD-TuM2-41</b> Demonstration of Pt-Wire Temperature Sensors Fabricated by Atomic-Layer 3D Printer Using MeCpPtMe <sub>3</sub> and O <sub>3</sub> , <i>Gabriel Vanko, B. Hudec</i> , Slovak Academy of Sciences, Slovakia; <i>M. Precner</i> , Institute of Electrical Engineering, Slovak Academy of Sciences, Bratislava, Slovakia; <i>I. Kundrata, M. Plakhotnyuk</i> , ATLANT 3D Nanosystems, Denmark; <i>J. Bachmann</i> , Friedrich-Alexander Universität Erlangen-Nürnberg, Germany; <i>K. Fröhlich</i> , Slovak Academy of Sciences, Slovakia	
12:55pm		
1:00pm		
1:05pm	<b>LI-ALD-TuM2-44</b> Optimization of 1D Core-Shell Heterostructures for Gas Sensing, <i>M. Raza, Nicola Pinna</i> , Humboldt University Berlin, Germany	
1:10pm		
1:15pm		
1:20pm	<b>LI-ALD-TuM2-47</b> Bridging the Synthesis Gap in Vapor-Phase Deposition using Ionic Liquid as Solvent, <i>Jingwei Shi, S. Bent</i> , Stanford University	
1:25pm		
1:30pm		
1:35pm	<b>LI-ALD-TuM2-50</b> A Model of ALD Particle Coating in Fluidized Bed Reactors: Comparison With Experiments and Other Particle Coating Techniques, <i>Angel Yanguas-Gil, Z. Lu, P. Darapaneni, D. Kang, A. Mane, J. Kropf, C. Marshall, J. Elam</i> , Argonne National Laboratory	
1:40pm		
1:45pm		
1:50pm	<b>LI-ALD-TuM2-53</b> Closing Remarks & Thank Yous, <i>X. Meng</i> , University of Arkansas	

# Tuesday Morning, June 29, 2021

<p><b>Live Session</b>  <b>Room Live - Session LI-ALE-TuM3</b>  <b>Atomic Layer Etching Live Session I</b>  <b>Moderators:</b> Prof. Gottlieb Oehrlein, University of Maryland, USA, Dr. Dmitry Suyatin, Lund University, Sweden</p>		
9:30am	<b>LI-ALE-TuM3-1</b> Welcome, Thank Yous, & Instructions, <i>Dmitry Suyatin</i> , Lund University, Sweden; <i>G. Oehrlein</i> , University of Maryland	
9:35am	<b>INVITED: LI-ALE-TuM3-2</b> Atomic Scale Profile Control in Fine Pitch Patterning and High Aspect Ratio Contact Hole Etching, <i>Tetsuya Nishizuka</i> , <i>S. Kumakura</i> , <i>T. Katsunuma</i> , <i>Y. Kihara</i> , <i>M. Honda</i> , Tokyo Electron Miyagi, Ltd., Japan	
9:40am		
9:45am		
9:50am		
9:55am	<b>LI-ALE-TuM3-6</b> Nanoscale Cryogenic Process for Highly Selective Etch of Si <sub>3</sub> N <sub>4</sub> Over Si, <i>Gaëlle Antoun</i> , <i>T. Tillocher</i> , <i>P. Lefauchaux</i> , GREMI CNRS/Université d'Orléans, France; <i>A. Girard</i> , IMN CNRS/Université de Nantes, France; <i>C. Cardinaud</i> , IMN CNRS/Université d'Orléans, France; <i>J. Faguet</i> , Tokyo Electron America Inc.,; <i>K. Maekawa</i> , <i>D. Zhang</i> , <i>H. Kim</i> , <i>M. Wang</i> , TEL Technology Center, America, LLC; <i>R. Dussart</i> , GREMI CNRS/Université d'Orléans, France	
10:00am		
10:05am		
10:10am	<b>LI-ALE-TuM3-9</b> Using Selective Surface Functionalization of SiN <sub>x</sub> to Increase SiO <sub>2</sub> to SiN <sub>x</sub> ALE Selectivity, <i>R. Gasvoda</i> , <i>Xue Wang</i> , Colorado School of Mines, USA; <i>P. Kumar</i> , <i>Z. Zhang</i> , <i>E. Hudson</i> , Lam Research Corporation; <i>S. Agarwal</i> , Colorado School of Mines, USA	
10:15am		
10:20am		
10:25am	<b>LI-ALE-TuM3-12</b> Etch-stop Mechanisms in Plasma-assisted Atomic Layer Etching of Silicon Nitride: A Molecular Dynamics Study, <i>Jomar Tercero</i> , University of the Philippines; <i>A. Hirata</i> , Sony Semiconductor Solutions Corporation, Japan; <i>M. Isobe</i> , Osaka University, Japan; <i>M. Fukasawa</i> , Sony Semiconductor Solutions Corporation, Japan; <i>M. Vasquez, Jr.</i> , University of the Philippines; <i>S. Hamaguchi</i> , Osaka University, Japan	
10:30am		
10:35am		
10:40am	BREAK	
10:45am		
10:50am	<b>INVITED: LI-ALE-TuM3-17</b> Landscape of Spontaneous Etch via Ligand-Exchange in Thermal Atomic Layer Etching, <i>Ann Lii-Rosales</i> , <i>A. Cavanagh</i> , <i>S. George</i> , University of Colorado Boulder	
10:55am		
11:00am		
11:05am		
11:10am	<b>LI-ALE-TuM3-21</b> Mechanisms of Self-Limiting Processes in Thermal Atomic Layer Etching of Nickel by β-diketones, <i>Abdulrahman Basher</i> , <i>I. Hamada</i> , <i>T. Ito</i> , <i>K. Karahashi</i> , <i>S. Hamaguchi</i> , Osaka University, Japan	
11:15am		
11:20am		
11:25am	<b>LI-ALE-TuM3-24</b> Oxidation Influences Etch Quality in the Low-Temperature Thermal ALE of Copper, <i>Martin McBriarty</i> , <i>J. McWilliams</i> , <i>M. Moinpour</i> , <i>R. Kanjolia</i> , <i>K. Littau</i> , EMD Electronics	
11:30am		
11:35am		
11:40am	<b>LI-ALE-TuM3-27</b> Thermal Atomic Layer Etching of Al <sub>2</sub> O <sub>3</sub> and AlN Using HF or XeF <sub>2</sub> for Fluorination and BCl <sub>3</sub> for Ligand-Exchange, <i>Austin Cano</i> , <i>S. George</i> , University of Colorado at Boulder	
11:45am		
11:50am		
11:55am	<b>LI-ALE-TuM3-30</b> Closing Remarks & Thank Yous, <i>Gottlieb Oehrlein</i> , University of Maryland; <i>D. Suyatin</i> , Lund University, Sweden	
12:00pm		

# Wednesday Morning, June 30, 2021

<p><b>Live Session</b>  <b>Room Live - Session LI-ALD-WeM1</b>  <b>Selective Deposition (AS) Live Session</b>  <b>Moderators:</b> Prof. Adam Hock, Illinois Institute of Technology, USA, Prof. Henrik Pedersen, Linköping University, Sweden, Prof. Matti Putkonen, University of Helsinki, Finland</p>		
9:30am	<b>LI-ALD-WeM1-1</b> Welcome, Thank You & Instructions, <b>Matti Putkonen</b> , University of Helsinki, Finland	
9:35am	<b>INVITED: LI-ALD-WeM1-2</b> Another Opportunity in Area Selective Atomic Layer Deposition using Precursor Inhibitors, <b>Han-Bo-Ram Lee</b> , Incheon National University, Republic of Korea	
9:40am		
9:45am		
9:50am		
9:55am	<b>LI-ALD-WeM1-6</b> Direct Deposition of High-resolution 3D Nanostructures by Atomic-Layer Additive Manufacturing (ALAM), <b>Sarah Tymek</b> , Friedrich-Alexander-University Erlangen-Nürnberg (FAU), Germany; <b>I. Kundrata</b> , ATLANT, Germany; <b>M. Barr</b> , Friedrich-Alexander-University Erlangen-Nürnberg (FAU), Germany; <b>P. Wiesner</b> , ATLANT, Germany; <b>M. Plakhotnyuk</b> , ATLANT, Denmark; <b>J. Bachmann</b> , Friedrich-Alexander-University Erlangen-Nürnberg (FAU), Germany	
10:00am		
10:05am		
10:10am	<b>LI-ALD-WeM1-9</b> The Relation between Reactive Surface Sites and Precursor Choice for Area-Selective Atomic Layer Deposition, <b>Marc Merks</b> , <b>A. Angelidis</b> , <b>J. Li</b> , Eindhoven University of Technology, Netherlands; <b>D. Hausmann</b> , Lam Research Corp.; <b>E. Kessels</b> , Eindhoven University of Technology, Netherlands; <b>T. Sandoval</b> , Universidad Técnica Federico Santa María, Chile; <b>A. Mackus</b> , Eindhoven University of Technology, Netherlands	
10:15am		
10:20am		
10:25am	<b>LI-ALD-WeM1-12</b> Diffusion-Mediated Ruthenium Area-Selective Atomic Layer Deposition in Nanopatterns, <b>Jan-Willem J Clerix</b> , <b>E. Marques</b> , <b>J. Soethoudt</b> , KU Leuven / imec, Belgium; <b>F. Grillo</b> , ETH Zurich, Switzerland; <b>G. Pourtois</b> , imec, Belgium; <b>J. Van Ommen</b> , TU Delft, Netherlands; <b>A. Delabie</b> , KU Leuven / imec, Belgium	
10:30am		
10:35am		
10:40am	BREAK	
10:45am		
10:50am	<b>INVITED: LI-ALD-WeM1-17</b> Area-Selective CVD of Metallic Films on Oxide Substrates With Acidic or Basic Hydroxyl Groups, <b>Laurent Souqui</b> , University of Illinois at Urbana-Champaign; <b>Z. Zhang</b> , Applied Materials; <b>S. Liu</b> , University of California - Riverside; <b>E. Mohimi</b> , LAM Research; <b>G. Girolami</b> , <b>J. Abelson</b> , University of Illinois at Urbana-Champaign	
10:55am		
11:00am		
11:05am		
11:10am	<b>LI-ALD-WeM1-21</b> Inhibiting Plasma Enhanced Atomic Layer Deposition of SiO <sub>2</sub> on Cu using Thiol Multilayers in an ABC Cycle, <b>Rohit Narayanan Kavassery Ramesh</b> , <b>W. Xu</b> , <b>R. Gasvoda</b> , Colorado School of Mines, USA; <b>X. Lei</b> , <b>B. Zope</b> , <b>H. Chandra</b> , <b>R. Ridgeway</b> , <b>X. Jiang</b> , <b>G. Liu</b> , <b>R. Kanjolia</b> , <b>A. Derecskei</b> , <b>R. Pearlstein</b> , EMD Electronics, USA; <b>S. Agarwal</b> , Colorado School of Mines, USA	
11:15am		
11:20am		
11:25am	<b>LI-ALD-WeM1-24</b> Sequential Area Selective Deposition of Poly(3,4-ethylenedioxythiophene) (PEDOT) and Tungsten on SiO <sub>2</sub> /Si-H Substrates, <b>Hwan Oh</b> , <b>J. Kim</b> , <b>S. Song</b> , <b>G. Parsons</b> , North Carolina State University	
11:30am		
11:35am		

# Wednesday Morning, June 30, 2021

11:40am	<b>LI-ALD-WeM1-27</b> Atomic Precision Advanced Manufacturing and Lessons for Area-Selective Deposition, <b>Scott Schmucker</b> , <i>E. Frederick, Q. Campbell, J. Ivie, E. Anderson</i> , Sandia National Laboratories, USA; <i>K. Dwyer</i> , University of Maryland, College Park; <i>A. Baczewski, G. Wang</i> , Sandia National Laboratories, USA; <i>R. Butera</i> , Laboratory for Physical Sciences; <i>S. Misra</i> , Sandia National Laboratories, USA	
11:45am		
11:50am		
11:55am	<b>INVITED: LI-ALD-WeM1-30</b> The Role of Precursor-Inhibitor Interactions in Area-Selective Atomic Layer Deposition, <b>Tania Sandoval</b> , Universidad Técnica Federico Santa María, Chile	
12:00pm		
12:05pm		
12:10pm		
12:15pm	BREAK	
12:20pm		
12:25pm		
12:30pm	<b>LI-ALD-WeM1-37</b> Spatially Controlled Atomic Layer Deposition within Polymer Templates for Multi-Material Nanorods and Nanowires Fabrication, <b>Rotem Azoulay</b> , <i>T. Segal Peretz</i> , Technion, Israel	
12:35pm		
12:40pm		
12:45pm	<b>LI-ALD-WeM1-40</b> Maskless Patterned Spatial ALD for Thin-Film Encapsulation, <i>C. Frijters</i> , SALDtech B.V., Netherlands; <i>Y. Creyghton</i> , Holst Centre / TNO, Netherlands; <b>Paul Poedt</b> , SALDtech B.V., Netherlands	
12:50pm		
12:55pm		
1:00pm	<b>LI-ALD-WeM1-43</b> Y <sub>2</sub> O <sub>3</sub> Atomic Layer Deposition Process Scale-Up to Very Large Batch Size, <b>Lassi Leppilähti</b> , <i>P. Päivike, M. Saarniheimo, S. Sneek</i> , Beneq, Finland	
1:05pm		
1:10pm		
1:15pm	<b>LI-ALD-WeM1-46</b> Low Temperature Thermal Atomic Layer Deposition of Elemental Tellurium Using and a Novel Tellurium Precursor and Nitrogen-Based Coreactants, <i>A. Upadhyay</i> , Wayne State University; <i>K. Woods</i> , Applied Materials; <i>M. Saly, T. Knisley</i> , Applied Materials Inc.; <b>Charles Winter</b> , Wayne State University	
1:20pm		
1:25pm		
1:30pm	<b>INVITED: LI-ALD-WeM1-49</b> When Complex Becomes Complicated – Strategies for Succeeding with Arduous Ternary Oxide Processes, <b>Henrik Soenstebj</b> , University of Oslo, Norway	
1:35pm		
1:40pm		
1:45pm		
1:50pm	<b>LI-ALD-WeM1-53</b> Announcement of ALD and ALE Student Awardees, Closing Remarks & Thank Yous, <b>Scott Clendenning</b> , Intel	
1:55pm		

# Wednesday Morning, June 30, 2021

<p><b>Live Session</b>  <b>Room Live - Session LI-ALD-WeM2</b>  <b>AM/AF (in-situ metro) Live Session</b>  <b>Moderators:</b> Dr. Alex Martinson, Argonne National Laboratory, USA, Dr. Nathanaelle Schneider, CNRS-IPVF, France, Dr. Virginia Wheeler, U.S. Naval Research Laboratory, USA</p>		
9:30am	<b>LI-ALD-WeM2-1</b> Welcome, Thank You & Instructions, <b>Nathanelle Schneider</b> , CNRS-IPVF, France	
9:35am	<b>INVITED: LI-ALD-WeM2-2</b> Surface Modification of TiO <sub>2</sub> Nanoparticles by Ultrathin SiO <sub>2</sub> Films, Cu <sub>2</sub> O and Pt Nanoclusters for Enhanced Photocatalytic Activity Using Atomic Layer Deposition in a Fluidized Bed Reactor: A Comparative Study, <b>Hao Van Bui</b> , Phenikaa University, Viet Nam; <b>D. Benz</b> , <b>J. van Ommen</b> , Delft University of Technology, Netherlands	
9:40am		
9:45am		
9:50am		
9:55am	<b>LI-ALD-WeM2-6</b> In-Situ High Temperature XRD of Atomic Layer Deposited Gallia-Ceria Mixed Oxides, <b>Fatemeh Gashouli Daresibi</b> , University of Tehran, Iran; <b>M. Heikkilä</b> , <b>M. Ritala</b> , University of Helsinki, Finland; <b>A. Khodadadi</b> , <b>Y. Mortazavi</b> , University of Tehran, Iran	
10:00am		
10:05am		
10:10am	<b>LI-ALD-WeM2-9</b> Using Ambient Pressure X-Ray Photoelectron Spectroscopy to Study ALD in real-time, <b>Esko Kokkonen</b> , Max IV Laboratory, Sweden; <b>M. Kaipio</b> , <b>H. Nieminen</b> , University of Helsinki, Finland; <b>F. Rehman</b> , Lund University, Sweden; <b>V. Miikkulainen</b> , Aalto University, Finland; <b>M. Putkonen</b> , <b>M. Ritala</b> , <b>S. Huotari</b> , University of Helsinki, Finland; <b>J. Schnadt</b> , Lund University, Sweden; <b>S. Urpelainen</b> , University of Oulu, Finland	
10:15am		
10:20am		
10:25am	<b>LI-ALD-WeM2-12</b> Observing the Crystallization of Ultrathin Alumina and Polymorphic Transformations of Gallium Oxide Using <i>in Situ</i> Reflection High Energy Electron Diffraction, <b>Alexandra Howzen</b> , <b>N. Strandwitz</b> , Lehigh University	
10:30am		
10:35am		
10:40am	BREAK	
10:45am		
10:50am	<b>INVITED: LI-ALD-WeM2-17</b> Novel Functional Metal-Organic Materials by ALD/MLD, <b>Maarit Karppinen</b> , Aalto University, Finland	
10:55am		
11:00am		
11:05am		
11:10am	<b>LI-ALD-WeM2-21</b> Ultrathin Hybrid Siloxane-Alumina Dielectric Films by Ring Opening Molecular Layer Deposition of Cyclic Tetrasiloxane, <b>Kristina Ashurbekova</b> , Dagestan State University, Russian Federation; <b>K. Ashurbekova</b> , CIC nanoGUNE BRTA, Spain; <b>I. Saric</b> , University of Rijeka, Croatia; <b>M. Gobbi</b> , <b>E. Modin</b> , <b>A. Chuvilin</b> , CIC nanoGUNE BRTA, Spain; <b>M. Petracic</b> , University of Rijeka, Croatia; <b>I. Abdulagatov</b> , Dagestan State University, Russian Federation; <b>M. Knez</b> , CIC nanoGUNE BRTA, Spain	
11:15am		
11:20am		
11:25am	<b>LI-ALD-WeM2-24</b> Optically Controlled Large-Coercivity Room-Temperature Thin-Film Magnets Through ALD/MLD, <b>Anish Philip</b> , <b>M. Karppinen</b> , Aalto University, Finland	
11:30am		
11:35am		
11:40am	<b>LI-ALD-WeM2-27</b> Deposition of Thermally Stable Polybenzimidazole (PBI) Thin Films by Molecular Layer Deposition Technique, <b>Saba Ghafourisaleh</b> , <b>M. Leskelä</b> , <b>M. Putkonen</b> , <b>M. Ritala</b> , University of Helsinki, Finland	

# Wednesday Morning, June 30, 2021

11:45am		
11:50am		
11:55am	<b>INVITED: LI-ALD-WeM2-30</b> Future of Membrane Separations through Atomic Layer Processing, <i>David Bergsman</i> , University of Washington	
12:00pm		
12:05pm		
12:10pm		
12:15pm	BREAK	
12:20pm		
12:25pm		
12:30pm	<b>LI-ALD-WeM2-37</b> Molecular Layer Deposition of All-Organic Polyamide Nylon 6,2, <i>Marcel Junige</i> , S. George, University of Colorado at Boulder	
12:35pm		
12:40pm		
12:45pm	<b>LI-ALD-WeM2-40</b> Vapor Phase Conversion of Pt Nanoparticles Into Pt-Sn Bimetallic Nanoparticles, <i>Nithin Poonkottil</i> , R. Ramachandran, Ghent University, Belgium; E. Solano, ALBA Synchrotron, Spain; N. Veeraraghavan Srinath, J. Feng, A. Werbrouck, M. Van Daele, M. M. Minjauw, M. Filez, H. Poelman, Ghent University, Belgium; A. Coati, Synchrotron SOLEIL, France; C. Detavernier, J. Dendooven, Ghent University, Belgium	
12:50pm		
12:55pm		
1:00pm	<b>LI-ALD-WeM2-43</b> Atomic Layer Deposition of Zirconium Sulfide, <i>Xiangbo Meng</i> , University of Arkansas	
1:05pm		
1:10pm		
1:15pm	<b>LI-ALD-WeM2-46</b> Vapor Phase Infiltration of Titanium Tetrachloride Into Polyaniline (PANI): Process Kinetics, Electronic Properties and Optical Response, <i>Mark Losego</i> , S. Gregory, Y. Li, K. Malinowski, Georgia Tech	
1:20pm		
1:25pm		
1:30pm	<b>INVITED: LI-ALD-WeM2-49</b> Atomic/Molecular Layer Deposition for Batteries Materials, <i>Chunmei Ban</i> , University of Colorado Boulder	
1:35pm		
1:40pm		
1:45pm		
1:50pm	<b>LI-ALD-WeM2-53</b> Announcement of ALD and ALE Student Awardees, Closing Remarks & Thank Yous, <i>Seán Barry</i> , Carleton University, Canada	
1:55pm		

# Wednesday Morning, June 30, 2021

<p><b>Live Session</b>  <b>Room Live - Session LI-ALE-WeM3</b>  <b>Atomic Layer Etching Live Session II</b>  <b>Moderators:</b> Prof. Satoshi Hamaguchi, Osaka University, Japan,  Dr. Angelique Raley, TEL Technology Center, America, LLC, USA</p>		
9:30am	<b>LI-ALE-WeM3-1</b> Welcome, Thank Yous, & Instructions, <i>Satoshi Hamaguchi</i> , Osaka University, Japan; <i>A. Raley</i> , TEL Technology Center, America, LLC	
9:35am	<b>INVITED: LI-ALE-WeM3-2</b> Precise Atomic Layer Control of 2D MoS <sub>2</sub> by ALE Technique for Device Applications, <i>Geun Young Yeom</i> , Sungkyunkwan University, Republic of Korea; <i>K. Kim, J. Kang</i> , Sungkyunkwan University, Korea, Korea (Democratic People's Republic of); <i>K. Kim</i> , Sungkyunkwan University, Korea, Massachusetts Institute of Technology	
9:40am		
9:45am		
9:50am		
9:55am		
9:55am	<b>LI-ALE-WeM3-6</b> Structural and Compositional Evolution of SiN Surfaces Under Low Energy Ar <sup>+</sup> Bombardment, <i>Erik Cheng, G. Hwang</i> , University of Texas at Austin; <i>P. Ventzek, Z. Chen</i> , Tokyo Electron America	
10:00am		
10:05am		
10:10am	<b>LI-ALE-WeM3-9</b> Demonstration of Atomic-Layer-Etching of SiO <sub>2</sub> in a small-plasma-volume incorporating 162MHz CCP source and 27MHz substrate bias using CHF <sub>3</sub> and Ar/O <sub>2</sub> , <i>Cleo Harvey, B. Ellingboe</i> , Dublin City University, Ireland	
10:15am		
10:20am		
10:25am	<b>LI-ALE-WeM3-12</b> Vacuum Ultraviolet Enhanced Atomic Layer Etching of Metal Films, <i>Xin Yang, H. Nallan</i> , University of Texas at Austin; <i>B. Coffey</i> , Lam Research; <i>J. Ekerdt</i> , University of Texas at Austin	
10:30am		
10:35am		
10:40am	BREAK	
10:45am		
10:50am	<b>INVITED: LI-ALE-WeM3-17</b> Plasma ALE for Anisotropic and Isotropic Etching, <i>Erwin Kessels, A. Mackus</i> , Eindhoven University of Technology, Netherlands	
10:55am		
11:00am		
11:05am		
11:10am	<b>LI-ALE-WeM3-21</b> Atomic Layer Etching of Gallium Nitride (GaN) Using SF <sub>6</sub> /Ar Plasmas, <i>Lamia Hamraoui, T. Tillocher, P. Lefauchaux, R. Dussart</i> , GREMI CNRS/Université d'Orléans, France; <i>M. Boufnichel</i> , STMicroelectronics, France	
11:15am		
11:20am		
11:25am	<b>LI-ALE-WeM3-24</b> Selective Atomic Layer Etching between GaN and SiN by Using HBr Neutral Beam, <i>Takahiro Sawada, D. Otori</i> , Tohoku University, Japan; <i>K. Sugawara</i> , Sumitomo Electric Industries, Ltd., Japan; <i>M. Okada, K. Nakata, K. Inoue</i> , Sumitomo Electric Industries, Ltd, Japan; <i>D. Sato</i> , Showa Denko K.K., Japan; <i>S. Samukawa</i> , Tohoku University, Japan	
11:30am		
11:35am		
11:40am	<b>LI-ALE-WeM3-27</b> Study of Surface Damage Formation in Atomic Layer Etching of Si via Molecular Dynamics Simulation, <i>Erin Joy Capdos Tinacba, M. Isobe, S. Hamaguchi</i> , Osaka University, Japan	
11:45am		
11:50am		
11:55am	BREAK	

# Wednesday Morning, June 30, 2021

12:00pm	<b>INVITED: LI-ALE-WeM3-31</b> Patterning High Density STT-MRAM with a Novel Atomic Layer Etch Process, <i>Samantha Tan, W. Yang, T. Mukherjee, Z. El Otell, Y. Fan, R. Lin, S. Yun, K. Kanarik, T. Lill, Y. Pan, R. Gottscho</i> , Lam Research Corporation	
12:05pm		
12:10pm		
12:15pm		
12:20pm	<b>LI-ALE-WeM3-35</b> Exploring Thermal Ale for Spin-Torque Majority Gate Applications, <i>Jean-Francois de Marneffe</i> , imec v.z.w., Belgium; <i>P. Nguyen</i> , Air Liquide; <i>S. Couet, L. Souriau</i> , imec v.z.w., Belgium; <i>N. Stafford, P. Venkateswara</i> , Air Liquide; <i>S. De Gendt</i> , imec v.z.w. / KULeuven, Dpt of Chemistry, Belgium; <i>Y. Canvel</i> , imec v.z.w., Belgium	
12:25pm		
12:30pm		
12:35pm	<b>LI-ALE-WeM3-38</b> Topographic Selective Deposition (TSD) by Combining Plasma Enhanced Atomic Layer Deposition and Atomic Layer Etching Processes, <i>Moustapha Jaffal, G. Lefevre, T. Yeghoyan, T. Chevolleau</i> , LTM, France; <i>R. Gassilloud, N. Posseme</i> , CEA-LETI, France; <i>M. Bonvalot</i> , LTM, France; <i>C. Vallee</i> , University Grenoble-Alpes, France	
12:40pm		
12:45pm		
12:50pm	<b>LI-ALE-WeM3-41</b> Surface Smoothing by Atomic Layer Deposition and Etching, <i>S. Gerritsen, Nicholas Chittock, V. Vandalon, W. Kessels, A. Mackus</i> , Eindhoven University of Technology, Netherlands	
12:55pm		
1:00pm		
1:05pm	<b>LI-ALE-WeM3-44</b> In Situ Analysis on Atomic Layer Etching of Al <sub>2</sub> O <sub>3</sub> , <i>Johanna Reif, M. Knaut, S. Killge, M. Albert, J. Bartha, T. Mikolajick</i> , Technische Universität Dresden, Germany	
1:10pm		
1:15pm		
1:20pm	<b>LI-ALE-WeM3-47</b> Announcement of ALE and ALD Student Awardees, Closing Remarks & Thank Yous, <i>A. Raley</i> , TEL Technology Center, America, LLC; <i>S. Hamaguchi</i> , Osaka University, Japan; <i>Thorsten Lill</i> , Lam Research Corp.	
1:25pm		



## ALD Applications

### Room On Demand - Session AA1

#### Energy: Catalysis and Fuel Cells

1:00pm

**AA1-1** High-crystalline RuO<sub>2</sub> based on Atomic Layer Deposition for Oxygen Evolution Catalyst, *Jaehyeok Kim, D. Kim, J. Park, H. Kim*, Yonsei University, Korea

**AA1-2** Atomic Layer Deposition of Pt@Pd Core-Shell Structure Electrocatalyst for Carbon Dioxide Reduction, *Ming Li*, Delft University of Technology, China; *R. Kortlever, R. van Ommen*, Delft University of Technology, Netherlands

**AA1-3** Understanding Metal-Support Interactions in Model Pd/ALD-Al<sub>2</sub>O<sub>3</sub>/SiO<sub>2</sub> Catalysts, *Arun Asundi, E. Goodman*, Stanford University; *A. Hoffman*, SLAC National Accelerator Laboratory; *K. Bustillo*, Lawrence Berkeley Lab, University of California, Berkeley; *J. Stebbins*, Stanford University; *S. Bare*, SLAC National Accelerator Laboratory; *S. Bent, M. Cargnello*, Stanford University

**AA1-4** Size Control of Gold Nanoparticles Using Sequential Atomic Layer Deposition of Gold and Titanium Dioxide, *Saeed Saedy, R. Baaijens*, Delft University of Technology, Netherlands; *E. Goodwin, M. Griffiths, S. T. Barry*, Carleton University, Canada; *J. van Ommen*, Delft University of Technology, Netherlands

**AA1-7** Atomic Layer Deposition for Improved Biomass Conversion Catalysts, *Wilson McNeary, S. Tacey, G. Lahti, D. Conklin*, National Renewable Energy Laboratory; *K. Unocic*, Oak Ridge National Laboratory; *E. Tan*, National Renewable Energy Laboratory; *E. Wegener*, Argonne National Laboratory; *T. Eralp Erden*, Johnson Matthey, UK; *S. Moulton, C. Gump, J. Burger*, Forge Nano; *M. Griffin, C. Farberow*, National Renewable Energy Laboratory; *M. Watson, L. Tuxworth*, Johnson Matthey, UK; *K. van Allsburg*, National Renewable Energy Laboratory; *A. Dameron, K. Buechler*, Forge Nano; *D. Vardon*, National Renewable Energy Laboratory

**AA1-10** Electrochemical Activation of Atomic Layer Deposited Cobalt Phosphate Electrocatalysts for Water Oxidation, *Gerben van Straaten, R. Zhang, V. DiPalma*, Eindhoven University of Technology, Netherlands; *G. Zafeiropoulos*, Dutch Institute For Fundamental Energy Research, Netherlands; *E. Kessels*, Eindhoven University of Technology, Netherlands; *R. van de Sanden, M. Tsampas*, Dutch Institute For Fundamental Energy Research, Netherlands; *A. Creatore*, Eindhoven University of Technology, Netherlands

## ALD Applications

### Room On Demand - Session AA10

#### Memory Applications: RRAM & Neuromorphic, MIM Capacitors

1:00pm

**AA10-1** Li-Nb-O Family Deposited by Atomic Layer Deposition (ALD) for Artificial Neuron and Synapse, *Hyun Seung Choi, H. Kim, S. Park, T. Park*, Hanyang University, Korea (Republic of)

**AA10-2** Li Compound-Based Two-Terminal Artificial Synaptic Devices via Atomic Layer Deposition, *Hye Rim Kim, H. Choi, S. Park*, Hanyang University, Korea (Republic of); *G. Kim*, Korea Research Institute of Chemical Technology (KRICT), Korea (Republic of); *T. Park*, Hanyang University, Korea (Republic of)

## ALD Applications

### Room On Demand - Session AA11

#### Memory Applications: Other Non-Volatile Memories (MRAM, FeRAM, Phase Change,...)

1:00pm

**AA11-1** Fabrication of Vertical-Type Phase-Change Memory Leveraging Atomic Layer Deposition, *Jeong Woo Jeon, C. Yoo, E. Park, W. Kim, W. Choi, B. Park*, Seoul National University, Korea (Republic of); *Y. Lee*, Jeonbuk National University, Korea (Republic of); *C. Hwang*, Seoul National University, Korea (Republic of)

**AA11-2** Effect of Ti Scavenging Layer on Ferroelectricity of Hf<sub>x</sub>Zr<sub>1-x</sub>O<sub>2</sub> Thin Films Fabricated by Atomic Layer Deposition using Hf/Zr Cocktail Precursor, *Takashi Onaya*, Meiji University/National Institute for Materials Science/JSPS Research Fellow, Japan; *T. Nabatame*, National Institute for Materials Science, Japan; *N. Sawamoto*, Meiji Renewable Energy Laboratory, Japan; *A. Ohi, N. Ikeda, T. Nagata*, National Institute for Materials Science, Japan; *A. Ogura*, Meiji University/Meiji Renewable Energy Laboratory, Japan

**AA11-3** Atomic Layer Deposition of Antiferroelectric La-Doped Hf<sub>0.5</sub>Zr<sub>0.5</sub>O<sub>2</sub> Thin Film and Its Electrical Behaviors, *Yong Chan Jung, J. Kim, S. Hwang, J. Mohan, H. Hernandez-Arriaga*, University of Texas at Dallas; *W. Maeng, K. Im*, SK hynix Inc, Korea (Republic of); *J. Kim*, University of Texas at Dallas

**AA11-4** Metal-insulator Transition in ALD VO<sub>2</sub> using VCl<sub>4</sub> and H<sub>2</sub>O as Precursors, *Jeya Prakash Ganesan, D. Dev, A. Krishnaprasad*, University of Central Florida; *D. Moser, R. Kanjolia*, EMD Electronics; *T. Roy*, Nanoscience Technology Center, University of Central Florida; *P. Banerjee*, University of Central Florida

## ALD Applications

### Room On Demand - Session AA12

#### Display Applications: Thin Film Transistor, Diodes, Thin Film Encapsulation for OLEDs/QDs...

1:00pm

**AA12-1** Two-dimensional electron gas at atomic-layer-deposited ZnS/ZnO Heterostructure, *Jae Hyun Yoon, T. Seok*, Hanyang University, Korea (Republic of); *Y. Liu*, Hanyang University, China; *J. Choi, S. Kim, T. Park*, Hanyang University, Korea (Republic of); *S. Lee*, Ajou University, Korea (Republic of)

**AA12-2** Three-Dimensional Multi-Stacked Field-Effect Transistor Using Two-Dimensional Electron Gas at the Interface of Al<sub>2</sub>O<sub>3</sub>/ZnO Ultra-Thin Film Heterostructures, *Ji Hyeon Choi, T. Seok, J. Yoon*, Hanyang University, Korea; *S. Lee*, Ajou University, Korea (Republic of); *T. Park*, Hanyang University, Korea

**AA12-3** Atomic Layer Deposited p-type SnO Thin Film Transistors, *Kham Niang, D. Gomersall*, Cambridge University, UK; *J. Parish, A. Johnson*, University of Bath, UK; *A. Flewitt*, Cambridge University, UK

**AA12-4** The Impact of PEALD InGaO TFT Performances on Paring In/Ga Precursor Structures, *TaeHyun Hong, H. Jeong, J. Park*, Hanyang University, Korea

**AA12-5** Structural Modulation of ALD IGZO TFT for Controlling the Hydrogen Concentration, *Wan-Ho Choi, K. Kim, J. Park*, Hanyang University, Korea

**AA12-6** Ultrathin Amorphous Titanium Oxide Field-Effect Transistors with Large Gate-Induced Electron Mobility Modulation, *Nikhil Tiwale*, Brookhaven National Laboratory; *A. Subramanian*, Stony Brook University; *Z. Dai*, Brookhaven National Laboratory; *S. Sikder*, Stony Brook University; *J. Sadowski*, Brookhaven National Laboratory; *C. Nam*, Brookhaven National Laboratory/Stony Brook University

## ALD Applications

### Room On Demand - Session AA14

#### Emerging:

#### Optics/Optoelectronics/Metamaterials/Plasmonics

1:00pm

**AA14-1** Optical Quantizing Structures in Al<sub>2</sub>O<sub>3</sub>/TiO<sub>2</sub> Heterostructures by Plasma Enhanced Atomic Layer Deposition, *Pallabi Paul, A. Szeghalmi*, Friedrich Schiller University Jena, Germany

**AA14-2** Excellent Surface Passivation of Germanium by ALD Al<sub>2</sub>O<sub>3</sub> with a-Si:H Interlayers, *Willem-Jan Berghuis, J. Melskens, B. Macco, R. Theeuwes, K. Erwin*, Eindhoven University of Technology, Netherlands

**AA14-3** Tunable and Scalable Fabrication of Plasmonic Dimer Arrays With Sub-10 nm Nanogaps by Area Selective ALD, *Chengwu Zhang, B. Willis*, University of Connecticut

**AA14-4** Lithium Aluminum Fluoride as an Ultraviolet Coating Material, *John Hennessy*, Jet Propulsion Laboratory

**AA14-7** Stress Compensated HfO<sub>2</sub>/SiO<sub>2</sub> High-reflective Coatings at 355 nm and 532 nm by Plasma Enhanced Atomic Layer Deposition using Substrate Biasing, *Vivek Beladiya*, Friedrich-Schiller-University Jena, Germany; *D. Kästner*, Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Germany; *S. Riese, P. Hanke*, LAYERTEC GmbH, Germany; *A. Szeghalmi*, Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Germany

## ALD Applications

### Room On Demand - Session AA15

#### Emerging: Medical/Healthcare/Pharmaceuticals

1:00pm

**AA15-1** Atomic Layer Deposition of Nanocomposite Antimicrobial and Antiviral Coatings, *Anil Mane, M. Gros, R. Wilton, S. Forrester, Y. Zhang, . Zaluzec, D. Schabacker, S. Darling, J. Elam*, Argonne National Laboratory, USA

## ALD Applications

### Room On Demand - Session AA16

#### Emerging: Others (Protective Coatings, Hardness, MEMS...)

1:00pm

**AA16-1** Capacitance Modulation by Light and Mechanical Stimuli in ALD-deposited ZnO Thin Films Integrated in Piezotronic MEMS Strain Microsensors, **Raoul Joly**, S. Girod, N. Adjero, P. Grysan, J. Polesel, Luxembourg Institute of Science and Technology (LIST), Luxembourg

**AA16-2** Applications of Atomic-Scale Processing for the Next Decade of MEMS Technology, **Daniel Potrepka**, N. Strnad, R. Rudy, U.S. Army Research Laboratory

**AA16-3** Texture Control of Piezoelectric Aluminum Nitride Grown by Atomic Layer Deposition for 3D Microelectromechanical Systems, **Nicholas Strnad**, W. Sarney, CCDC Army Research Laboratory; G. Rayner, Kurt J. Lesker Company, Inc.; G. Fox, Fox Materials Consulting, LLC; R. Rudy, J. Pulskamp, CCDC Army Research Laboratory

**AA16-4** Electrically-Conductive Kevlar Fabrics for Multi-Functional Fiber Reinforced Composites Enabled by Atomic Layer Deposition, **Robin E. Rodriguez**, T. Lee, Y. Chen, T. Cho, C. Huang, E. Kazyak, A. Poli, University of Michigan, Ann Arbor; W. LePage, University of Michigan - Ann Arbor; M. Thouless, M. Banu, N. Dasgupta, University of Michigan, Ann Arbor

**AA16-5** COO Reduction for Semiconductor Parts via ALD Coatings and Recycling of Parts, **Russell Parise**, I. Iordanov, QuantumClean, A Business Unit of UCT; G. Osoro, Inficon

**AA16-8** Aqueous Degradation and Nanoscale Coatings of Al<sub>2</sub>O<sub>3</sub> via Atomic Layer Deposition (ALD) of BaAl<sub>2</sub>O<sub>4</sub>: Eu<sup>2+</sup>, Dy<sup>3+</sup> Long Afterglow Phosphors, **Erkul Karacaoglu**, Georgia Institute of Technology, USA and Karamanoglu Mehmetbey University, Turkey; E. Öztürk, Karamanoglu Mehmetbey University, Turkey; M. Uyaner, Necmettin Erbakan University, Turkey; A. Okyay, OkyayTechALD Okyay Technologies, Turkey and Stanford University; M. Losego, Georgia Institute of Technology, USA

## ALD Applications

### Room On Demand - Session AA17

#### ALD Applications Poster Session

1:00pm

**AA17-1** Atomic Layer Deposition of AlN Films With and Without Plasma. Piezoelectric Effect and Magnetoelectric Coupling With Nickel, **Noureddine Adjeroud**, Luxembourg Institute of Science and Technology (LIST), Luxembourg

**AA17-2** ALD SnO P-Type Thin Film Transistors and the Influence of Post Fabrication Annealing Conditions on Device Performance, **Benjamin Peek**, Pegasus Chemicals, UK; P. Chalker, M. Werner, The University of Liverpool, UK; P. Williams, Pegasus Chemicals, UK; F. Alkhalil, S. Das, Pragmatic Semiconductor, UK

**AA17-3** Low-Temperature Plasma-Enhanced Atomic Layer Deposition of Indium Oxide, **Ali Mahmoodinezhad**, C. Morales, Brandenburg University of Technology Cottbus-Senftenberg, Germany; F. Naumann, P. Plate, R. Meyer, SENTECH Instruments GmbH, Germany; C. Janowitz, K. Henkel, M. Kot, J. Flege, Brandenburg University of Technology Cottbus-Senftenberg, Germany

**AA17-4** High-Reliable Atomic Layer Deposited N-doped GeSe and Its Leaky-Integrate-and-Fire Neuron Application, **Woohyun Kim**, M. Ha, C. Yoo, J. Jeon, W. Choi, B. Park, G. Kim, K. Woo, J. Kim, Y. Jang, E. Park, Seoul National University, Korea (Republic of); Y. Lee, Jeonbuk National University, Korea (Republic of); C. Hwang, Seoul National University, Korea (Republic of)

**AA17-5** Zero Temperature Coefficient of Resistance in Back-End-of-the-Line - Compatible Titanium-Aluminum Nitride Nanolaminates Grown by Plasma Enhanced Atomic Layer Deposition, **I. Krylov**, Tower Semiconductor Ltd., Israel; Y. Qi, **Valentina Korchnoy**, K. Weinfeld, M. Eizenberg, E. Yalon, Technion-Israel Institute of Technology, Israel

**AA17-6** Influence of H<sub>2</sub>S Dosage on Surface Roughness of Zn(O,S) Films by Atomic Layer Deposition (ALD), **Narmatha Koothan**, T. Chou, Y. Yu, W. Cho, J. Su, C. Kei, Taiwan Instrument Research Institute, National Applied Research Laboratories, Taiwan

**AA17-7** Bias-Enhanced Atomic Layer Annealing for the Deposition of High-Quality Aluminum Nitride Films on Silicon, **Aaron McLeod**, S. Ueda, University of California at San Diego; D. Alvarez, RASIRC; A. Kummel, University of California at San Diego

**AA17-8** Atomic Layer Deposition of NiO for the Modification of Electro-Catalysts for Alkaline Water Splitting, **Muhammad Hamid Raza**, Humboldt-Universität zu Berlin, Germany; M. Frisch, R. Kraehnert, Technische Universität Berlin, Germany; N. Pinna, Humboldt-Universität zu Berlin, Germany

**AA17-11** Plasma-Resistant Mixed Metal Oxide Films, **Vasil Vorsa**, A. Pavel, Greene Tweed & Co.

**AA17-14** Super-Cycle Atomic Layer Deposition of Indium Gallium Zinc Oxide, **Paul Plate**, L. Marth, F. Naumann, SENTECH Instruments GmbH, Germany; A. Mahmoodinezhad, C. Janowitz, K. Henkel, J. Flege, BTU Cottbus, Germany

**AA17-17** Effect of Precursor on Deposition Behavior of ZrO<sub>2</sub> Atomic Layer Deposition, **Younsoo Kim**, Y. Cho, Samsung Electronics, Korea (Republic of); T. Shiratori, N. Yamada, ADEKA, Japan; S. Ryu, S. Kang, S. Chung, H. Kim, J. Seo, M. Park, J. Lim, J. Choi, H. Jung, H. Lim, Samsung Electronics, Korea (Republic of)

**AA17-20** Gas-Sensing Properties of Hierarchical Core-Shell Nanofibers: Radial Modulation of Hole-Accumulation Layer, **M. Raza**, Humboldt University Berlin, Germany; K. Movlaee, University of Messina, Italy; S. Santangelo, University of Reggio Calabria, Italy; G. Neri, University of Messina, Italy; **Nicola Pinna**, Humboldt University Berlin, Germany

**AA17-23** Developing a Model for Describing the Effect of Dispersion of P-Type Co-Catalyst on Photocatalytic Activity Using ALD Prepared CuO<sub>x</sub>/TiO<sub>2</sub> Photocatalyst, **Saeed Saedy**, N. Hiemstra, D. Benz, Delft University of Technology, Netherlands; H. van Bui, Phenikaa University, Viet Nam; J. van Ommen, Delft University of Technology, Netherlands

**AA17-26** Low-Temperature Deposition of Highly Conformal TiN Films on Pt/C Nanoparticles via Plasma-Enhanced ALD for Fuel Cell Applications, **S. Ilhom**, R. Godoy, A. Mohammad, D. Shukla, University of Connecticut; M. Kattan, N. Solomatin, Y. Ein-Eli, Technion, Israel; J. Jankovic, **Necmi Biyikli**, University of Connecticut

**AA17-29** Low Temperature Ferroelectric Hf<sub>0.5</sub>Zr<sub>0.5</sub>O<sub>2</sub> Films Deposited by Thermal Atomic Layer Deposition Using High Purity H<sub>2</sub>O<sub>2</sub>, **Jin-Hyun Kim**, Y. Jung, University of Texas at Dallas; S. Hwang, university of texas at dallas; H. Arriaga, J. Mohan, D. Le, University of Texas at Dallas; D. Alvarez, J. Spiegelman, RASIRC; J. Kim, University of Texas at Dallas

**AA17-32** Effect of NH<sub>3</sub> Flow on Electrical and Mechanical Properties of ALD TiN Thin Films, **Hyunchol Cho**, Eugenius, Inc., Korea (Republic of); B. Nie, Eugenius, Inc.; A. Dhamdhere, Eugenius, Inc., India; Y. Meng, M. Neuburger, Eurofins EAG Materials Science; J. Mack, Eugenius, Inc.; J. Ahn, Hanyang University, Korea (Republic of); S. Jung, H. Kim, Eugenius, Inc., Korea (Republic of)

**AA17-35** ALD Al<sub>2</sub>O<sub>3</sub> and MoS<sub>2</sub> Coated TiO<sub>2</sub> Nanotube Layers as Anodes for Lithium Ion Batteries, **H. Sophia**, R. Zazpe, Uni Pardubice, Czechia; T. Djenizian, Ecole de Mine, France; **Jan Macak**, Uni Pardubice, Czechia

**AA17-38** Experimental Ru Precursors for Cutting Edge ALD & CVD Processes, **Ivan Zylukov**, Umicore, Belgium; W. Schorn, Umicore, Germany; S. Tymek, J. Bachmann, University of Erlangen-Nuremberg, Germany; S. Armini, G. Poutois, IMEC, Belgium

**AA17-41** Characterization of Al Doped SnO<sub>2</sub> Thin Films With Various Doping Positions Using Atomic Layer Deposition, **Hyunwoo Park**, N. Lee, Y. Choi, S. Song, J. Lee, G. Lee, E. Lee, S. Lee, H. Jeon, C. Jung, Hanyang University, Korea

## ALD Applications

### Room On Demand - Session AA2

#### Energy: Solar Energy Materials

1:00pm

**AA2-1** Synthesis of a Composite Dielectric With Conformal Coating of Aluminium Nitride Over the Distribution of Titanium Nitride Nanoparticles, for Concentrated Solar Power Applications, **Nikhil Khanna**, M. El Hachemi, Luxembourg Institute of Science and Technology (LIST), Luxembourg

**AA2-2** Interface Chemistry in Metal Halide Perovskite/ALD Metal Oxide Systems, **Andrea E.A. Bracesco**, C. Burgess, A. Tadinova, Eindhoven University of Technology, Netherlands; V. Zardetto, Solliance Solar Research, Eindhoven, Netherlands; D. Koushik, W. Kessels, Eindhoven University of Technology, Netherlands; I. Dogan, Solliance Solar Research, Eindhoven, Netherlands; C. Weijtens, Eindhoven University of Technology, Netherlands; S. Veenstra, R. Andriessen, Solliance Solar Research, Eindhoven, Netherlands; M. Creatore, Eindhoven University of Technology, Netherlands

**AA2-3** ALD of Lead Halide Perovskites, **Jake Vagott**, K. Bairley, A. Castro Mendez, C. Perini, J. Correa-Baena, Georgia Institute of Technology

**AA2-4** Atomic Layer Deposition of  $Zn_{1-x}Mg_xO$  as Transparent Conducting Films for Chalcopyrite Solar Cells, **Poorani Gnanasambandan**, Luxembourg Institute of Science and Technology (LIST), Luxembourg; **M. Sood**, University of Luxembourg; **N. Adjeroud**, Luxembourg Institute of Science and Technology (LIST), Luxembourg; **R. Leturca**, Luxembourg Institute of Science and Technology (LIST), Luxembourg; **S. Siebentritt**, University of Luxembourg

## ALD Applications

### Room On Demand - Session AA3

#### Energy: Batteries and Energy Storage

1:00pm

**AA3-1** Revealing the Control of Lithium Plating Microstructure Derived from ALD-Grown  $TiO_2$ , **Solomon Oyakhire**, **W. Huang**, **Y. Cui**, **S. Bent**, Stanford University

**AA3-2** Li, N co-controlled Lithium Phosphorous Oxy-nitride(LiPON) Coating for Three Dimensional Thin Film Solid-state Batteries (3D TSSBs) using ALD, **Ha Yeon Kwon**, **S. Hong**, **T. Park**, Hanyang University, Korea

**AA3-3** Rational Modification of  $LiMn_2O_4$  Surfaces by Controlling the Acid-Base Surface Chemistry of Atomic Layer Deposition, **D. Kang**, Argonne National Laboratory, USA; **R. Warburton**, Purdue University, USA; **A. Mane**, Argonne National Laboratory, USA; **J. Greeley**, Purdue University, USA; **Jeffrey Elam**, Argonne National Laboratory, USA

**AA3-6** ALD of Thin-Film  $Na_xMn_yO$  Cathode Materials for Sodium Ion Batteries, **Nikhila Paranamana**, **M. Young**, University of Missouri, Columbia

## ALD Applications

### Room On Demand - Session AA4

#### Applications in ULSI FEOL: High-k

1:00pm

**AA4-1** Plasma Impact on the  $HfO_2$  High-K Dielectric: Continuous-Wave Plasma Etch Versus Quasi-Atomic Layer Etch, **Dunja Radisic**, **Q. Smets**, **T. Schram**, IMEC, Belgium

**AA4-2** Self-Aligned Atomic Layer Deposited Gate Stacks for Electronic Applications, **Amy Brummer**, **A. Mohabir**, **M. Filler**, **E. Vogel**, Georgia Institute of Technology

**AA4-3** Film Characteristics of Lanthanide Oxide Thin Film by Using Atomic Layer Deposition Method, **Se-Won Lee**, **M. Kim**, Merck Electronics, Korea (Republic of); **S. Ivanov**, EMD Electronics

## ALD Applications

### Room On Demand - Session AA7

#### Applications in ULSI BEOL: Interconnects, Diffusion Barriers, Low-k

1:00pm

**AA7-1** Grain-Resistivity Relationship of Ru ALD Precursors, **Michael Breeden**, **V. Wang**, University of California at San Diego; **R. Kanjolia**, **M. Moinpour**, **J. Woodruff**, EMD Performance Materials; **H. Simka**, Samsung; **A. Kummel**, University of California at San Diego

**AA7-2** Atomic Layer Deposition of  $RuO_2$  Using a New Metalorganic Precursor as a Diffusion Barrier for Ru Interconnect, **Youn-Hye Kim**, Yeungnam University, Korea (Republic of); **Y. Kotsugi**, Tanaka Precious Metals, Japan; **T. Cheon**, **R. Ramesh**, **S. Kim**, Yeungnam University, Korea (Republic of)

## ALD Applications

### Room On Demand - Session AA8

#### Memory Applications: DRAM

1:00pm

**AA8-1** Influences of Oxygen Source and Substrate Temperature on Growth Mechanism of Atomic Layer Deposited Magnesium Oxide Using Bis(Cyclopentadienyl)Magnesium Precursor, **Bowen Wang**, **J. Choi**, **H. Kim**, **S. Hyun**, **H. Lee**, **C. Hwang**, Seoul National University, Korea (Republic of)

**AA8-2** Atomic Layer Deposition of  $Y$ -Doped  $TiO_2$  Thin Films to Decrease the Leakage Current for DRAM Capacitor Applications, **Tae Kyun Kim**, **C. Hwang**, Seoul National University, South Korea

**AA8-3** Improved Properties of the Atomic Layer Deposited Ru Electrode for Dynamic Random-Access Memory Capacitor Using Discrete Feeding Method, **Dae Sean Kwon**, Seoul National University, Korea; **W. Jeon**, Kyung Hee University, Korea; **D. Kim**, **T. Kim**, **H. Seo**, **J. Lim**, **C. Hwang**, Seoul National University, Korea

**AA8-6** A Comparative Study on the Crystallization Behavior of Atomic Layer Deposited  $ZrO_2 / Y_2O_3 / ZrO_2$  Dielectric Thin Films for DRAM Capacitors, **Haengha Seo**, **D. Kim**, **D. Kwon**, **J. Lim**, **T. Kim**, **H. Paik**, **C. Hwang**, Seoul National University, Korea (Republic of)

## ALD Fundamentals

### Room On Demand - Session AF1

#### Precursors and Chemistry: Precursor Design, New

#### Precursors, Process Development

1:00pm

**AF1-1** Thermal Atomic Layer Deposition of Cobalt Metal Films: Synthesis and Characterization of Volatile, Thermally Stable Cobalt Precursors and Development of New Thermal Cobalt ALD Processes, **Nyi Myat Khine Linn**, **J. Hollin**, **Z. Devereaux**, **C. Winter**, Wayne State University

**AF1-2** Atomic Layer Deposition of  $Ga_2O_3$  Thin Films Using a Liquid Precursor Pentamethylcyclopentadienyl Gallium and Combinations of  $H_2O$  and  $O_3$ , **Makoto Mizui**, **N. Takahashi**, **S. Higashi**, **F. Mizutani**, Kojundo Chemical Laboratory Co., Ltd., Japan

**AF1-3** Synthesis, Structure and Property Evaluation of a New Class of Volatile Lanthanide Precursors Containing Enaminolate Ligands, **C. Winter**, **Navada Jayakodiarachchi**, Wayne State University

**AF1-4** Metal Selenides: From Precursor Synthesis to Atomic Layer Deposition, **Jaroslav Charvat**, University of Pardubice, Czechia; **M. Barr**, Friedrich-Alexander University of Erlangen-Nürnberg, Germany; **R. Zazpe**, University of Pardubice, Czechia; **Y. Cao**, **V. Koch**, Friedrich-Alexander University of Erlangen-Nürnberg, Germany; **D. Pokorný**, **J. Macák**, University of Pardubice, Czechia; **J. Bachmann**, Friedrich-Alexander University of Erlangen-Nürnberg, Germany; **F. Bureš**, University of Pardubice, Czechia

**AF1-5** Investigating the Role of Sigma and Pi Bonding in Volatile Molybdenum(VI) Precursors, **Michael Land**, **G. Bačić**, Carleton University, Canada; **K. Robertson**, Saint Mary's University, Canada; **S. Barry**, Carleton University, Canada

**AF1-6** Unearthing Zinc Alkyls as Reducing Agents in Cobalt Metal ALD: Mechanistic Studies, Process Development and Thin Film Analysis, **David Zanders**, Ruhr University Bochum, Germany; **J. Liu**, Tyndall National Institute, University College Cork, Ireland; **J. Obenlünenschloß**, **C. Bock**, Ruhr University Bochum, Germany; **M. Nolan**, Tyndall National Institute, University College Cork, Ireland; **S. Barry**, Carleton University, Canada; **A. Devi**, Ruhr University Bochum, Germany

**AF1-7** Deposition of Dielectric  $Y_2O_3$  Thin Films by Thermal ALD Using a Homoleptic yttrium Formamidinate Precursor and Water, **Nils Boysen**, **D. Zanders**, **T. Berning**, **D. Rogalla**, **S. Beer**, **C. Bock**, **A. Devi**, Ruhr University Bochum, Germany

**AF1-8** ( $^iBuNH$ ) $SiMe_2NMe_2$  – a new  $N,N'$ - $k_2$ -monoanionic Ligand for Atomic Layer Deposition Precursors, **Matthew Griffiths**, Carleton University, Canada; **D. Zanders**, Ruhr University Bochum, Germany; **M. Land**, Carleton University, Canada; **J. Masuda**, Saint Mary's University, Canada; **A. Devi**, Ruhr University Bochum, Germany; **S. Barry**, Carleton University, Canada

**AF1-9** Aluminum Hydride Precursors for Atomic Layer Deposition of Aluminum Metal, **C. Winter**, **Nilanka Sirikkathuge**, Wayne State University

**AF1-10** Growth Mechanism of the Atomic Layer Deposition of ZnO Thin Films Using Bis( $n$ -Propyltetramethylcyclopentadienyl)Zinc, **Fumikazu Mizutani**, **M. Mizui**, **N. Takahashi**, Kojundo Chemical Laboratory Co., Ltd., Japan; **M. Inoue**, **T. Nabatame**, National Institute for Materials Science, Japan

**AF1-11** Ultrasonic Atomization of Titanium Isopropoxide at Room Temperature for  $TiO_2$  ALD Thin Films, **Moon-Hyung Jang**, **Y. Lei**, University of Alabama in Huntsville

**AF1-14** Designing Volatility Into Lead Precursors, **Goran Bacic**, Carleton University, Canada; **J. Masuda**, St. Mary's University, Canada; **S. Barry**, Carleton University, Canada

**AF1-17** Solution ALD: A Versatility Process for Various Material Growth, **Maissa Barr**, **B. Zhao**, **P. Von Grundherr**, **M. Uddin**, **V. Koch**, **M. Halik**, **J. Bachmann**, Friedrich-Alexander-University Erlangen-Nürnberg (FAU), Germany

**AF1-20** Routes to Novel Dielectric and Semiconductor Devices Using Cyclohexasilane, **Ramez Elgammal**, The Coretec Group

**AF1-23** Atomic Layer Deposition of Cupric Oxide Using Copper(II) Acetylacetonate, **Gabriel Bartholazzi**, L. Black, The Australian National University, Australia

**AF1-26** Low-Temperature Growth of Crystalline Tin(II) Monosulfide Thin Films by Atomic Layer Deposition Using a Liquid Divalent Tin Precursor, **Mahd Zahid Ansari**, Yeungnam University, Korea (Republic of); **P. Janicek**, University of Pardubice, Czechia; **D. Nandi**, Yeungnam University, Korea (Republic of); **S. Slang**, M. Bouska, University of Pardubice, Czechia; **H. Oh**, Yeungnam University, Korea (Republic of); **B. Shong**, Yeungnam University, Czechia; **S. Kim**, Yeungnam University, Korea (Republic of)

## ALD Fundamentals

### Room On Demand - Session AF10

#### ALD Fundamentals Poster Session

1:00pm

**AF10-1** Datasets and Algorithms for Machine Learning-Driven Process Optimization Using ALD Growth Profiles, **Angel Yanguas-Gil**, J. Elam, Argonne National Laboratory

**AF10-2** Conducting Hafnium Nitride Films Fabricated by Atomic Layer Deposition With Cleaning Step and Post-Deposition Annealing in NH<sub>3</sub> Atmosphere, **Seung Kyu Ryoo**, B. Kim, H. Park, Y. Lee, S. Lee, M. Oh, I. Lee, S. Byun, D. Shim, C. Hwang, Seoul National University, Korea (Republic of)

**AF10-3** Higher Temperature ALD for HfO<sub>2</sub> Film using Hafnium Aminoalkoxide Precursors, **Masako Hatase**, H. Sato, A. Sakurai, T. Yoshino, N. Okada, A. Nishida, A. Yamashita, ADEKA CORPORATION, Japan

**AF10-4** Plasma Enhanced Atomic Layer Deposition (PEALD) of Nickel Using Allyl Cyclopentadienyl Nickel as the Precursor, **Elham Kamali Heidari**, K. Bosnick, J. Canlas, T. Patrie, National Research Council, Canada

**AF10-5** Enhancement of Ferroelectric Properties of Hf<sub>0.5</sub>Zr<sub>0.5</sub>O<sub>2</sub> Thin Films by Various Metal Electrodes, **In Soo Lee**, Department of Materials Science and Engineering and Inter-University Semiconductor Research Center, Seoul National University, Korea (Republic of); **B. Kim**, S. Hyun, H. Park, Y. Lee, S. Lee, M. Oh, S. Ryu, S. Byun, D. Shim, C. Hwang, Seoul National University, Korea (Republic of)

**AF10-6** Simulating Ultrasoother, Pinhole-free Thin Films with a Monte Carlo Model of Nucleation and Growth, **D. LaFollette**, University of Southern California; **Kinsey Canova**, J. Abelson, University of Illinois at Urbana-Champaign

**AF10-7** Revisiting Process Optimization in Atomic Layer Deposition: Going Beyond Growth Rate, **Elham Rafie Borujeny**, K. Cadien, University of Alberta, Canada

**AF10-8** Surface Reaction of Nb<sub>2</sub>O<sub>5</sub> RT-ALD Explained by Using Quartz Crystal Microbalance Measurements, **Kazuki Yoshida**, K. Saito, M. Miura, K. Kanomata, B. Ahmad, S. Kubota, F. Hirose, Yamagata University, Japan

**AF10-9** Ir Studies on Low-Temperature Atomic Layer Deposition of Aluminum Nitride Using Plasma Excited Ammonia, **Kentaro Saito**, K. Yoshida, K. Kanomata, M. Miura, B. Ahmad, S. Kubota, F. Hirose, 4-3-16 Jonan, Japan

**AF10-10** Atomic Layer Deposition of SiO<sub>2</sub> using BDEAS and O<sub>3</sub> as Precursor, **Yu-Hsuan Yu**, Taiwan Instrument Research Institute, National Applied Research Laboratories, Taiwan; **C. Kei**, Taiwan Instrument Research Institute, National Applied Research Laboratories, Taiwan

**AF10-11** Effect of Plasma Time in Plasma-Enhanced Atomic Layer Deposition on Wet Etching Properties of Aluminum Nitride, **Heli Seppänen**, H. Lipsanen, Department of Electronics and Nanoengineering, Aalto University, Finland

**AF10-12** ALD of TiO<sub>2</sub> using a Titanium Precursor with a Linked Amidocyclopentadienyl Ligand: A Density Functional Theory Study, **Romel Hidayat**, H. Kim, Y. Choi, Sejong University, Korea (Republic of); **J. Seok**, J. Park, Hansol Chemical, Korea (Republic of); **W. Lee**, Sejong University, Korea (Republic of)

**AF10-13** Atomic Layer Deposition of Silicon Oxide Using a Silylamine Precursor and Ozone, **Heeju Son**, Y. Choi, H. Han, H. Roh, Y. Kim, W. Lee, Sejong University, Korea (Republic of)

**AF10-14** Reaction Mechanism and Film Characteristics of High-temperature ALD of Silicon Nitride, **Tanzia Chowdhury**, H. Han, K. Jainuri, H. Son, Sejong University, Korea (Republic of); **J. Han**, Y. Kim, J. Seok, J. Park, Hansol Chemical, Korea (Republic of); **W. Lee**, Sejong University, Korea (Republic of)

**AF10-15** Atomic Layer Deposition of Nanometer Thick Tungsten Nitride Using Anhydrous Hydrazine for Potential X-Ray Optics Application, **Dan N. Le**, A. Kondusamy, S. Hwang, A. Ravichandran, J. Mohan, Y. Jung, University of Texas at Dallas; **D. Alvarez**, J. Spiegelman, RASIRC; **M. Markevitch**, NASA Goddard Space Flight Center; **J. Kim**, University of Texas at Dallas

**AF10-16** First-Principles Investigation of Atomic Layer Deposition of Silicon Nitride Using NH<sub>3</sub> Plasma, **Tsung-Hsuan Yang**, G. Hwang, University of Texas at Austin; **P. Ventzek**, T. Iwao, K. Ishibashi, Tokyo Electron America

**AF10-19** Low Temperature ALD of Antimony Oxide, **J. Yang**, Leibniz Institute for Solid State and Materials Research, Germany; **S. He**, Leibniz Institute for Solid State and Materials Research Dresden, Germany; **S. Lehmann**, **Amin Bahrami**, K. Nielsch, Leibniz Institute for Solid State and Materials Research, Germany

**AF10-22** Development of Fast Response Flow Controlled Vapour Delivery System for ALD/ALE Applications, **Krunal Girase**, HORIBA STEC, Co., Ltd., Japan; **H. Nishizato**, HORIBA STEC, Co., Ltd., Japan; **T. Hayashi**, **M. Hotta**, HORIBA STEC, Co., Ltd., Japan; **P. Lowery P.E.**, HORIBA Reno Technology Centre; **P. Totten**, HORIBA Instruments Incorporated; **T. Hoke**, HORIBA Reno Technology Centre; **T. Freeman**, HORIBA Instruments Incorporated, Poland

**AF10-25** Thermal Atomic Layer Deposition of Elemental Antimony at Room Temperature: Growth and Uniformity Studies, **Majeda Al Hareri**, D. Emslie, McMaster University, Canada

**AF10-28** Impact of Different Intermediate Layers on the Morphology and Crystallinity of TiO<sub>2</sub> Grown on Carbon Nanotubes by Atomic Layer Deposition, **Jiao Wang**, Z. Yin, E. List-Kratochvil, N. Pinna, Humboldt-Universität zu Berlin, Germany

**AF10-31** Growth, Intermixing and Composition Control of Atomic Layer Deposited Zinc Tin Oxide, **Poorani Gnanasambandan**, R. Leturca, Luxembourg Institute of Science and Technology (LIST), Luxembourg

**AF10-34** Hollow Cathode Plasma Enhanced Atomic Layer Deposition of Vanadium Oxide Films: *in situ* Ellipsometric Monitoring of Film Growth with TEMAV and Oxygen Plasma, **Adnan Mohammad**, K. Joshi, S. Ilhom, . Shukla, B. Willis, B. Wells, Uconn; **A. Okyay**, Stanford University; **N. Biyikli**, Uconn

**AF10-37** Combined Fabrication and Testing System for Atomic Layer Deposition Microchannel Plates, **Anil Mane**, J. Elam, Argonne National Laboratory, USA

## ALD Fundamentals

### Room On Demand - Session AF2

#### Precursors and Chemistry: Simulation, Modeling, and Theory of ALD

1:00pm

**AF2-1** Comparison of ALD Saturation Profiles Simulated With Two Theoretical Models, **Jihong Yim**, E. Verkama, R. L. Puurunen, Aalto University, Finland

**AF2-2** Theoretical Prediction of the Adverse Effects of H<sup>+</sup>/Cl<sup>-</sup> Byproducts on SiN Atomic Layer Deposition with Dichlorosilane, **Tsung-Hsuan Yang**, G. Hwang, E. Cheng, University of Texas at Austin; **P. Ventzek**, T. Iwao, K. Ishibashi, Tokyo Electron America

## ALD Fundamentals

### Room On Demand - Session AF3

#### Precursors and Chemistry: Mechanisms

1:00pm

**AF3-1** Titanium Nitride ALD Process Using High Purity Hydrazine: N<sub>2</sub>H<sub>4</sub> Reactivity in Gas Phase, **Hayato Murata**, H. Shimizu, K. Andachi, TAIYO NIPPON SANSO Corporation, Japan; **D. Alvarez**, J. Spiegelman, RASIRC; **K. Suzuki**, TAIYO NIPPON SANSO Corporation, Japan

**AF3-2** Mechanistic Insights into the Thermal ALD of Gold: Infrared, Mass Balance, Nucleation, and Epitaxy, **P. Liu**, Argonne National Laboratory; **A. Hock**, Illinois Institute of Technology; **Alex Martinson**, Argonne National Laboratory

**AF3-3** Oxygen Reservoirs in Metal Oxides: Mechanisms of Reactive Species Formation and Transport in Atomic Layer Deposition of Fe<sub>2</sub>O<sub>3</sub> and NiO, **Joel Schneider**, C. de Paula, N. Richey, J. Baker, S. Bent, Stanford University

**AF3-4** Nonaqueous Atomic Layer Deposition of Zinc Oxide Using Diethylzinc and Ethanol, **Miso Kim**, E. Shin, J. Hwang, B. Shong, Hongik University, Korea (Republic of)

## ALD Fundamentals

### Room On Demand - Session AF4

#### Growth and Characterization: Surface Science of ALD

1:00pm

**AF4-1** Atomic Layer Deposition of Bimetallic Alloy and Work Function Modulation Using Discrete Feeding Method, *Ji Won Han*, Y. Kim, J. Heo, T. Park, Hanyang University, Korea

**AF4-2** Novel ALD Study of TiO<sub>2</sub> and ZrO<sub>2</sub> on Pmma Substrates as Separate and Mixed Oxide Thin Films for Enhanced Biomaterial Functionalization, *Mina Shahmohammadi*, University of Illinois - Chicago; B. Nagay, V. Barão, University of Campinas (UNICAMP), Brazil; C. Sukotjo, C. Takoudis, University of Illinois - Chicago

**AF4-3** Advanced Atomic Layer Deposition of Metal Oxide Films With Discrete Feeding Method, *Jae Chan Park*, Hanyang University, Korea; S. Lee, S. Yoo, J. Lee, K. Dae, J. Jang, Korea Basic Science Institute, Korea (Republic of); W. Kim, T. Park, Hanyang University, Korea

**AF4-4** Study of SiO<sub>2</sub> Growth Mechanism Between a Single SiO<sub>2</sub> and (HfO<sub>2</sub>)/(SiO<sub>2</sub>) Nanolaminate Formation by ALD Using TDMAS and H<sub>2</sub>O Gas, *Toshihide Nabatame*, WPI-MANA, National Institute for Materials Science, Japan; M. Inoue, E. Maeda, T. Onaya, M. Hirose, R. Kobayashi, National Institute for Materials Science, Japan; A. Ohi, WPI-MANA, National Institute for Materials Science, Japan; N. Ikeda, National Institute for Materials Science, Japan; K. Tsukagoshi, WPI-MANA, National Institute for Materials Science, Japan

**AF4-5** Discovery of Crystalline Anatase on Fluorine-Rich Carbon Substrates During Low Temperature ALD of Ultra-Thin TiO<sub>2</sub>, *Brian Butkus*, S. Dabas, C. Feit, J. Ganesan, Z. Parsons, X. Feng, P. Banerjee, University of Central Florida

**AF4-6** Thin Films Island Structure Analysis Using X-Ray Photoelectron Spectroscopy Methodology, *V. Afanas'ev*, *Daniil Selyakov*, Moscow Power Engineering Institute, Russian Federation

**AF4-9** Thermal and Plasma Enhanced Atomic Layer Deposition of TiO<sub>2</sub> from Amide and Alkoxide Precursors: Growth Characteristics and Photoelectrochemical Performance, *Shane O'Donnell*, F. Jose, K. Shiel, M. Snelgrove, C. McFeely, R. O'Connor, Dublin City University, Ireland

## ALD Fundamentals

### Room On Demand - Session AF5

#### Growth and Characterization: High Aspect Ratio/High Surface Area/Powder ALD

1:00pm

**AF5-1** Conformal Atomic Layer Deposition of Ultra-Thin Conductive Silver Films, S. Wack, P. Lunca Popa, N. Adjeroud, C. Vergne, *Renaud Leturcq*, Luxembourg Institute of Science and Technology (LIST), Luxembourg

**AF5-2** Toolbox for ALD Process Development on High Surface Area Powders, *Kristian Knemeyer*, BasCat - UniCat BASF JointLab, TU Berlin, Germany; R. Baumgarten, BasCat - UniCat BASF Jointlab, TU Berlin, Germany; P. Ingale, R. Naumann d'Alhonnourt, BasCat - UniCat BASF JointLab, TU Berlin, Germany; M. Driess, Technical University of Berlin, Germany; F. Rosowski, BASF SE, Process Research and Chemical Engineering, Germany

**AF5-3** Tunable ALD Infiltration into Ultra-High-Aspect-Ratio Aerogels Enabled by Process Modeling for High-Temperature Solar Thermal Applications, *Andrew J. Gayle*, Z. Berquist, University of Michigan, Ann Arbor; Y. Chen, University of Michigan; A. Hill, J. Hoffman, A. Bielinski, A. Lenert, N. Dasgupta, University of Michigan, Ann Arbor

**AF5-4** Enhanced Throughput of High-Aspect-Ratio Atomic Layer Deposition Using Trimethylaluminum and Hydrogen Peroxide, *Hideharu Shimizu*, T. Mizuno, Taiyo Nippon Sanso, Japan; D. Alvarez, J. Spiegelman, RASIRC

## ALD Fundamentals

### Room On Demand - Session AF6

#### Growth and Characterization: Plasma Enhanced ALD

1:00pm

**AF6-1** Plasma-Enhanced Atomic Layer Deposition: Correlating O<sub>2</sub> Plasma Parameters and Species to Blister Formation and Conformal Film Growth, *Andreas Werbrouck*, K. Van De Kerckhove, J. Dendooven, C. Detavernier, Ghent University, Belgium

**AF6-2** Plasma-Enhanced ALD of TiN: Effect of the N-Source on the Growth and Quality of the Thin Films, *Clémence Badie*, CINaM, France; T. Defforge, GREMAN, France; G. Gautier, GREMAN, France; L. Santinacci, CINaM, France

**AF6-3** Plasma Treatment to Tailor Growth and Photoelectric Performance of Plasma Enhanced Atomic Layer Deposition SnOx Transparent Conductive Thin Films, *Liangge Xu*, Harbin Institute of Technology, China

**AF6-4** Plasma-Induced Local Crystallization of ALD TiO<sub>2</sub> Films, *DOHYUN GO*, J. SHIN, . LEE, J. AN, Seoul National University of Science and Technology, Korea (Republic of)

**AF6-7** In-situ Photoemission Study on the Growth of Cobalt Nitride through PE-ALD, *Matthew Snelgrove*, K. Shiel, E. McGlynn, R. O'Connor, Dublin City University, Ireland

**AF6-10** Atomic Layer Doping of β-Ga<sub>2</sub>O<sub>3</sub> Films via Plasma Processing, *Saidjafarzoda Ilhom*, A. Mohammad, D. Shukla, J. Grasso, B. Willis, A. Okyay, N. Biyikli, University of Connecticut

**AF6-13** Electron Enhanced Atomic Layer Deposition of Aluminum Phosphide with Trimethylaluminum and Tris(tert-butyl)phosphine, *SeongUk Yun*, A. Kummel, S. Ueda, V. Wang, C. Kuo, H. Kashyap, A. Mcleod, University of California, San Diego, USA

**AF6-16** Tuning the Structural Properties of Low-Temperature Grown GaN Films via *in Situ* Ar-Plasma Annealing During Hollow-Cathode Atomic Layer Deposition, *DEEPA SHUKLA*, N. Biyikli, University of Connecticut

**AF6-19** Optimization of AlN Film Purity Using Atomic Layer Annealing, *Markus Bosund*, E. Salmi, K. Väyrynen, M. Söderlund, Beneq, Finland; P. Rabinzohn, Beneq, France; M. Heikkilä, (2) University of Helsinki, Department of Chemistry, Finland; J. Julin, (3) University of Jyväskylä, Department of Physics, Finland; T. Sajavaara, University of Jyväskylä, Department of Physics, Finland

**AF6-22** Understanding the Influence of Plasma-Enhanced Atomic Layer Deposition of SiN on GeSbTe, *Hamid Razavi*, University of California, Los Angeles; M. Shen, J. Hoang, T. Lill, Lam Research Corporation; J. Chang, University of California, Los Angeles

**AF6-25** Low-Temperature Plasma Enhanced Atomic Layer Deposition of WO<sub>x</sub> using a novel Tungsten Precursor, *Kamesh Mullanpudi*, K. Holden, J. Peterson, Oregon State University; R. Kanjolia, D. Moser, C. Dezelah, EMD Performance Materials; J. Conley, Oregon State University

## ALD Fundamentals

### Room On Demand - Session AF7

#### Growth and Characterization: Low Temperature ALD

1:00pm

**AF7-1** Neutral Beam Enhanced Atomic Layer Deposition at Room Temperature for Si Dielectric Film, *Ge Beibei*, Tohoku University, Japan, China; C. Hua Hsuan, National Yang Ming Chiao Tung University, Taiwan; O. Daisuke, O. Takuya, S. Seiji, Tohoku University, Japan

## ALD Fundamentals

### Room On Demand - Session AF8

#### Growth and Characterization: *In-situ* Monitoring and Analysis

1:00pm

**AF8-1** Optimization of Quadrupole Mass Spectrometers for In-situ Monitoring of Atomic Layer Deposition Processing, *Chenglong Yang*, J. Blessing, MKS Instruments, Inc.; U. Meissner, MKS Instruments, Inc., Germany; A. Wallace, MKS Instruments, Inc., UK

**AF8-2** Quantitative Calorimetry of ALD: Design, Model, and Calibrate, *Ashley Bielinski*, A. Martinson, Argonne National Laboratory

**AF8-3** Atomic Layer Deposition of Hafnium Oxide on InAs: Insight from Time-Resolved *in Situ* Studies, *Giulio D'Acunto*, Lund University, Synchrotron Radiation Research, Department of Physics, and NanoLund, Sweden; A. Troian, Lund University, Dept. of Electrical and Information Technology, and MAX IV laboratory, Sweden; E. Kokkonen, MAX IV Laboratory, Lund University, Sweden; F. Rehman, Lund University, Synchrotron Radiation Research, Department of Physics, and NanoLund, Sweden; J. Schnadt, Lund University, Synchrotron Radiation Research, Department of Physics, and NanoLund and MAX IV laboratory, Sweden; R. Timm, Lund University, Synchrotron Radiation Research, Department of Physics, and NanoLund, Sweden

## ALD Fundamentals

### Room On Demand - Session AF9

#### Growth and Characterization: Characterization of ALD Films 1:00pm

**AF9-1** Smoothing Surface Roughness Using Al<sub>2</sub>O<sub>3</sub> Atomic Layer Deposition, *Tyler Myers*, University of Colorado Boulder; *J. Throckmorton*, *R. Borrelli*, *M. O'Sullivan*, *T. Hatwar*, L3Harris; *S. George*, University of Colorado Boulder

**AF9-2** Effect of Oxidant on Film Properties of HfO<sub>2</sub> grown via Atomic Layer Deposition using Newly Synthesized Cp-based Hf Precursors, *Seonyeong Park*, *H. Yoon*, *Y. Lee*, *S. Lee*, *H. Lee*, *S. Chung*, *H. Kim*, Yonsei University, Korea

**AF9-3** Advanced Wafer Scale Uniformity Characterization Method for Conformal 3D Thin Films, *Mikko Utriainen*, *P. Hyttinen*, *F. Gao*, Chipmetrics Ltd, Finland; *A. Bider*, *K. Saastamoinen*, *H. Rekola*, University of Eastern Finland, Institute of Photonics, Finland; *R. Puurunen*, Aalto University, School of Chemical Engineering, Finland; *O. Ylivaara*, VTT Technical Research Centre of Finland

**AF9-4** Thermal Atomic Layer Deposition of Silicon Nitride Using Anhydrous Hydrazine and Ammonia, *Dan N. Le*, *S. Hwang*, *J. Mohan*, *J. Kim*, *Y. Jung*, University of Texas at Dallas; *D. Alvarez*, *J. Spiegelman*, RASIRC; *J. Kim*, University of Texas at Dallas

**AF9-5** Importance of XPS Investigations of ALD Grown 2D Materials, *Jhonatan Rodriguez Pereira*, University of Pardubice, Czechia; *R. Zazpe*, *H. Söpha*, University of Pardubice; Central European Institute of Technology, Brno University of Technology, Czechia; *F. Bures*, University of Pardubice, Czechia; *J. Macak*, University of Pardubice; Central European Institute of Technology, Brno University of Technology, Czechia

**AF9-6** Microstructure and Mechanical Properties of Atomic Layer Deposited Alumina Doped Zirconia, *Helle-Mai Piirsoo*, University of Tartu, Estonia

**AF9-7** Friction and Wear Properties of Low-Temperature Metal Oxides, *Olli Ylivaara*, *L. Kilpi*, VTT Technical Research Centre of Finland; *R. Ritasalo*, Picosun Oy, Finland; *H. Ronkainen*, VTT Technical Research Centre of Finland

**AF9-8** Cryo-ePDF to Measure the Atomic Structure of Amorphous ALD Interfaces, *Matthias Young*, *N. Paranamana*, *X. He*, *T. White*, University of Missouri-Columbia

**AF9-11** Growth and Characterization of Sodium Fluoride Thin Films Deposited by Atomic Layer Deposition, *Sara Kuraitis*, Boise State University; *D. Kang*, *A. Mane*, *H. Zhou*, Argonne National Laboratory; *J. Soares*, Boise State University; *J. Elam*, Argonne National Laboratory; *E. Graugnard*, Boise State University

**AF9-14** Advanced Applications of Noncontact Electrical Metrology for ALD Films and Interfaces, *Marshall Wilson*, *D. Marinskiy*, *J. Lagowski*, Semilab SDI

**AF9-17** Assessing the Quality of 3D-printed ALD Films by Low Energy Ion Scattering, *Philipp Brüner*, IONTOF GmbH, Germany; *I. Kundrata*, *M. Plakhotnyuk*, ATLANT 3D Nanosystems, Denmark; *J. Bachmann*, Friedrich-Alexander-University Erlangen-Nürnberg (FAU), Germany; *T. Grehl*, IONTOF GmbH, Germany

**AF9-20** Resistive Switching Performance of Mixed Al<sub>2</sub>O<sub>3</sub> and ZrO<sub>2</sub> Thin Films, *Joonas Merisalu*, *T. Jõgiaas*, *A. Kasikov*, *A. Tamm*, *J. Aarik*, *K. Kukli*, University of Tartu, Estonia

## Atomic Layer Etching

### Room On Demand - Session ALE1

#### Plasma and/or Energy-enhanced ALE

1:00pm

**ALE1-1** Interpretation of SiO<sub>2</sub> Atomic Layer Etching Based on Plasma Diagnostics, *Youngseok Lee*, *C. Cho*, Chungnam National University, Korea (Republic of); *S. Kim*, Nanotech, Korea (Republic of); *J. Lee*, *I. Seong*, *S. You*, Chungnam National University, Korea (Republic of)

## Atomic Layer Etching

### Room On Demand - Session ALE12

#### Atomic Layer Etching Poster Session

1:00pm

**ALE12-1** On the Reactivity of SiN Surfaces Damaged by Ion Bombardment Towards CH<sub>3</sub>F and CF<sub>4</sub> Precursors, *Erik Cheng*, *G. Hwang*, University of Texas at Austin; *P. Ventzek*, *Z. Chen*, Tokyo Electron America

**ALE12-2** Mechanism of Thermal Dry Etching of Metallic Iron Thin Films Using Chlorine and Acetylacetone (acacH), *Mahsa Konh*, *A. Teplyakov*, *A. Janotti*, University of Delaware

**ALE12-3** Atomic Layer Etching of Titanium Nitride With O<sub>2</sub> Plasma and CF<sub>3</sub>I Plasma, *Seon Yang Kim*, Hanyang University, Korea (Republic of); *S. Shin*, *I. Park*, *J. Ahn*, Hanyang University, Korea

**ALE12-6** Thermal Atomic Layer Etching of Cobalt with Cl<sub>2</sub> Plasma and Hexafluoroacetylacetone (hfacH), *Yongjae Kim*, *D. Shim*, *J. Kim*, *H. Chae*, Sungkyunkwan University (SKKU), Korea (Republic of)

## Atomic Layer Etching

### Room On Demand - Session ALE2

#### Gas-phase and/or Thermal ALE

1:00pm

**ALE2-1** Anomalous Etch Behavior of NHC-Containing Gold Precursor, *Eden Goodwin*, Carleton University, Canada; *M. Griffiths*, Wayne State University, Canada; *A. Kadri*, McMaster University, Canada; *S. Barry*, Carleton University, Canada

**ALE2-2** Thermal Cyclic Etching of Non-Volatile Material by Self-Stabilizing Organometallic Complex Formation, *Yoshihide Yamaguchi*, *S. Fujisaki*, *K. Shinoda*, Hitachi, Japan; *K. Sato*, *M. Izawa*, Hitachi High Technologies, Japan

## Atomic Layer Etching

### Room On Demand - Session ALE3

#### Solution-based including Wet ALE

1:00pm

**ALE3-1** Novel Electrochemical Concepts for Enabling Atomic Layer Etching of Metals, *Y. Gong*, *Theodore Phung*, *R. Akolkar*, Case Western Reserve University

## Atomic Layer Etching

### Room On Demand - Session ALE8

#### Integration of ALD + ALE

1:00pm

**ALE8-1** Simultaneous Selective Deposition and Etching of Ru for Atomic Layer Processing of SiO<sub>2</sub>, *Sumaira Yasmeen*, *B. Ko*, *B. Gu*, *H. Lee*, Incheon National University, Korea (Republic of)

## ALD for Manufacturing

### Room On Demand - Session AM1

#### Equipment Design/Modeling/Large Format/Precursor Delivery

1:00pm

**AM1-1** Closed Loop Control of ALD/ALE Precursor Dose Delivery, *Jim Ye*, *J. Ding*, *V. Saptari*, MKS Instruments, Inc.

**AM1-2** Efficiency Characterization of Reactor-Scale Gas Exchange by CFD, *Anton Persson*, Linköping University, Sweden; *Ö. Danielsson*, Physicom AB, Sweden; *H. Pedersen*, *M. Karlsson*, Linköping University, Sweden

## ALD for Manufacturing

### Room On Demand - Session AM2

#### Spatial/R2R/Fast ALD

1:00pm

**AM2-1** Surface Modification and Stabilization of Photoluminescence Perovskite Nanocrystals via Atomic Layer Deposition, *Y. Jing*, Huazhong University of Science and Technology, China; *K. Cao*, *Rong Chen*, State Key Laboratory of Digital Manufacturing Equipment and Technology, School of Mechanical Science and Engineering, Huazhong University of Science and Technology, China

**AM2-4** Influence of Reactor and Pattern Geometry on Atomic Layer 3D Printing, *Ivan Kundrata*, *M. Plakhotnyuk*, ATLANT 3D Nanosystems, Denmark; *J. Bachmann*, *M. Barr*, *S. Tymek*, Friedrich-Alexander Universität Erlangen-Nürnberg, Germany; *P. Brüner*, IONTOF GmbH, Germany

**AM2-7** Realization and Dual Angle In-situ OES Characterization of Saturated 10-100 ms Precursor Pulses in a 300 mm CCP Chamber Employing de Laval Nozzle Ring Injector for Fast ALD, *Abhishekkumar Thakur*, *S. Wege*, *S. Bürzele*, *E. Ricken*, Plasway Technologies GmbH, Germany; *M. Krug*, Fraunhofer IKTS, Germany; *J. Sundqvist*, BALD Engineering AB, Sweden

## ALD for Manufacturing

### Room On Demand - Session AM4

#### ALD on Particles

1:00pm

**AM4-1** Improvement of Mechanical Properties of Nanoparticles-Based Thin Films by Using Atomic Layer Deposition, *Fatma Trabelsi, M. Fivel*, Univ. Grenoble Alpes, CNRS, Grenoble INP, SIMaP, France; *R. Salhi*, Laboratory of Advanced Materials, National School of Engineers of Sfax, University of Sfax, Tunisia; *F. Mercier, E. Blanquet*, Univ. Grenoble Alpes, CNRS, Grenoble INP, SIMaP, France

**AM4-2** Three-Dimensional Conformal Coating of Particles *Resting* on a Surface by Vapor-Phase Infiltration, *Chang-Yong Nam*, Brookhaven National Laboratory

**AM4-5** Atomic Layer Deposition (ALD) of Ultra-Thin Diffusion Barriers on ZnSe Microparticles for Phase Stability in Chalcogenide Glasses for Mid-Infrared Optics, *Jaynlynn Sosa*, Nanoscience Technology Center, University of Central Florida; *M. Chazot*, CREOL, College of Optics and Photonics, University of Central Florida; *C. Feit*, Department of Materials Science & Engineering, University of Central Florida; *A. Kostogiannes*, Department of Chemistry, University of Central Florida, Orlando, FL 32816, USA; *M. Kang, C. Blanco, K. Richardson*, CREOL, College of Optics and Photonics, University of Central Florida; *P. Banerjee*, Department of Materials Science & Engineering, University of Central Florida

## ALD for Manufacturing

### Room On Demand - Session AM5

#### ALD for Manufacturing Poster Session

1:00pm

**AM5-1** Development of MeCpPtMe3 Platinum Process by Rotary Type Reactor Atomic Layer Deposition on Powders, *Min Jong Kil, S. Yoon*, Korea Electronics Technology Institute, Korea (Republic of); *S. Jung*, Gachon University, Korea (Republic of); *H. Kim*, Korea Electronics Technology Institute, Korea (Republic of); *T. Kim*, Gachon University, Korea (Republic of); *H. Kim*, Korea Electronics Technology Institute, Korea (Republic of)

**AM5-2** Nanoscale Film Thickness Gradients Printed in Open Air by Spatially Varying Chemical Vapor Deposition, *Jhi Yong Loke*, University of Waterloo, Canada

**AM5-5** Measurements and Prediction Model for the Evaporation of Bis(diethylamino)silane, *Seung-Ho Seo, E. Shin, Y. Lee, D. Kim, H. Shin*, GO Element, Korea (Republic of); *C. Kim, W. Lee*, Sejong University, Korea (Republic of)

**AM5-6** Interface Modification of Bismuth by Atomic Layer Deposition: Enhanced Thermoelectrical Performance, *Shiyang He, A. Bahrami, K. Nielsch*, Leibniz Institute for Solid State and Materials Research, Germany

**AM5-9** Low Resistivity Titanium Nitride Thin Film Fabricated by Atomic Layer Deposition on Silicon, *Cheng-Hsuan Kuo*, UC San Diego, Taiwan; *V. Wang, z. zhang, H. Kashyap, A. Kummel*, UC San Diego

**AM5-12** Morphology-Controlled MoS<sub>2</sub> by Low-Temperature Atomic Layer Deposition, *Chengxu Shen, M. Raza, P. Amsalem, T. Schultz, N. Koch, N. Pinna*, Humboldt-Universität zu Berlin, Germany

## Area Selective ALD

### Room On Demand - Session AS1

#### Selective ALD by Area-Activation

1:00pm

**AS1-1** Area-Selective Atomic Layer Deposition Patterned by Electrohydrodynamic Jet Printing for Additive Nanomanufacturing of Functional Materials and Devices, *Tae Cho, N. Farjam, C. Allemang, C. Pannier, E. Kazyak, C. Huber, M. Rose, O. Trejo, R. Peterson, K. Barton, N. Dasgupta*, University of Michigan, Ann Arbor

**AS1-2** Surface-Activated Area-Selective Atomic Layer Deposition of Palladium, *Himamshu Nallan, X. Yang*, University of Texas at Austin; *B. Coffey*, Lam Research Corporation; *J. Ekerdt*, University of Texas at Austin

**AS1-3** In-Situ and in-Vacuo Studies on Area Selective Atomic Layer Deposited Ruthenium Films on Silicon and Silicon Oxide, *Sebastian Killge, J. Reif*, Technische Universität Dresden, Germany; *M. Knaut, M. Albert*, Technische Universität Dresden, Institute of Semiconductor and Microsystems (IHM); Chair of Nanoelectronics, Germany; *J. Bartha, T. Mikolajick*, Technische Universität Dresden, Germany

**AS1-6** Nucleation and Growth in Localized Thermal Atomic Layer Deposition, *Bart de Braaf, K. Storm*, Eindhoven University of Technology, Netherlands

## Area Selective ALD

### Room On Demand - Session AS2

#### Selective ALD by Area-Deactivation

1:00pm

**AS2-1** Gradient Area Selective Deposition using Ti Precursor Inhibitor for Seamless Gap-filling in 3D Nanostructure Pattern, *Chi Thang Nguyen*, Incheon National University, Korea (Republic of); *E. Cho*, Samsung Electronics, Korea (Republic of); *J. Park*, Hongik University, Korea (Republic of); *B. Gu*, Incheon National University, Korea (Republic of); *B. Shong*, Hongik University, Korea (Republic of); *H. Lee*, Incheon National University, Korea (Republic of)

**AS2-4** Selectivity Loss Mechanisms in TiO<sub>2</sub> Area Selective Deposition on Dimethylamino-Trimethylsilane Passivated SiO<sub>2</sub>, *Rachel Nye*, North Carolina State University; *K. Van Dongen, J. Clerix*, KU Leuven, Belgium; *G. Parsons*, North Carolina State University; *A. Delabie*, KU Leuven, Belgium

**AS2-7** Area-Selective Atomic Layer Deposition of Al<sub>2</sub>O<sub>3</sub> on SiO<sub>2</sub> Vapor-Functionalized with Small-Molecule Aminosilanes, *Wanxing Xu*, Colorado School of Mines, USA; *P. Lemaire, K. Sharma, D. Hausmann*, Lam Research Corporation; *S. Agarwal*, Colorado School of Mines, USA

## Area Selective ALD

### Room On Demand - Session AS3

#### Inherently Selective Processes

1:00pm

**AS3-1** Impact of Precursor Structure on the Initial Growth Trends of Atomic Layer Deposited Al<sub>2</sub>O<sub>3</sub> Films on Chemical Oxide and Hf-last Silicon, *Holger Saare, G. Parsons*, North Carolina State University

**AS3-2** Inherently Area-Selective Atomic Layer Deposition for High-K Dielectrics by Catalytic Local Activation, *Jeong-Min Lee, H. Kim, J. Ahn, W. Kim*, Hanyang University, Korea

**AS3-3** Integration of Two Atomic Layer Depositions in a Sequence for Area Selective Deposition of Two Materials, *Seung Keun Song, J. Kim, G. Parsons*, North Carolina State University

**AS3-4** Substrate Dependent Absorption of Volatile Antimony Pentachloride during Vapor Phase Poly(3,4-ethylenedioxythiophene) Polymerization, *JUNGSIK KIM, G. Parsons*, North Carolina State University

**AS3-7** Inherent Selective CVD of Amorphous HfO<sub>2</sub>/TiO<sub>2</sub> Nanolaminate for Nanoscale Patterning, *Yunil Cho, J. Huang*, University of California at San Diego; *C. Ahles*, University of California San Diego; *K. Wong, S. Nemani, E. Yeah*, Applied Materials; *A. Kummel*, University of California at San Diego

**AS3-10** Optimization of Substrate-Selective Atomic Layer Deposition of Zirconia on Different Forms of Copper Using Ethanol as Precursor Reactant and Surface Pre-Treatment, *Soumya Saha*, University of Illinois at Chicago; *N. Anderson*, Intel Corporation; *G. Jursich, C. Takoudis*, University of Illinois at Chicago

## Area Selective ALD

### Room On Demand - Session AS4

#### Area Selective ALD Poster Session

1:00pm

**AS4-1** Effect of Surface Cleaning Efficacy on Vapor-Phase Cleaning of Cu and Co Using Anhydrous N<sub>2</sub>H<sub>4</sub>, *Su Min Hwang, J. Kim, D. Le, R. Gummadavally, Y. Jung, J. Veyan*, University of Texas at Dallas, USA; *D. Alvarez, J. Spiegelman*, RASIRC; *J. Kim*, University of Texas at Dallas, USA

## Emerging Materials

### Room On Demand - Session EM1

#### Molecular Layer Deposition

1:00pm

**EM1-1** Gas Phase Phosphane-ene Polymer Film Depositions, *Peter Gordon*, Carleton University, Canada; *P. Ragogna*, University of Western Ontario, Canada; *C. McGuinness, Solvay; S. Barry*, Carleton University, Canada

**EM1-2** Atomic/Molecular Layer Deposition of Ordered 1D Coordination Polymer Thin Films With Adjustable Electric Conductivity, **Mikko Nisula**, Ghent University, Belgium; **A. Karttunen**, Aalto University, Finland; **E. Solano**, ALBA Synchrotron Light Source, Spain; **P. Kaur**, **A. Devi**, Ruhr University Bochum, Germany; **G. Tewari**, **M. Karppinen**, Aalto University, Finland; **M. Minjauw**, **H. Jena**, **P. Van Der Voort**, **C. Detavernier**, Ghent University, Belgium

**EM1-3** Oxidative Molecular Layer Deposition of Conjugated Amine Polymer Thin-Films, **Quinton Wyatt**, **M. Vaninger**, **T. Heitmann**, **H. Kaiser**, **M. Young**, University of Missouri, Columbia

**EM1-6** Converting Molecular Layer Deposited Alucone Films into Al<sub>2</sub>O<sub>3</sub>/alucone Hybrid Multilayers by Plasma Densification, **Juan Santo Domingo Peñaranda**, Ghent University, Spain; **M. Nisula**, Ghent University, Finland; **S. Vandembroucke**, **M. Minjauw**, Ghent University, Belgium; **J. Li**, Ghent University, China; **A. Werbrouck**, **J. Keukelier**, Ghent University, Belgium; **A. Pitillas Martínez**, IMEC, Spain; **J. Dendooven**, **C. Detavernier**, Ghent University, Belgium

## Emerging Materials

### Room On Demand - Session EM11

#### Emerging Materials Poster Session

1:00pm

**EM11-1** Strategies for High-Quality Nitride and Oxide Stacks by Plasma ALD, **Yi Shu**, Oxford Instruments Plasma Technology, UK; **F. McGuire**, Oxford Instruments Plasma Technology; **A. Kurek**, **O. Thomas**, Oxford Instruments Plasma Technology, UK; **H. Knoops**, Oxford Instruments Plasma Technology, Netherlands

**EM11-2** Compositionally Graded Laminate ALD Films, **Alexandru Pavel**, **V. Vorsa**, Greene Tweed, Inc.

**EM11-3** *In Situ* Electrical Conductance to Measure Vapor Phase Infiltration (VPI) Doping Kinetics of Semiconducting Polymers, **Kristina Malinowski**, **S. Gregory**, **O. Hvidsten**, **A. Jungreis**, **M. Losego**, Georgia Institute of Technology

**EM11-4** Atomic Layer Deposition of Yttrium Oxide using a Liquid Yttrium Precursor, Y-08, **M. Kim**, EMD Performance Materials, Korea (Republic of); **S. Lee**, EMD Electronics, Korea (Republic of); **M. Fang**, **J. Aldo**, **J. Woodruff**, **R. Kanjolia**, EMD Performance Materials; **Bhushan Zope**, EMD Electronics, USA; **S. Ivanov**, EMD Performance Materials

**EM11-7** Direct sALD of MOF: An Improvement in the Nucleation Behavior, **Maissa Barr**, **S. Nadiri**, Friedrich-Alexander-University Erlangen-Nürnberg (FAU), Germany; **D. Chen**, **P. Weidler**, Karlsruhe Institute of Technology (KIT), Germany; **S. Bochmann**, Friedrich-Alexander-University Erlangen-Nürnberg (FAU), Germany; **H. Baumgart**, department of Electrical and computer Engineering, Germany; **j. Bachmann**, Friedrich-Alexander-University Erlangen-Nürnberg (FAU), Germany; **E. Redel**, Karlsruhe Institute of Technology (KIT), Germany

**EM11-10** Thermal ALD Growth of Ir and IrOx Films Using (MeCp)Ir(COD) and Oxygen, **Guo Liu**, **J. Woodruff**, EMD Electronics, USA; **T. Okamura**, Merck Performance Materials Ltd, Japan; **D. Moser**, **R. Kanjolia**, **B. Zope**, EMD Electronics, USA

## Emerging Materials

### Room On Demand - Session EM2

#### Organic-Inorganic Hybrid Materials

1:00pm

**EM2-1** Toward Industrially Viable ALD/MLD Nanolaminate Films for Flexible Electronics, **Jesse Kalliomaki**, **T. McKee**, Picosun Oy, Finland

**EM2-2** Antibacterial Alumochitin Thin Films Grown by Molecular Layer Deposition, **Karina Ashurbekova**, CIC nanoGUNE BRTA, Spain; **K. Ashurbekova**, Dagestan State University, Russian Federation; **A. Muriqi**, Tyndall National Institute, University College Cork, Ireland; **L. Barandiaran Larrea**, CIC nanoGUNE BRTA, Spain; **B. Alonso Lerma**, CIC nanoGUNE BRTA, Spain; **I. Saric**, University of Rijeka, Croatia; **E. Modin**, CIC nanoGUNE BRTA, Spain; **R. Perez-Jimenez**, CIC nanoGUNE BRTA, IKERBASQUE, Spain; **P. Petracic**, University of Rijeka, Croatia; **M. Nolan**, Tyndall National Institute, University College Cork, Ireland; **M. Knez**, CIC nanoGUNE BRTA, IKERBASQUE, Spain

**EM2-3** Mechanics of Flexible  $\epsilon$ -Fe<sub>2</sub>O<sub>3</sub>/Organic Superlattice Thin-Film Magnets, **Janne-Petteri Niemelä**, Empa - Swiss Federal Laboratories for Materials Science and Technology, Switzerland; **A. Philip**, **G. Tewari**, Aalto University, Finland; **N. Rohbeck**, **B. Putz**, **T. Edwards**, Empa - Swiss Federal Laboratories for Materials Science and Technology, Switzerland; **M. Karppinen**, Aalto University, Finland; **J. Michler**, **I. Utke**, Empa - Swiss Federal Laboratories for Materials Science and Technology, Switzerland

**EM2-4** Effect of Vapor-Phase Metal Infiltration on Lithography of PMMA Resist for EUV Applications, **Su Min Hwang**, **R. Gummadavelly**, **D. Le**, **J. Kim**, **Y. Jung**, **J. Veyan**, University of Texas at Dallas, USA; **C. Nam**, Brookhaven National Laboratory; **J. Ahn**, Hanyang University, Korea; **J. Kim**, University of Texas at Dallas, USA

On Demand

**EM2-5** About the Importance of Purge Time in Molecular Layer Deposition of Alucone Films, **Hardik Jain**, **P. Poedt**, Holst Centre / TNO, Netherlands

**EM2-8** Low Temperature Alumina and Alucone Multistack by ALD for Flexible and Transparent Gas Barrier Layers, **Shiv Bhudia**, **N. Adjeroud**, **R. Leturq**, Luxembourg Institute of Science and Technology (LIST), Luxembourg

**EM2-11** Transport in Vapor Phase Infiltration Processes: Modeling and Measuring Competition between Reactions and Diffusion, **Emily McGuinness**, **Y. Ren**, **B. Jean**, **R. Lively**, **M. Losego**, Georgia Institute of Technology

**EM2-14** First Principles Study of Reactions in Hybrid Organic-Inorganic Films: The Impact of the Organic Reactant, **Arbresha Muriqi**, **M. Nolan**, Tyndall National Institute, University College Cork, Ireland

## Emerging Materials

### Room On Demand - Session EM3

#### Atomic Layer Epitaxy and Doping

1:00pm

**EM3-1** Low-Temperature Dopant-Assisted Crystallization of HfO<sub>2</sub> Thin Films, **Theodosia Gougousi**, Department of Physics, UMBC

## Emerging Materials

### Room On Demand - Session EM8

#### Nanolaminates

1:00pm

**EM8-1** Properties of Atomic Layer Deposited ZrO<sub>2</sub> or Fe<sub>2</sub>O<sub>3</sub> Based Multilayers, **Helina Seemen**, **K. Kukli**, **A. Tamm**, University of Tartu, Estonia

**EM8-2** Evaluation of the Near-Zero Temperature Coefficient of Resistivity (Nz-TCR) of ALD TiSi<sub>x</sub>N Films, **Corbin Feit**, **S. Berriel**, University of Central Florida; **A. Dhamdhare**, **B. Nie**, **H. Cho**, **H. Kim**, **S. Chugh**, **S. Rathi**, **N. Mukherjee**, Eugenius, Inc.; **P. Banerjee**, University of Central Florida

## Emerging Materials

### Room On Demand - Session EM9

#### Ternary and Quaternary Materials

1:00pm

**EM9-1** Substitutional W Doping of MoS<sub>2</sub> for Threshold Voltage Control of Field Effect Transistor, **Hwi Yoon**, **W. Woo**, **I. Sohn**, **Y. Lee**, **S. Seo**, **S. Cheong**, **H. Kim**, **H. Kim**, Yonsei University, Korea

**EM9-2** Atomic Layer Deposition of CuSn<sub>x</sub>S<sub>y</sub> from Low-Cost Precursors and Its Optical and Electrical Characteristics, **Jakub Ostapko**, **G. Kolodziej**, **M. Wlazlo**, CBRT - Research and Development Center of Technology for Industry, Poland; **Z. Starowicz**, Institute of Metallurgy and Materials Science, Poland; **G. Putynkowski**, CBRT - Research and Development Center of Technology for Industry, Poland

## Nanostructure Synthesis and Fabrication

### Room On Demand - Session NS2

#### Nanotubes, Nanowires, Nanopores

1:00pm

**NS2-1** Atomic Layer Deposition for Modification of Various 1D Nanomaterials, **R. Zazpe**, **H. Sopha**, **M. Motola**, Uni Pardubice, Czechia; **M. Rihova**, Brno University of Technology, Czechia; **Jan Macak**, Uni Pardubice, Czechia

## Nanostructure Synthesis and Fabrication

### Room On Demand - Session NS3

#### 2D Nanomaterials by ALD (including Transition Metal Dichalcogenides)

1:00pm

**NS3-1** 2D Core-Shell Quantum Dots Grown by ALD, **Jeff Schulpen**, **M. Verheijen**, **E. Kessels**, **V. Vandalon**, **A. Bol**, Eindhoven University of Technology, Netherlands

**NS3-2** 2D Molybdenum Dichalcogenides Family by Atomic Layer Deposition, **Raul Zazpe**, University of Pardubice, Czech Republic; **R. Krumpolec**, Masaryk University, Czech Republic; **J. Charvot**, **L. Hromadko**, University of Pardubice, Czech Republic; **H. Sopha**, University of Pardubice, Czech Republic, Czechia; **M. Motola**, **F. Bures**, **J. Macak**, University of Pardubice, Czech Republic



**NS3-3** Atomic Layer Deposition of Ultrathin Tungsten Oxide Films for 2D WS<sub>2</sub> Synthesis, **Maxim Kozodaev**, R. Romanov, A. Markeev, Moscow Institute of Physics and Technology, Russian Federation

**NS3-6** Wafer-Scale Synthesis of Transition Metal Dichalcogenide Thin Films by ALD-Based Technique Towards Nanoelectronics and Optoelectronics Applications, **Hao Zhu**, Z. Gu, T. Zhang, H. Liu, L. Chen, L. Ji, Q. Sun, Fudan University, China

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## Nanostructure Synthesis and Fabrication

### Room On Demand - Session NS4

#### ALD on 2D Related Materials and Devices

1:00pm

**NS4-1** Recovery Enhancement of Al<sub>2</sub>O<sub>3</sub> Functionalized MoS<sub>2</sub> Gas sensor by Atomic Layer Deposition, **Inkyu Sohn**, S. Wi, Y. Kim, M. Kim, H. Yoon, S. Jung, H. Kim, Yonsei University, Korea

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## Nanostructure Synthesis and Fabrication

### Room On Demand - Session NS5

#### ALD on Polymer Materials

1:00pm

**NS5-1** ALD of In<sub>2</sub>O<sub>3</sub> in PMMA: Resolving the Atomic Structure of Sequential Infiltration Synthesized Clusters, X. He, R. Waldman, S. Darling, D. Tiede, **Alex Martinson**, Argonne National Laboratory

**NS5-2** Understanding and Controlling Polymer-Organometallic Precursor Interactions in Sequential Infiltration Synthesis, **Inbal Weisbord**, N. Shomrat, R. Azoulay, A. Kaushansky, T. Segal-Peretz, Technion - Israel Institute of Technology, Israel

**NS5-3** Atomic Layer Deposition of Al<sub>2</sub>O<sub>3</sub> and TiO<sub>2</sub> on Polydimethylsiloxane, **Albert Santoso**, B. van den Berg, V. van Steijn, J. van Ommen, TU Delft, Netherlands

**NS5-6** Modified 3D Printed Architectures: Effects of Coating and Infiltration by Alumina on ABS, **Atilla Varga**, B. Nwokolo, P. Gordon, S. Barry, Carleton University, Canada

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## Nanostructure Synthesis and Fabrication

### Room On Demand - Session NS6

#### Nanostructures Synthesis and Fabrication Poster Session

1:00pm

**NS6-1** Synthesis of Silicon Carbide Thin Films by Post-Processing of Molecular Layer Deposition (MLD) Polyamide Films on Silicon, **Rustam Amashaev**, Dagestan State University, Russian Federation; I. Abdulagatov, Dagestan State University, Russian Federation

**NS6-2** Fabrication of Free-standing Three-dimensional Structures by Spatial Atomic Layer Printing, **Philipp Wiesner**, I. Kundrata, ATLANT, Germany; S. Tymek, M. Barr, Friedrich-Alexander-University Erlangen-Nürnberg (FAU), Germany; M. Plakhotnyuk, ATLANT, Denmark; J. Bachmann, Friedrich-Alexander-University Erlangen-Nürnberg (FAU), Germany

**NS6-5** Al<sub>2</sub>O<sub>3</sub> ALD Buffer Layers for Epitaxial Growth of Boron Nitride Beyond the Self-Termination Limit, **Mateusz Wlazlo**, CB RTP - Research and Development Center of Technology for Industry, Poland; P. Caban, Łukasiewicz Research Network - Institute of Microelectronics and Photonics, Poland; G. Kołodziej, CB RTP - Research and Development Center of Technology for Industry, Poland; P. Michałowski, Łukasiewicz Research Network - Institute of Microelectronics and Photonics, Poland

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Wang, V.: AA7-1, **19**; AF6-13, **21**; AM5-9, **23**  
Wang, X.: LI-ALD-TuM2-2, **8**; LI-ALE-TuM3-9, **10**  
Warburton, R.: AA3-3, **19**  
Watson, M.: AA1-7, **17**  
Wege, S.: AM2-7, **22**  
Wegener, E.: AA1-7, **17**  
Weidler, P.: EM11-7, **24**  
Weijtens, C.: AA2-2, **18**  
Weinfeld, K.: AA17-5, **18**  
Weisbord, I.: NS5-2, **25**  
Wells, B.: AF10-34, **20**  
Werbrouck, A.: AF6-1, **21**; EM1-6, **24**; LI-ALD-WeM2-40, **14**  
Werner, M.: AA17-2, **18**  
White, T.: AF9-8, **22**  
Wi, S.: NS4-1, **25**  
Wiesner, P.: LI-ALD-WeM1-6, **11**; NS6-2, **25**  
Williams, P.: AA17-2, **18**  
Willis, B.: AA14-3, **17**; AF10-34, **20**; AF6-10, **21**  
Wilson, M.: AF9-14, **22**  
Wilton, R.: AA15-1, **17**  
Winter, C.: AF1-1, **19**; AF1-3, **19**; AF1-9, **19**; LI-ALD-WeM1-46, **12**  
Wlazło, M.: EM9-2, **24**; NS6-5, **25**  
Wong, K.: AS3-7, **23**  
Woo, K.: AA17-4, **18**  
Woo, W.: EM9-1, **24**  
Woodruff, J.: AA7-1, **19**; EM11-10, **24**; EM11-4, **24**  
Woods, K.: LI-ALD-WeM1-46, **12**  
Wyatt, Q.: EM1-3, **24**  
— **X** —  
Xiang, J.: LI-ALD-TuM2-2, **8**  
Xu, C.: LI-ALD-TuM2-2, **8**  
Xu, L.: AF6-3, **21**  
Xu, W.: AS2-7, **23**; LI-ALD-WeM1-21, **11**  
— **Y** —  
Yalon, E.: AA17-5, **18**  
Yamada, N.: AA17-17, **18**  
Yamaguchi, Y.: ALE2-2, **22**  
Yamashita, A.: AF10-3, **20**  
Yang, C.: AF8-1, **21**  
Yang, J.: AF10-19, **20**  
Yang, T.: AF10-16, **20**; AF2-2, **20**  
Yang, W.: LI-ALE-WeM3-31, **16**  
Yang, X.: AS1-2, **23**; LI-ALE-WeM3-12, **15**  
Yanguas-Gil, A.: AF10-1, **20**; LI-ALD-TuM2-50, **9**  
Yasmeen, S.: ALE8-1, **22**  
Yasuhara, S.: LI-ALD-TuM1-6, **6**  
Ye, J.: AM1-1, **22**  
Yeah, E.: AS3-7, **23**  
Yeghoyan, T.: LI-ALE-WeM3-38, **16**  
Yeom, G.: LI-ALE-WeM3-2, **15**  
Yeon, C.: LI-ALD-TuM1-9, **6**  
Yim, J.: AF2-1, **20**  
Yin, Z.: AF10-28, **20**  
Ylivaara, O.: AF9-3, **22**; AF9-7, **22**  
Yong, J.: LI-ALD-TuM1-6, **6**  
Yoo, C.: AA11-1, **17**; AA17-4, **18**; LI-ALD-TuM2-6, **8**  
Yoo, S.: AF4-3, **21**  
Yoon, H.: AF9-2, **22**; EM9-1, **24**; NS4-1, **25**  
Yoon, J.: AA12-1, **17**; AA12-2, **17**  
Yoon, S.: AM5-1, **23**  
Yoshida, K.: AF10-8, **20**; AF10-9, **20**  
Yoshino, T.: AF10-3, **20**  
You, S.: ALE1-1, **22**  
Young, E.: LI-ALD-TuM2-37, **9**  
Young, M.: AA3-6, **19**; AF9-8, **22**; EM1-3, **24**  
Younkin, T.: LI-MoM-3, **4**  
Yu, Y.: AA17-6, **18**; AF10-10, **20**  
Yun, S.: AF6-13, **21**; LI-ALE-WeM3-31, **16**  
— **Z** —  
Zafeiropoulos, G.: AA1-10, **17**  
Zaitsu, M.: LI-ALD-TuM1-6, **6**  
Zaluzec, .: AA15-1, **17**  
Zanders, D.: AF1-6, **19**; AF1-7, **19**; AF1-8, **19**  
Zardetto, V.: AA2-2, **18**  
Zazpe, R.: AA17-35, **18**; AF1-4, **19**; AF9-5, **22**; NS2-1, **24**; NS3-2, **24**  
Zhang, C.: AA14-3, **17**  
Zhang, D.: LI-ALE-TuM3-6, **10**  
Zhang, R.: AA1-10, **17**  
Zhang, T.: NS3-6, **25**  
Zhang, Y.: AA15-1, **17**  
zhang, z.: AM5-9, **23**  
Zhang, Z.: LI-ALD-WeM1-17, **11**; LI-ALE-TuM3-9, **10**  
Zhao, B.: AF1-17, **19**  
Zhao, C.: LI-ALD-TuM2-2, **8**  
Zhou, H.: AF9-11, **22**  
Zhu, H.: NS3-6, **25**  
Zope, B.: EM11-10, **24**; EM11-4, **24**; LI-ALD-WeM1-21, **11**  
Zyulkov, I.: AA17-38, **18**