

Program Key

Conference Topics

AA	ALD Applications
AF	ALD Fundamentals
ALE	Atomic Layer Etching
AM	ALD for Manufacturing
AS	Area Selective ALD
EM	Emerging Materials
NS	Nanostructure Synthesis and Fabrication
PS	Plenary Session

Program Overview

Room /Time	Evergreen Ballroom & Foyer	Grand Ballroom A-C	Grand Ballroom A-G	Grand Ballroom E-G	Grand Ballroom H-K	Regency Ballroom A-C
SuP	Poster Sessions					
MoM			PS1-MoM: ALD Plenary Session PS2-MoM: ALE Plenary Session			
MoA		AA1-MoA: ALD for Biological and Space Applications AA2-MoA: ALD for Solar Cells, Fuel Cells, and H ₂ Storage		AF2-MoA: ALD Precursors I AF3-MoA: Growth and Characterization I	AF1-MoA: ALD Growth Mechanisms I AF4-MoA: Growth Mechanisms II	ALE1-MoA: Energy-enhanced ALE ALE2-MoA: ALE of Compound Semiconductors
MoP	Poster Sessions					
TuM		AF1-TuM: In-Situ Characterization of ALD Processes AF3-TuM: Growth and Characterization II		AA1-TuM: ALD for Catalysts, Electrocatalysts, and Photocatalysts AA2-TuM: ALD for Batteries I	AF2-TuM: ALD Precursors II AS1-TuM: Area-Selective ALD Techniques	ALE1-TuM: ALE: Gas-phase and/or Thermal ALE ALE2-TuM: Alternative Methods to ALE
TuA		AA3-TuA: ALD for Memory Applications I AF-TuA: Plasma ALD: Growth and Characterization		AA1-TuA: Emerging Applications I AA2-TuA: ALD for Batteries II	AS1-TuA: Area-Selective ALD by Area-Deactivation AS2-TuA: Area-Selective ALD: Combinations with Etching	ALE1-TuA: Modeling & Instrumentation I ALE2-TuA: Modeling & Instrumentation II
TuP	Poster Sessions					
WeM		EM1-WeM: Molecular Layer Deposition EM2-WeM: Organic-Inorganic Hybrid Materials		AM1-WeM: Spatial ALD, Fast ALD, and Large-Area ALD EM3-WeM: Epitaxial Growth and III-V Materials	AA1-WeM: ALD for Memory Applications II AA2-WeM: ALD for ULSI Applications I	ALE1-WeM: Integration & Application of ALE ALE2-WeM: Materials Selective ALE
WeA		AA1-WeA: Emerging Applications II		NS-WeA: 2D Nanomaterials by ALD (including Transition Metal Dichalcogenides)	AA2-WeA: ALD for ULSI Applications II	EM1-WeA: Ternary and Quaternary Oxide Materials

Special Events Sunday

Special Events Sunday

1:00 PM Tutorial/Grand H-K
6:00 PM Welcome Reception/Evergreen Ballroom & Foyer

Atomic Layer Etching

Room Evergreen Ballroom & Foyer - Session ALE-SuP

Atomic Layer Etching Poster Session

6:00pm

ALE-SuP-1 Mechanistic Thermal Desorption Studies of Thermal Dry Etching Reactions for Cobalt and Iron Thin Films, **Mahsa Konh**, *A Teplyakov*, University of Delaware

ALE-SuP-2 Mechanistic Study of the Thermal Atomic Layer Etch of Tungsten Metal Using O₂ and WCl₆, **Suresh Kondati Natarajan**, *M Nolan*, Tyndall National Institute, Ireland; *P Theofanis*, *C Mokhtarzadeh*, *S Clendenning*, Intel Corp.

ALE-SuP-3 Using Etching of the Atomic Layer to Remove Damaged Layers Obtained by Plasma-Chemical Etching with Subsequent Growth of GaAs Quantum Dots by the Method of Droplet Epitaxy, **Victor Klimin**, *A Rezvan*, *O Ageev*, Southern Federal University, Russia

ALE-SuP-4 Atomic Layer Etching of Silicon Using a Conventional ICP Etch Chamber for Failure Analysis Applications, **John Mudrick**, *R Shul*, *K Greth*, *R Goeke*, *D Adams*, Sandia National Laboratories

ALE-SuP-5 Study of the Chemical Fabrication Process of NSOM Probes and the Modification of its Surface for Sensing Applications, **Muhammad Nazmul Hussain**, *J Woehl*, University of Wisconsin-Milwaukee

ALE-SuP-6 A Mechanistic Study of the HF Pulse in the Thermal Atomic Layer Etch of HfO₂ and ZrO₂, **Rita Mullins**, *S Kondati Natarajan*, *M Nolan*, Tyndall National Institute, Ireland

ALE-SuP-7 Atomic Precision Processing of Aluminum Mirrors for Enhanced Ultra-violet Optical Properties, **Scott Walton**, *A Kozen*, U.S. Naval Research Laboratory; *J del Hoyo*, *M Quijada*, NASA Goddard Space Flight Center; *D Boris*, U.S. Naval Research Laboratory

ALE-SuP-8 Surface Reaction Analysis for Atomic-Layer Etching and Deposition by Means of Beam Experiments, **Kazuhiro Karahashi**, *T Ito*, *S Hamaguchi*, Osaka University, Japan

ALE-SuP-9 Atomic Layer Etching of SiO₂ and Si₃N₄ with Fluorocarbon, Hydrofluorocarbon and Fluoroether Compounds, *H Chae*, **Yongjae Kim**, *T Cha*, *Y Cho*, Sungkyunkwan University (SKKU), Republic of Korea

ALE-SuP-10 Cyclic Etching of Copper Thin Films using Two Sequential Steps, **Eun Tack Lim**, *J Choi*, *J Ryu*, *M Cha*, *C Chung*, Inha University, Republic of Korea

ALE-SuP-11 Analysis of Mechanisms Involved in Cryogenic ALE, **Thomas Tillocher**, *G Antoun*, *P Lefauchaux*, *R Dussart*, GREMI Université d'Orléans/CNRS, France; *K Yamazaki*, *K Yatsuda*, Tokyo Electron Limited, Japan; *J Faguet*, *K Maekawa*, TEL Technology Center, America, LLC

ALE-SuP-12 Study on Dry Etching Characteristics of Germanium Oxide by Atomic Layer Deposition, **Donghyuk Shin**, *J Jeong*, *H Song*, *H Park*, *D Ko*, Yonsei University, Republic of Korea

ALE-SuP-13 Laser Isotropic Atomistic Removal of Germanium, *D Paeng*, **He Zhang**, *Y Kim*, Lam Research Corp.

ALE-SuP-14 Anisotropic Atomic Layer Etching of Tungsten using Reactive Ion Beam, **Doo San Kim**, *J Kim*, *W Lee*, *Y Gill*, *B Jeong*, *G Yeom*, Sungkyunkwan University, Republic of Korea

Special Events Monday

Special Events Monday

12:00 AM Lunch Break and Exhibits/Evergreen Ballroom & Foyer
8:30 AM Opening Remarks ALD/Grand Ballroom A-G
10:15 AM Break & Exhibits/Evergreen Ballroom & Foyer
10:45 AM Opening Remarks ALE/Grand Ballroom A-G
3:30 PM Break & Exhibits/Evergreen Ballroom & Foyer

Monday Morning, July 22, 2019

Room Grand Ballroom A-G		
8:30am		Plenary Session Session PS1-MoM ALD Plenary Session Moderators: Sumit Agarwal, Colorado School of Mines, Dennis Hausmann, Lam Research
8:45am	INVITED: PS1-MoM-2 Atomic Scale Processing: From Understanding to Innovation, <i>Erwin Kessels</i> , Eindhoven University of Technology, Netherlands	
9:00am	Invited talk continues.	
9:15am	Invited talk continues.	
9:30am	INVITED: PS1-MoM-5 Plenary-ALD Elam, <i>Jeffrey W. Elam</i> , Argonne National Laboratory	
9:45am	Invited talk continues.	
10:00am	Invited talk continues.	
10:15am	Break & Exhibits	
10:30am	Break & Exhibits	
10:45am		
11:00am	INVITED: PS2-MoM-11 Mapping the Future Evolution of Atomic Scale Processing to enable the World of Artificial Intelligence, <i>Eric A. Joseph</i> , IBM T.J. Watson Research Center	Plenary Session Session PS2-MoM ALE Plenary Session Moderators: Craig Huffman, Micron, Gottlieb S. Oehrlein, University of Maryland, College Park
11:15am	Invited talk continues.	
11:30am	Invited talk continues.	

Monday Afternoon, July 22, 2019

Room Grand Ballroom A-C		
1:30pm	AA1-MoA-1 Atomic Layer Deposition on Pharmaceutical Particles for Inhaled Drug Delivery, <i>Damiano La Zara</i> , Delft University of Technology, Netherlands; <i>D Zhang, M Quayle, G Pettersson, S Folestad</i> , AstraZeneca, Sweden; <i>J van Ommen</i> , Delft University of Technology, Netherlands	ALD Applications Session AA1-MoA ALD for Biological and Space Applications Moderators: Elton Graugnard, Boise State University, Mato Knez, CIC nanoGUNE
1:45pm	AA1-MoA-2 The Use of Atomic Layer Deposition to Increase the Availability of Medical Radio-Isotopes, <i>Ruud van Ommen, J Moret, B Wolterbeek, E Pidko, A Denkova</i> , Delft University of Technology, Netherlands	
2:00pm	AA1-MoA-3 Atomic Layer Deposition for Biosensing Applications, <i>O Graniel, Matthieu Weber, S Balme, P Miele, M Bechelany</i> , Institut Européen des Membranes, France	
2:15pm	AA1-MoA-4 Multi-layer Stacked ALD Coating for Hermetic Encapsulation of Implantable Biomedical Microdevices, <i>Joonsoo Jeong</i> , Pusan National University, Republic of Korea; <i>S Sigurdsson, F Laiwalla</i> , Brown University; <i>R Ritasalo, M Pudas, T McKee, T Pilvi</i> , Picosun Oy, Finland; <i>A Nurmikko</i> , Brown University	
2:30pm	AA1-MoA-5 Modification of Spaceflight Radiator Coating Pigments by Atomic Layer Deposition for Thermal Applications, <i>Vivek Dwivedi</i> , NASA Goddard Space Flight Center; <i>R Adomaitis, H Salami, A Uy</i> , University of Maryland; <i>M Hasegawa</i> , NASA Goddard Space Flight Center	
2:45pm	AA1-MoA-6 Novel Atomic Layer Deposition Process/Hardware for Superconducting Films for NASA Applications, <i>Frank Greer, D Cunnane</i> , Jet Propulsion Laboratory	
3:00pm	AA1-MoA-7 Fluoride-based ALD Materials System for Optical Space Applications, <i>John Hennessy</i> , Jet Propulsion Laboratory, California Institute of Technology	
3:15pm	AA1-MoA-8 Atomic Layer Deposition of Aluminum Fluoride for use in Astronomical Optical Devices, <i>Alan Uy, H Salami, A Vadapalli, C Grob, R Adomaitis</i> , University of Maryland; <i>V Dwivedi</i> , NASA Goddard Space Flight Center	
3:30pm	Break & Exhibits	
3:45pm	Break & Exhibits	
4:00pm	AA2-MoA-11 Nucleation Layer for Atomic Layer Deposition Enabling High Efficiency and Flexible Monolithic All-Perovskite Tandem Solar Cells, <i>Axel F. Palmstrom, G Eperon, T Leijtens</i> , National Renewable Energy Laboratory; <i>R Prasanna</i> , Stanford University; <i>S Nanayakkara, S Christensen, K Zhu</i> , National Renewable Energy Laboratory; <i>M McGehee</i> , University of Colorado Boulder; <i>D Moore, J Berry</i> , National Renewable Energy Laboratory	ALD Applications Session AA2-MoA ALD for Solar Cells, Fuel Cells, and H₂ Storage Moderators: Christophe Detavernier, Ghent University, Belgium, Nicholas Strandwitz, Lehigh University
4:15pm	AA2-MoA-12 Perovskite Solar Cells Fabricated using Atomic Layer Deposited Doped ZnO as a Transparent Electrode, <i>Louise Ryan, M McCarthy, S Monaghan, M Modreanu, S O'Brien, M Pemble, I Povey</i> , Tyndall National Institute, Ireland	
4:30pm	AA2-MoA-13 Metal Oxide Barrier and Buffer Layers by Atomic Layer Deposition and Pulsed-Chemical Vapor Deposition for Semi-Transparent Perovskite Solar Cells, <i>Helen Hejin Park, T Eom, R Agbenyeke, S Yeo, G Kim, S Shin, T Yang, N Jeon, Y Lee, C Kim, T Chung, J Seo</i> , Korea Research Institute of Chemical Technology (KRICT), Republic of Korea	
4:45pm	AA2-MoA-14 Particle Atomic Layer Deposition of Tungsten Nitride Environmental Barrier Coatings from Bis(t-butylimido)bis(dimethylamino)tungsten(VI) and Ammonia, <i>Sarah Bull, A Weimer</i> , University of Colorado - Boulder	
5:00pm	AA2-MoA-15 Atomic Layer Deposition on Mg(BH ₄) ₂ : A Route to Improved Automotive H ₂ Storage, <i>Noemi Leick</i> , National Renewable Energy Laboratory; <i>K Gross</i> , H₂ Technology Consulting LLL; <i>T Gennett, S Christensen</i> , National Renewable Energy Laboratory	
5:15pm	AA2-MoA-16 Plasmonic Mediated Hydrogen Desorption from Metal Hydrides, <i>Katherine Hurst, A Gauding, M Martinez, N Leick, S Christensen, T Gennett</i> , National Renewable Energy Laboratory	
5:30pm	AA2-MoA-17 Surface Modification of Solid Oxide Fuel Cell Cathodes by Atomic Layer Deposition, <i>Dong Hwan Kim, H Choi, J Koo</i> , Korea University, Republic of Korea; <i>J Park, J Son</i> , Korea Institute of Science and Technology (KIST), Republic of Korea; <i>J Shim</i> , Korea University, Republic of Korea	

Monday Afternoon, July 22, 2019

Room Grand Ballroom E-G		
1:30pm	INVITED: AF2-MoA-1 The Materials Supplier Challenge: Flawless Execution from Precursor Design to High Volume Manufacturing, <i>Madhukar B. Rao</i> , Versum Materials	ALD Fundamentals Session AF2-MoA ALD Precursors I Moderators: Daniel Alvarez, RASIRC, Charles H. Winter, Wayne State University
1:45pm	Invited talk continues.	
2:00pm	AF2-MoA-3 Precursor and Co-Reactant Selection: A Figure of Merit, <i>Seán Barry</i> , <i>M Griffiths</i> , Carleton University, Canada	
2:15pm	AF2-MoA-4 Designing Thermal Atomic Layer Deposition Processes for Gold Metal using New Organogold Precursors and Co-reagents, <i>Matthew Griffiths</i> , <i>G Bačić</i> , <i>A Varga</i> , <i>S Barry</i> , Carleton University, Canada	
2:30pm	AF2-MoA-5 A New Carbene Based Silver Precursor Applied in APP-ALD Yielding Conductive and Transparent Ag Films: A Promising Precursor Class for Ag Metal ALD, <i>Nils Boysen</i> , Ruhr University Bochum, Germany; <i>T Hasselmann</i> , <i>D Theirich</i> , <i>T Riedl</i> , University of Wuppertal, Germany; <i>A Devi</i> , Ruhr University Bochum, Germany	
2:45pm	AF2-MoA-6 Transition Metal β -ketoiminates: A Promising Precursor Class for Atomic Layer Deposition of Binary and Ternary Oxide Thin Films, <i>Dennis Zywitzki</i> , <i>A Devi</i> , Ruhr University Bochum, Germany	
3:00pm	AF2-MoA-7 A New and Promising ALD Process for Molybdenum Oxide Thin Films: From Process Development to Hydrogen Gas Sensing Applications, <i>Jan-Lucas Wree</i> , Ruhr University Bochum, Germany; <i>M Mattinen</i> , University of Helsinki, Finland; <i>E Ciftçiyrek</i> , <i>K Schierbaum</i> , Heinrich Heine University Düsseldorf, Germany; <i>M Ritala</i> , <i>M Leskelä</i> , University of Helsinki, Finland; <i>A Devi</i> , Ruhr University Bochum, Germany	
3:15pm	AF2-MoA-8 Atomic Layer Deposition of Gallium Oxide Thin Films using Pentamethylcyclopentadienyl Gallium and Combinations of H ₂ O and O ₂ Plasma, <i>Fumikazu Mizutani</i> , <i>S Higashi</i> , Kojundo Chemical Laboratory Co., Ltd., Japan; <i>M Inoue</i> , <i>T Nabatame</i> , National Institute for Materials Science, Japan	
3:30pm	Break & Exhibits	
3:45pm	Break & Exhibits	
4:00pm	AF3-MoA-11 Understanding Elemental Steps of ALD on Oxidation Catalysts, <i>Kristian Knemeyer</i> , <i>M Piernawieja Hermida</i> , <i>R Naumann d'Alnoncourt</i> , Technische Universität Berlin, Germany; <i>A Trunschke</i> , <i>R Schlägl</i> , Fritz Haber Institute of the Max Planck Society, Germany; <i>M Driess</i> , Technische Universität Berlin, Germany; <i>F Rosowski</i> , BASF SE, Germany	ALD Fundamentals Session AF3-MoA Growth and Characterization I Moderators: Somilkumar Rathi, Eugenius, Inc., Sumit Agarwal, Colorado School of Mines
4:15pm	AF3-MoA-12 Advanced Lateral High Aspect Ratio Test Structures for Conformality Characterization by Optical Microscopy, <i>Oili Ylivaara</i> , <i>P Hyttinen</i> , VTT Technical Research Centre of Finland Ltd, Finland; <i>K Arts</i> , Eindhoven University of Technology, Netherlands; <i>F Gao</i> , VTT Technical Research Centre of Finland Ltd, Finland; <i>E Kessels</i> , Eindhoven University of Technology, Netherlands; <i>R Puurunen</i> , Aalto University, Finland; <i>M Utriainen</i> , VTT Technical Research Centre of Finland Ltd, Finland	
4:30pm	AF3-MoA-13 Dopant Concentration Analysis of ALD Thin Films in 3D Structures by ToF-SIMS, <i>A Kia</i> , <i>Wenke Weinreich</i> , Fraunhofer-Institut für Photonische Mikrosysteme (IPMS), Germany; <i>M Utriainen</i> , VTT Technical Research Centre of Finland Ltd, Finland; <i>R Puurunen</i> , Aalto University, Finland; <i>N Haufe</i> , Fraunhofer-Institut für Photonische Mikrosysteme (IPMS), Germany	
4:45pm	AF3-MoA-14 Metallic Ruthenium Coating on SiO ₂ Powder by Atomic Layer Deposition using H ₂ O Reactant., <i>H Lee</i> , <i>Chi Thang Nguyen</i> , Incheon National University, Republic of Korea	
5:00pm	AF3-MoA-15 Low Energy Ion Scattering Study of Pt@Al ₂ O ₃ Nanoparticle Coarsening, <i>Philipp Brüner</i> , IONTOF GmbH, Germany; <i>E Solano</i> , ALBA Synchrotron Light Source, Spain; <i>C Detavernier</i> , <i>J Dendooven</i> , Ghent University, Belgium	
5:15pm	AF3-MoA-16 Physical and Electrical Characterization of ALD Chalcogenide Materials for 3D Memory Applications, <i>Vijay K. Narasimhan</i> , <i>V Adinolfi</i> , <i>L Cheng</i> , <i>M McBriarty</i> , Intermolecular, Inc.; <i>M Utriainen</i> , <i>F Gao</i> , VTT Technical Research Centre of Finland Ltd, Finland; <i>R Puurunen</i> , Aalto University, Finland; <i>K Littau</i> , Intermolecular, Inc.	
5:30pm	AF3-MoA-17 The Tailoring of the Single Metal Atom-Oxide Interface, <i>Bin Zhang</i> , <i>Y Qin</i> , Institute of Coal Chemistry, Chinese Academy of Sciences, China	

Monday Afternoon, July 22, 2019

Room Grand Ballroom H-K		
1:30pm	AF1-MoA-1 Hybrid Computational Fluid Dynamics / Machine Learning Approaches to Reactor Scale Simulations and Optimization of ALD, ALEt, and LPCVD Processes, <i>Angel Yanguas-Gil</i> , <i>S Letourneau</i> , <i>A Lancaster</i> , <i>J Elam</i> , Argonne National Laboratory	ALD Fundamentals Session AF1-MoA ALD Growth Mechanisms I Moderators: Simon Elliot, Schrödinger, Inc., Angel Yanguas-Gil, Argonne National Lab
1:45pm	AF1-MoA-2 Scalable Kinetic Monte-Carlo Model for Parasitic Reactions in Silicon Nitride Growth using 3DMAS Precursor, <i>Gem Shoute</i> , <i>T Muneshwar</i> , Synthergy Inc., Canada; <i>D Barlage</i> , <i>K Cadien</i> , University of Alberta, Canada	
2:00pm	INVITED: AF1-MoA-3 Diffusion and Aggregation in Island-Growth and Area-Selective Deposition, <i>Fabio Grillo</i> , ETH Zurich, Switzerland	
2:15pm	Invited talk continues.	
2:30pm	AF1-MoA-5 Surface Kinetics in ALD and ALE: Computing the Cooperative Effect by Automated Enumeration of Reaction Pathways with Spectator Adsorbates, <i>Thomas Mustard</i> , Schrödinger, Inc.; <i>S Elliot</i> , Schrödinger, Inc.; <i>T Hughes</i> , <i>A Bochevarov</i> , <i>L Jacobson</i> , <i>S Kwak</i> , Schrödinger, Inc.; <i>T Morisato</i> , Schrödinger K.K., Japan; <i>J Gavartin</i> , Schrödinger, Inc., UK; <i>S Pandiyan</i> , Schrödinger, Inc., India; <i>M Halls</i> , Schrödinger, Inc.	
2:45pm	AF1-MoA-6 An Immiscible Fluids Approach for Correctly Predicting Agglomerate Dynamics during Particle Atomic Layer Deposition (Particle ALD), <i>Julia Hartig</i> , <i>A Weimer</i> , University of Colorado - Boulder	
3:00pm	INVITED: AF1-MoA-7 The Time-Resolved Interface between ALD and CVD, <i>Henrik Pedersen</i> , Linköping University, Sweden	ALD Fundamentals Session AF4-MoA Growth Mechanisms II Moderators: Viljami Pore, ASM, Mikko Ritala, University of Helsinki
3:15pm	Invited talk continues.	
3:30pm	Break & Exhibits	
3:45pm	Break & Exhibits	
4:00pm	INVITED: AF4-MoA-11 Monolithic Integration of Single Crystal Perovskites on Semiconductors with ALD, <i>John Ekerdt</i> , University of Texas at Austin	
4:15pm	Invited talk continues.	
4:30pm	AF4-MoA-13 Introducing the Concept of Pulsed Vapor Phase Copper-free Surface Click-chemistry using the ALD Technique, <i>Iva Saric</i> , <i>R Peter</i> , <i>M Kolympadi Markovic</i> , <i>I Jelovica Badovinac</i> , University of Rijeka, Croatia; <i>C Rogero</i> , Materials Physics Center (CSIC-UPV/EHU), Spain; <i>M Ilyn</i> , Donostia International Physics Center (DIPC), Spain; <i>M Knez</i> , CIC nanoGUNE, Spain; <i>G Ambrozic</i> , University of Rijeka, Croatia	ALD Fundamentals Session AF4-MoA Growth Mechanisms II Moderators: Viljami Pore, ASM, Mikko Ritala, University of Helsinki
4:45pm	AF4-MoA-14 Surface Enhanced Raman Spectroscopy Studies of Aluminum ALD Precursors for Al ₂ O ₃ Growth, <i>Michael Foody</i> , Illinois Institute of Technology	
5:00pm	AF4-MoA-15 Atomic Layer Deposition of Aluminum, Hafnium and Zirconium Oxyfluoride Films with Tunable Stoichiometry, <i>Neha Mahuli</i> , <i>J Wallas</i> , <i>S George</i> , University of Colorado - Boulder	
5:15pm	AF4-MoA-16 Fundamental Study on the SiO ₂ Growth Mechanism of Electronegativity Difference of Metal-O in the High- <i>k</i> Underlayers by PE-ALD Method, <i>Erika Maeda</i> , Shibaura Institute of Technology, Japan; <i>T Nabatame</i> , National Institute for Materials Science, Japan; <i>M Hirose</i> , Shibaura Institute of Technology, Japan; <i>M Inoue</i> , <i>A Ohji</i> , <i>N Ikeda</i> , National Institute for Materials Science, Japan; <i>M Takahashi</i> , <i>K Ito</i> , Osaka University, Japan; <i>H Kiyono</i> , Shibaura Institute of Technology, Japan	
5:30pm	AF4-MoA-17 Low Temperature Aluminium Nitride Deposition: Comparing Hydrazine and Ammonia, <i>Aswin L.N. Kondusamy</i> , <i>S Hwang</i> , <i>A Lucero</i> , <i>Z Qin</i> , <i>X Meng</i> , The University of Texas at Dallas; <i>D Alvarez</i> , <i>J Spiegelman</i> , RASIRC; <i>J Kim</i> , The University of Texas at Dallas	

Monday Afternoon, July 22, 2019

Room Regency Ballroom A-C		
1:30pm	INVITED: ALE1-MoA-1 Atomic Layer Etching – Advancing Its Application with a New Regime, <i>Samantha Tan, W Yang, K Kanarik, Y Pan, R Gottscho</i> , Lam Research Corp.	Atomic Layer Etching Session ALE1-MoA Energy-enhanced ALE Moderators: Keren J. Kanarik, Lam Research Corp., Harm Knoop, Eindhoven University of Technology
1:45pm	Invited talk continues.	
2:00pm	ALE1-MoA-3 Control of the Interface Layer in ALE Process by Alternating O ₂ Plasma with Fluorocarbon Deposition for High Selectivity Etching, <i>Takayoshi Tsutsumi, A Kobayashi</i> , Nagoya University, Japan; <i>N Kobayashi</i> , ASM Japan K.K., Japan; <i>M Hori</i> , Nagoya University, Japan	
2:15pm	ALE1-MoA-4 Self-limiting Atomic Layer Etching of SiO ₂ using Low Temperature Cyclic Ar/CHF ₃ Plasma, <i>Stefano Dallorto</i> , Lawrence Berkeley National Laboratory; <i>A Goodyear, M Cooke</i> , Oxford Instruments Plasma Technology, UK; <i>S Dhuey</i> , Lawrence Berkeley National Laboratory; <i>J Szornel</i> , Lawrence Livermore National Laboratory; <i>I Rangelow</i> , Ilmenau University of Technology, Germany; <i>S Cabrini</i> , Lawrence Berkeley National Laboratory	
2:30pm	ALE1-MoA-5 Evolution of Photoresist Layer Structure and Surface Morphology in a Fluorocarbon-Plasma-Based Atomic Layer Etching Process, <i>Adam Pranda, K Lin, S Gutierrez Razo, J Fourkas, G Oehrlein</i> , University of Maryland	
2:45pm	ALE1-MoA-6 Optimized Radical Composition of C ₄ F ₈ /Ar Plasma to Improve Atomic Layer Etching of SiO ₂ , <i>Young-Seok Lee, J Lee, S Yoo, S Lee, I Seong, C Cho, S Kim, J Son, S You</i> , Chungnam National University, Korea	
3:00pm	ALE1-MoA-7 Atomic Layer Etching of Silicon Nitride with Ultrahigh Etching Selectivity over Silicon and Oxide Materials by Utilizing Novel Etch Gas Molecule, <i>Xiangyu Guo</i> , American Air Liquide; <i>N Stafford</i> , Air Liquide; <i>V Pallem</i> , American Air Liquide	
3:15pm	ALE1-MoA-8 Atomic Layer Etching at Low Substrate Temperature, <i>Gaëlle Antoun, T Tillocher, P Lefauchaux, R Dussart</i> , GREMI Université d'Orléans/CNRS, France; <i>K Yamazaki, K Yatsuda</i> , Tokyo Electron Limited, Japan; <i>J Faguet, K Maekawa</i> , TEL Technology Center, America, LLC	
3:30pm	Break & Exhibits	
3:45pm	Break & Exhibits	
4:00pm	INVITED: ALE2-MoA-11 Developments of Atomic Layer Etch Processes and their Applications in Fabricating III-V Compound Semiconductor Devices, <i>Xu Li, Y Fu, S Cho, D Hemakumara, K Floros, D Moran, I Thayne</i> , University of Glasgow, UK	Atomic Layer Etching Session ALE2-MoA ALE of Compound Semiconductors Moderators: David Boris, U.S. Naval Research Laboratory, Ishii Yohei, Hitachi High Technologies
4:15pm	Invited talk continues.	
4:30pm	ALE2-MoA-13 GaN and Ga ₂ O ₃ Thermal Atomic Layer Etching Using Sequential Surface Reactions, <i>N Johnson, Y Lee, Steven M. George</i> , University of Colorado - Boulder	
4:45pm	ALE2-MoA-14 Selective GaN Etching Process using Self-limiting Cyclic Approach for Power Device Applications, <i>Frédéric Le Roux, N Posseme, P Burtin, S Barnola, A Torres</i> , Univ. Grenoble Alpes, CEA, LETI, France	
5:00pm	ALE2-MoA-15 ALE of GaN (0001) by Sequential Oxidation and H ₂ /N ₂ Plasma, <i>Kevin Hatch, D Messina, H Fu, K Fu, X Wang, M Hao, Y Zhao, R Nemanich</i> , Arizona State University	
5:15pm	ALE2-MoA-16 Comparative Study of Two Atomic Layer Etching Processes for GaN, <i>Cédric Mannequin, C You</i> , University of Tsukuba, Japan; <i>G Jacopin, T Chevolleau, C Durand</i> , University Grenoble-Alpes, France; <i>C Vallée</i> , LTM-UGA, France; <i>C Dussarat, T Teramoto</i> , Air Liquide Laboratories, Japan; <i>H Mariette</i> , University Grenoble-Alpes, France; <i>K Akimoto, M Sasaki</i> , University of Tsukuba, Japan; <i>E Gheeraert</i> , University Grenoble-Alpes, France	
5:30pm	ALE2-MoA-17 Chlorinated Surface Layer of GaN in Quasi Atomic Layer Etching of Cyclic Processes of Chlorine Adsorption and Ion Irradiation, <i>Masaki Hasegawa, T Tsutsumi</i> , Nagoya University, Japan; <i>A Tanide</i> , SCREEN Holdings Co., Ltd.; <i>H Kondo, M Sekine, K Ishikawa, M Hori</i> , Nagoya University, Japan	

ALD Fundamentals

Room Evergreen Ballroom & Foyer - Session AF1-MoP Precursor Synthesis and Process Development Poster Session 5:45pm

AF1-MoP-1 Atomic Layer Deposition of Molybdenum Films from Molybdenum Pentachloride Precursor, *Changwon Lee, S Lee, M Kim*, Versum Materials, Republic of Korea; *S Ivanov*, Versum Materials, Inc.

AF1-MoP-2 Atomic Layer Deposition of Silver Metal Films: Synthesis and Characterization of Thermally Stable Silver Metal Precursors, *Harshani J. Arachchilage, C Winter*, Wayne State University

AF1-MoP-3 Atomic Layer Deposition of Lanthanum Oxide Using Heteroleptic La Precursors, *Daehyeon Kim, J Lee, W Noh*, Air Liquide Laboratories Korea, South Korea

AF1-MoP-4 Synthesis and Thermal Characterization of New Molybdenum Precursors for Atomic Layer Deposition of Molybdenum Metal, *Michael Land*, Carleton University, Canada; *K Robertson*, Saint Mary's University, Canada; *S Barry*, Carleton University, Canada

AF1-MoP-6 A Novel Hf Precursor with Linked Cyclopentadienyl-Amido Ligand for Thermal Atomic Layer Deposition of HfO₂ Thin Film, *Jeong do Oh, M Nim, J An, J Seok, J Park*, Hansol Chemical, Republic of Korea

AF1-MoP-7 Atomic Layer Deposition of WS₂ using a New Metal-Organic Precursor and H₂S Molecules, *Deok Hyun Kim, D Nandi, S Kim*, Yeungnam University, Republic of Korea

AF1-MoP-8 Recent Advances in the Development of Metal Organic Precursors for Atomic Layer Deposition, *Anjana Devi, L Mai, D Zywitzki, S Beer, N Boysen, D Zanders, J Wree, M Wilken, H Parala*, Ruhr University Bochum, Germany

AF1-MoP-9 Synthesis of Group VI Oxyhalide Adducts and Mo Metal Film Growth on TiN Surfaces, *David Ermert, R Wright Jr., T Baum*, Entegris, Inc.

AF1-MoP-10 Gallium Precursor Development for ALD Film Applications, *Atsushi Sakurai, M Hatase, N Okada, A Yamashita*, ADEKA Corporation, Japan

AF1-MoP-11 Design and Optimization of Heteroleptic Zirconium Precursors by Density Function Theory Calculation, *Romel Hidayat*, Sejong University, Republic of Korea; *J Cho, H Lim, B Yang, J Park, W Chae*, DNF Co. Ltd, Republic of Korea; *H Kim*, Sejong University, Republic of Korea; *S Lee*, DNF Co. Ltd, Republic of Korea; *W Lee*, Sejong University, Republic of Korea

AF1-MoP-12 Low Temperature Plasma-Enhanced Atomic Layer Deposition of ZnO from a New Non-Pyrophoric Zn Precursor, *Lukas Mai, F Mitschker, P Awakowicz, A Devi*, Ruhr University Bochum, Germany

AF1-MoP-13 Homoleptic and Heteroleptic Yttrium Precursor: Tuning of Volatility, Reactivity and Stability for ALD Applications, *Sebastian Markus Josef Beer, A Devi*, Ruhr University Bochum, Germany

AF1-MoP-14 Gallium ALD Precursor Development based on Mechanistic Study, *M Foody, Y Zhao, Adam Hock*, Illinois Institute of Technology

AF1-MoP-15 Fluorine Doping of Aluminium Oxide Through In-situ Precursor Synthesis: Theory, Design and Application., *Ben Peek*, University of Liverpool, UK

ALD Fundamentals

Room Evergreen Ballroom & Foyer - Session AF2-MoP Precursor Selection and Growth Optimization Poster Session 5:45pm

AF2-MoP-1 Atomic Layer Deposition of Cyclopentadienyl Based Hf Precursor With Various Oxidants, *Jooho Lee, D Kim, W Noh*, Air Liquide Laboratories Korea, South Korea

AF2-MoP-2 Atomic Layer Deposition of Magnesium Oxide Thin Films by using Bis(ethylcyclopentadienyl)Magnesium Precursor and H₂O, O₂ Plasma and O₃ Reactants, *Moo-Sung Kim, S Lee*, Versum Materials Korea, Republic of Korea; *S Ivanov*, Versum Materials, Inc.

AF2-MoP-3 Comparative Study between CpTi(OMe)₃ and CpTi(NMe₂)₃ for Atomic Layer Deposition of Titanium Oxide, *Jaemin Kim, S Kim, R Hidayat, Y Choi, H Kim, W Lee*, Sejong University, Republic of Korea

AF2-MoP-4 Tin Nitride Atomic Layer Deposition using Hydrazine, *Ann Greenaway, A Tamboli, S Christensen*, National Renewable Energy Laboratory

AF2-MoP-5 Growing Polycrystalline Indium Oxide Film by Atomic Layer Deposition, *Chien-Wei Chen*, ITRC, NARL, Republic of China

AF2-MoP-6 Low Temperature Tin Oxide by Atomic Layer Deposition, *Yu-Chiao Lin, B Liu, Y Yu, C Kei, C Lin*, National Applied Research Laboratories, Republic of China

AF2-MoP-7 Dielectric ALD with Hydrogen Peroxide: Comparative Study of Growth and Film Characteristics for Anhydrous H₂O₂, H₂O₂/H₂O Mixtures and H₂O, *Daniel Alvarez*, RASIRC; *K Andachi, G Tsuchibuchi, K Suzuki*, Taiyo Nippon Sanso Corporation; *J Spiegelman*, RASIRC

AF2-MoP-8 Atomic Layer Deposition of Carbon Doped Silicon Oxide and Effect of Thermal Treatment or Hydrogen Plasma Treatment on The Films, *Meiliang Wang, H Chandra, X Lei, A Mallikarjunan, K Cuthill, M Xiao, M Rao*, Versum Materials, Inc.

AF2-MoP-9 DFT Study on Atomic Layer Deposition of Al₂O₃ with Various Oxidants, *Seunggi Seo, T Nam*, Yonsei University, Republic of Korea; *H Lee*, Incheon National University, Republic of Korea; *B Shong*, Hongik University, Republic of Korea; *H Kim*, Yonsei University, Republic of Korea

AF2-MoP-10 Effect of Heteroleptic Structure on Atomic Layer Deposited HfO₂ Using Hf(N(CH₃)₂)₄ and CpHf(N(CH₃)₂)₃ Precursors, *Sung Min Park, B Park, S Lee, H Yoon*, Yonsei University, Republic of Korea; *M Lee, S Kim*, Yeungnam University, Republic of Korea; *H Kim*, Yonsei University, Republic of Korea

AF2-MoP-11 Effect of Co-Reactant on the Atomic Layer Deposition of Copper Oxide, *Jason Avila, N Nepal, V Wheeler*, U.S. Naval Research Laboratory

AF2-MoP-12 A Systematic Study on Atomic Layer Deposition of ZrO₂ Thin Films, *X Wang, J Cai, Xiangbo Meng*, University of Arkansas

AF2-MoP-13 Hydrophobic SiO_x Thin Film Deposition using Low-Temperature Atomic Layer Deposition, *Taewook Nam, H Kim*, Yonsei University, Republic of Korea

AF2-MoP-14 Characteristics of High-temperature ALD SiO₂ Thin Films Using a Si Precursor with Excellent Thermal Stability, *Jae-Seok An, J Park, M Nim*, Hansol Chemical, Republic of Korea; *Y Kim, J Gu, S Kim*, Sejong University, Republic of Korea; *J Seok, J Park*, Hansol Chemical, Republic of Korea; *W Lee*, Sejong University, Republic of Korea

AF2-MoP-15 Developing Routes Toward Atomic Layer Deposition of Tungsten using Fluorine-Free W Precursor and Various Reactants with Density Functional Theory, *Tae Hyun Kim, D Nandi, M Lee*, Yeungnam University, Republic of Korea; *R Hidayat, S Kim, W Lee*, Sejong University, Republic of Korea; *S Kim*, Yeungnam University, Republic of Korea

AF2-MoP-16 ALD HfO₂ with Anhydrous H₂O₂ in a 300 mm Cross-flow Reactor – Comparison with H₂O and O₃ Oxidants, *Steven Consiglio, R Clark, C Wajda, G Leusink*, TEL Technology Center, America, LLC

AF2-MoP-17 Atomic Layer Deposition of Copper (I) Chloride using Liquid 1-Chlorobutane Precursor, *Richard Krumpolec, D Cameron, D Bača, J Humlíček, O Čaha*, Masaryk University, Czech Republic

AF2-MoP-18 Number Effect of Si Atoms Contained in Precursor for SiN Atomic Layer Deposition, *Seungbae Park, H Ji, H Yang, S Yoon*, DUKSAN Techopia company, Republic of Korea; *I Park*, Hanyang University, Republic of Korea

ALD Fundamentals

Room Evergreen Ballroom & Foyer - Session AF3-MoP Growth Mechanisms and In Situ Studies Poster Session 5:45pm

AF3-MoP-1 Langasite Crystal Microbalance (LCM) for In-situ Process Monitoring of ALD up to 440 °C, *Masafumi Kumano*, Tohoku University, Japan; *K Inoue*, Piezo Studio, Japan; *K Hikichi*, Technofine co. Ltd, Japan; *M Shimizu, S Tanaka*, Tohoku University, Japan

AF3-MoP-2 In-Situ Process Monitoring of Precursor Delivery Using Infra-Red Spectroscopic Method, *Robert Wright, T Baum*, Entegris, Inc.

AF3-MoP-3 Quantitative Analysis of High-k ALD Precursors for Trace Elemental Impurities by Inductively Coupled Plasma – Mass Spectrometry (ICP-MS), *Jinjin Wang*, Air Liquide Electronics – Balazs NanoAnalysis

AF3-MoP-4 Numerical Studies of the Fluid Dynamics and Chemical Kinetics of Spatial Atomic Layer Deposition of Al₂O₃, *Dongqing Pan*, University of North Alabama

Monday Afternoon Poster Sessions, July 22, 2019

AF3-MoP-5 Mechanistic Understanding of Dicholasilane Thermal Decomposition during Atomic Layer Deposition of Silicon Nitride, *Gyeong Hwang, G Hartmann*, University of Texas at Austin; *P Ventzek*, Tokyo Electron America Inc.; *T Iwao, K Ishibashi*, Tokyo Electron Ltd.

AF3-MoP-6 New Challenges of the Channeled Spectroscopic Ellipsometry for ALD Applications, *Gai Chin*, ULVAC Inc., Japan

AF3-MoP-7 In-situ Ellipsometric Analysis of the Plasma Influence on Atomic Layer Deposited AlN Thin Films, *Necmi Biyikli, S Ilhom, D Shukla, A Mohammad, B Willis*, University of Connecticut

AF3-MoP-8 Reaction Mechanisms of Thermal and Plasma-Modified ALD Growth Studied by In-Situ Mass Spectrometry, *Thomas J. Larrabee, L Ruppalt*, U.S. Naval Research Laboratory

AF3-MoP-10 In-situ Quartz Crystal Microbalance Study of Poly(3,4-ethylenedioxythiophene) (PEDOT) by Oxidative Molecular Layer Deposition (o-MLD), *G Parsons, Jungsik Kim, A Volk*, North Carolina State University

ALD Fundamentals

Room Evergreen Ballroom & Foyer - Session AF4-MoP

Plasma Enhanced ALD Poster Session

5:45pm

AF4-MoP-1 Low-temperature Atomic Layer Deposition of Yttrium Oxide using tris(butylcyclopentadienyl)yttrium and a Plasma-Excited Humidified Argon, *Kentaro Saito, K Yosida, K Kanomata, M Miura, B Ahmmad, K Shigeru, F Hirose*, Yamagata University, Japan

AF4-MoP-2 Plasma Enhanced Atomic Layer Deposition of Silicon Nitride Thin Film by Organosilane Precursor and Process Engineering, *Se-Won Lee, C Lee, M Kim*, Versum Materials Korea, Republic of Korea; *S Yi, X Lei*, Versum Materials, Inc.

AF4-MoP-3 Understanding the Effect of Plasma Gas Chemistry and Reactor Pressure on the Crystallinity of AlN Films Grown via Plasma-Assisted Atomic Layer Deposition, *Saidjafarzoda Ilhom, D Shukla, A Mohammad, N Biyikli, B Willis*, University of Connecticut

AF4-MoP-4 Plasma Enhanced Atomic Layer Deposition of Aluminum and Aluminum Fluoride, *Daniel Messina, Z Haung, B Eller, F Koec, P Scowen, R Nemanich*, Arizona State University

AF4-MoP-5 High-temperature Hollow Cathode Plasma Enhanced Atomic Layer Deposition of Silicon Nitride (SiN_x) Thin Films using Hexachlorodisilane (HCDS), *Su Min Hwang, A Kondusamy, Q Zhiyang, H Kim, J Kim*, University of Texas at Dallas; *X Zhou, B Hwang*, Dow Chemicals

AF4-MoP-6 Effects of Ion Bombardment in Plasma Enhanced Atomic Layer Deposition Processes, *Hu Li*, Tokyo Electron Technology Solutions Ltd., Japan; *T Ito*, Osaka University, Japan; *M Kagaya, T Moriya*, Tokyo Electron Technology Solutions Ltd., Japan; *K Karahashi, S Hamaguchi*, Osaka University, Japan; *M Matsukuma*, Tokyo Electron Technology Solutions Ltd., Japan

AF4-MoP-8 Microwave Generated Plasma Enhanced Atomic Layer Deposition of Oxides, *Ji Hye Kim, Y Tak, Y Lee*, ISAC Research Inc., Republic of Korea; *A Poruba, J Dolak, SVCS Process Innovation s.r.o.*, Czech Republic; *H Park*, ISAC Research Inc., Republic of Korea

AF4-MoP-9 Epitaxial Growth of GaN by Plasma-Enhanced Atomic Layer Deposition, *Sanjie Liu, X Zheng*, University of Science and Technology Beijing, China

AF4-MoP-10 Improving Plasma Enhanced Atomic Layer Deposition of Silicon Nitride with A Halodisilane, *B Hwang, C Lee, Xiaobing Zhou, A Foss*, DuPont; *T Sunderland, A Millward*, Dow Chemicals; *S Hwang, J Kim, A Lucero, A Kondusamy*, University of Texas at Dallas

AF4-MoP-11 Characteristics of Silicon Nitride Film Deposited by Multi-electrode VHF (162 MHz)-PEALD, *Ki Hyun Kim, K Kim, Y Ji, J Byun*, Sungkyunkwan University, Republic of Korea; *A Ellingboe*, Dublin City University; *G Yeom*, Sungkyunkwan University, Republic of Korea

AF4-MoP-12 Characteristics of Low Damage Cobalt Films Deposited by Very High Frequency Plasma Enhanced Atomic Layer Deposition, *Changhoon Song, W Yeom, Y Shin, G Kim, G Yeom*, Sungkyunkwan University, Republic of Korea

ALD Fundamentals

Room Evergreen Ballroom & Foyer - Session AF5-MoP

Characterization of ALD Films Poster Session

5:45pm

AF5-MoP-1 Film Thickness and Trace Metal Analysis of Compound Semiconductor Stacks through Direct Film Stripping (DFS) followed by ICP-MS/OES, *Vijay (Jaya) Chowdhury, J Huang*, ChemTrace; *P Sun*, UCT - ChemTrace; *E Appiah*, ChemTrace

AF5-MoP-2 Overview of Doctoral Theses on Atomic Layer Deposition Worldwide - Outcome of the Virtual Project on the History of ALD, *J Aarik*, University of Tartu, Estonia; *J Aav, E Ahvenniemi*, Aalto University, Finland; *A Akbashev*, Stanford University; *S Ali*, Aalto University, Finland; *M Bechelany*, Institut Européen des Membranes, France; *M Berdova*, Aalto University, Finland; *I Bodalyov*, St. Petersburg State Institute of Technology, Russian Federation; *S Boyadjiev*, Bulgarian Academy of Sciences, Bulgaria; *D Cameron*, Masaryk University, Czech Republic; *N Chekurov*, Oxford Instruments Analytical Oy, Finland; *R Cheng*, Huazhong University of Science and Technology, China; *M Chubarov*, The Pennsylvania State University; *V Cremers*, Ghent University, Belgium; *A Devi*, Ruhr University Bochum, Germany; *V Drozd*, St. Petersburg State Institute of Technology, Russian Federation; *L Elnikova*, Institute for Theoretical and Experimental Physics, Russian Federation; *G Gottardi*, Fondazione Bruno Kessler, Center for Materials and Microsystems, Italy; *J. Ruud van Ommen*, Delft University of Technology, Netherlands; *R Puurunen*, Aalto University, Finland

AF5-MoP-3 Nanoscale Chemical Characterization of Ultrathin Films via PiFM, *Sung Park, D Nowak, W Morrison*, Molecular Vista

AF5-MoP-4 The Effect of Impurities on Film Properties in the Y(MeCp)₃/O₃ Process, *J Kalliomäki, T Lehto, M Kääriä, T Sarnet, Jani Kivioja*, Picosun Oy, Finland

AF5-MoP-6 Internal Photoemission Spectroscopy Measurement of Barrier Heights between ALD Ru and Al₂O₃, *Melanie Jenkins, M Hayes, K Holden, J Conley, Jr.*, Oregon State University

AF5-MoP-7 Growth and Characterization: Low Temperature ALD, *Biröl Kuyel, A Alphonse, K Hong, J Marshall*, Nano-Master, Inc.

AF5-MoP-8 Etch Rate Characterization of Oxide ALD Films, *Martin M. Winterkorn, H Kim, J Provine, F Prinz, T Kenny*, Stanford University

AF5-MoP-9 Structure and Properties of Amorphous Thin Films Vary with Nanometric Thickness, *Yael Etinger-Geller*, Technion-Israel Institute of Technology, Israel

AF5-MoP-10 Structural Aspects of Nanometer Size Amorphous Materials, *Yael Etinger-Geller, A Katsman, B Pokroy*, Technion - Israel Institute of Technology, Israel

ALD for Manufacturing

Room Evergreen Ballroom & Foyer - Session AM-MoP

ALD for Manufacturing Poster Session

5:45pm

AM-MoP-1 Cobalt Precursor Supply Chain - Ethics and Risks, *Andreas Wilk, A Frey, O Briel*, Umicore AG & Co. KG, Germany; *D Zeng*, Umicore AG & Co. KG

AM-MoP-2 Homogeneous and Stress Controlled PEALD Films for Large Optics, *Hassan Gargouri, F Naumann, S Golka*, SENTECH Instruments GmbH, Germany; *K Pfeiffer*, Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Germany; *V Beladiya*, Friedrich Schiller University, Germany; *A Szeghalmi*, Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Germany

AM-MoP-3 Sensing Response of ZnO Nanotube Gas Sensor Synthesized on Porous Substrate by Atomic Layer Deposition, *Pengtao Lin, K Zhang, H Baumgart*, Old Dominion University

AM-MoP-4 Temperature-based Control of Liquid Precursor Delivery for ALD Processes, *Egbert Woelk*, CeeVeeTech; *K Kimmerle, B Kimmerle*, NSI; *J Maslar*, National Institute of Standards and Technology

AM-MoP-5 Design and Manufacturing of ICP-Type Remote Plasma ALD, *J An, Dohyun Go, J Shin, B Yang, H Kim*, Seoul National University of Science and Technology, Republic of Korea

AM-MoP-6 ACS™ (Atomically Clean Surface™) Cleaning and Analytical Validation of Recycled ALD Chamber Parts for the Semiconductor Industry, *Russell Parise, I Iordanov, B Quinn*, UCT - QuantumClean; *P Sun*, UCT - ChemTrace

AM-MoP-8 Process Control and Mass Delivery Optimization from Low Vapor Pressure Precursors, *Jeffrey Spiegelman, C Ramos, D Alvarez, Z Shamsi*, RASIRC

AM-MoP-9 Scaling Low-temperature Thermal ALD of SiO₂ to Batch, *J Kalliomäki, M Mäntymäki, T Lehto, S Shukla, M Kääriä, T Sarnet, Juhana Kostamo*, Picosun Oy, Finland

AM-MoP-10 A Novel Technique for Pulsed Liquid Source Vapor Delivery for ALD and Short Pulse CVD, *Kathleen Erickson, E Ellsworth*, MSP - A Division of TSI

Emerging Materials

Room Evergreen Ballroom & Foyer - Session EM-MoP

Emerging Materials Poster Session

5:45pm

EM-MoP-1 Structure and Magnetism of Electrospun α -Fe₂O₃ Nanofibers SiO₂-Coated by ALD, *F Pantò*, CNR-Istituto di Tecnologie Avanzate per l'Energia (ITAE), Italy; *H Raza*, Humboldt-Universität zu Berlin, Germany; *A Ferretti*, CNR-Istituto di Scienze e Tecnologie Molecolari (ISTM), Italy; *C Triolo*, Università di Messina, Italy; *A Ponti*, CNR-Istituto di Scienze e Tecnologie Molecolari, Italy; *S Patanè*, Università di Messina, Italy; *N Pinna*, Humboldt-Universität zu Berlin, Germany; *Saveria Santangelo*, Università Mediterranea, Italy

EM-MoP-2 Fluidized Bed Molecular Layer Deposition of Ultrathin Poly(ethylene terephthalate) Films on TiO₂ P25 Nanoparticles, *Damiano La Zara, M Bailey, D Benz*, Delft University of Technology, Netherlands; *M Quayle, G Petersson, S Folestad*, AstraZeneca, Sweden; *J van Ommen*, Delft University of Technology, Netherlands

EM-MoP-3 Fabrication and Characterization of Organic-Inorganic Hybrid Thin Films, *S Mo, Chu Huang*, Hanyang University, Republic of Korea

EM-MoP-4 High Performance Encapsulation Polymer-Al₂O₃ Hybrid Thin Layer by Atomic Layer Infiltration, *S Mo, Hong Rho Yoon, J Park, N Long, C Huang*, Hanyang University, Republic of Korea

EM-MoP-5 ALD of Metal Oxides Fabricated by using La(NO₃)₃·6H₂O Oxidant and their Applications, *In-Sung Park, S Kim, T Lee, S Seong, Y Jung, J Ahn*, Hanyang University, Republic of Korea

EM-MoP-6 Bringing Higher Etch-resistance to Metal-infiltrated Polymer, *Norikatsu Sasao, K Asakawa, S Sugimura*, Toshiba Memory Corporation

EM-MoP-7 Magnetic and Electric Properties of Atomic Layer Deposited ZrO₂-based Thin Films, *Kristjan Kalam, H Seemen, P Ritslaid, T Jõgiias, M Rähn, A Kasikov, A Tamm, K Kukli, M Mikkor*, University of Tartu, Estonia; *J Link, R Stern*, National Institute of Chemical Physics and Biophysics, Estonia; *S Dueñas, H Castán*, University of Valladolid

EM-MoP-8 Vapor Phase Infiltration as a New Approach in the Fabrication of Advanced Hybrid Thermoelectric Materials, *Jaime DuMont, M Knez*, CIC nanoGUNE, Spain

EM-MoP-9 Low-temperature Atomic Layer Deposition of Aluminum Oxide on Polymeric Powder Feedstocks for Improved Powder Rheology, *John Miller, C Gillespie, J Chesser*, Lawrence Livermore National Laboratory; *A Scheppe*, United States Air Force Academy; *A Nelson, N Teslich, A Lange, S Elhadj, R Reeves*, Lawrence Livermore National Laboratory

EM-MoP-10 Atomic Layer Deposition of Molybdenum Oxide Carbide and Molybdenum Carbide Films, *Michael D. Overbeek, C Winter*, Wayne State University

EM-MoP-11 Solid Phase Epitaxy of ALD-Grown PrAlO₃ Films, *Navoda Jayakodiarachchi, W Waduge*, Wayne State University; *Y Chen, P Zuo, T Kuech, S Babcock, P Evans*, University of Wisconsin-Madison; *C Winter*, Wayne State University

EM-MoP-12 Homogenous Distribution of Dopants in ALD Films: Tin-Doped Zinc Oxide (ZTO) Case Study, *Tiratna Muneshwar, D Barlage, K Cadien*, University of Alberta, Canada

EM-MoP-13 Uniform, Thermal ALD of Al₂O₃ and ZnO on Zirconia Particles, *Dhruv Shah, D Patel, J O'Tani, M Linford*, Brigham Young University

EM-MoP-14 Composition Control of Ge-Sb-Te Film by Supercycles of ALD GeSb and ALD Sb Followed by Tellurization Annealing, *Yewon Kim, J Lee*, Sejong University, Republic of Korea; *S Baik*, Hankyong National University, Republic of Korea; *W Koh*, UP Chemical Co., Ltd., Republic of Korea; *W Lee*, Sejong University, Republic of Korea

EM-MoP-15 Study on The Crystallinity and The Dielectric Constant of Zr_xGe_{1-x}O₂ Films using Mixed Zr - Ge Precursor by Atomic Layer Deposition ., *Ju Young Jeong, Y Han, H Sohn*, Yonsei University, Korea; *H Noh, H Park*, SK Hynix Inc

Special Events Tuesday

Special Events Tuesday

10:00 AM Break & Exhibits/Evergreen Ballroom & Foyer
12:00 PM Lunch Break and Exhibits/Evergreen Ballroom & Foyer
3:30 PM Break & Exhibits/Evergreen Ballroom & Foyer

Tuesday Morning, July 23, 2019

Room Grand Ballroom A-C		
8:00am	AF1-TuM-1 Surface Chemistry during ALD of Nickel Sulfide, <i>Xinwei Wang</i> , Peking University, China	ALD Fundamentals Session AF1-TuM In-Situ Characterization of ALD Processes Moderators: Christophe Vallée, LTM/CNRS-UJF, France, Erwin Kessels, Eindhoven University of Technology, the Netherlands
8:15am	AF1-TuM-2 In situ and In vacuo Studies on Plasma Enhanced Atomic Layer Deposited Cobalt Films, <i>Johanna Reif</i> , M Knaut, S Killge, N Hampel, M Albert, J Bartha, Technische Universität Dresden, Germany	
8:30am	AF1-TuM-3 Investigation of PEALD Grown HfO ₂ Thin Films via Near Ambient Pressure XPS: Precursor Tuning, Process Design and a New In-situ Examination Approach for Studying Film Surfaces Exposed to Reactive Gases, <i>David Zanders</i> , Ruhr University Bochum, Germany; <i>E Ciftyurek</i> , Heinrich Heine University Düsseldorf, Germany; <i>C Bock</i> , A Devi, Ruhr University Bochum, Germany; <i>K Schierbaum</i> , Heinrich Heine University Düsseldorf, Germany	
8:45am	AF1-TuM-4 Surface Science Studies of GaN Substrates Subjected to Plasma-Assisted Atomic Layer Processes, <i>Samantha G. Rosenberg</i> , ASEE; <i>D Pennachio</i> , University of California, Santa Barbara; <i>E Young</i> , Y Chang, H Inbar, University of California Santa Barbara; <i>J Woodward</i> , U.S. Naval Research Laboratory; <i>Z Robinson</i> , SUNY College at Brockport; <i>J Grzeskowiak</i> , University at Albany-SUNY; <i>C Ventrice, Jr.</i> , SUNY Polytechnic Institute; <i>C Palmström</i> , University of California Santa Barbara; <i>C Eddy, Jr.</i> , U.S. Naval Research Laboratory	
9:00am	AF1-TuM-5 Infrared and Optical Emission Spectroscopy on Atmospheric-Pressure Plasma-Enhanced Spatial ALD of Al ₂ O ₃ , <i>Maria Antonietta Mione</i> , R Engeln, E Kessels, Eindhoven University of Technology, Netherlands; <i>F Roozeboom</i> , Eindhoven University of Technology and TNO, Netherlands	
9:15am	AF1-TuM-6 Fingerprinting of ALD Reaction Products with Time-Resolved In situ Mass Spectrometry, <i>Andreas Werbroeck</i> , F Mattelaer, J Dendooven, C Detavernier, Ghent University, Belgium	
9:30am	INVITED: AF1-TuM-7 Studying Pt and Pd Nanoparticle ALD through X-ray based In situ Characterization, <i>Jolien Dendooven</i> , J Feng, Ghent University, Belgium; <i>E Solano</i> , ALBA Synchrotron Light Source, Spain; <i>R Ramachandran</i> , M Minjauw, M Van Daele, Ghent University, Belgium; <i>D Hermida-Merino</i> , ESRF European Synchrotron, France; <i>A Coati</i> , Synchrotron SOLEIL, France; <i>C Detavernier</i> , Ghent University, Belgium	
9:45am	Invited talk continues.	
10:00am	Break & Exhibits	
10:15am	Break & Exhibits	
10:30am	Break & Exhibits	
10:45am	AF3-TuM-12 Enabling Nucleation Phenomena Studies of ALD Deposited Films by In-situ High-Resolution TEM, <i>Stephanie Burgmann</i> , A Dadlani, A Bin Afif, Norwegian University of Science and Technology, Norway; <i>J Provine</i> , Aligned Carbon; <i>A van Helvoort</i> , J Torgesen, Norwegian University of Science and Technology, Norway	ALD Fundamentals Session AF3-TuM Growth and Characterization II Moderators: Jolien Dendooven, Ghent University, Belgium, Henrik Pedersen, Linköping University, Sweden
11:00am	AF3-TuM-13 In-situ ellipsometric analysis of plasma assisted ALD grown-stoichiometric and crystalline AlN films, <i>Adnan Mohammad</i> , D Shukla, S Ilhom, B Willis, University of Connecticut; <i>B Johs</i> , Film Sense LLC; <i>A Okyay</i> , Stanford University; <i>N Biyikli</i> , University of Connecticut	
11:15am	AF3-TuM-14 Film Properties of ALD SiNx Deposited by Trisilylamine and N ₂ Plasma, <i>Markus Bosund</i> , E Salmi, K Niiranen, Beneq Oy, Finland	
11:30am	AF3-TuM-15 Comparison of Properties of Conductive Nitride Films Prepared by PEALD using Quartz and Sapphire Plasma Sources, <i>I Krylov</i> , X Xu, K Weinfeld, <i>Valentina Korchnoy</i> , D Ritter, M Eizenberg, Technion - Israel Institute of Technology, Israel	
11:45am	AF3-TuM-16 Role of Hydrogen Radicals in the Surface Reactions of Trimethyl-Indium (TMI) with Ar/N ₂ Plasma in Hollow-Cathode Plasma-Assisted ALD, <i>Saidjafarzoda Ilhom</i> , A Mohammad, D Shukla, N Biyikli, B Willis, University of Connecticut	

Tuesday Morning, July 23, 2019

Room Grand Ballroom E-G		
8:00am	INVITED: AA1-TuM-1 ALD for Solar Fuels: Rendering Halide Perovskites Acid-Compatible + Precision Cluster Electrocatalysts, <i>Alex Martinson, I Kim, M Pellin</i> , Argonne National Laboratory	ALD Applications Session AA1-TuM ALD for Catalysts, Electrocatalysts, and Photocatalysts Moderators: Jeffrey W. Elam, Argonne National Laboratory, Parag Banerjee, University of Central Florida
8:15am	Invited talk continues.	
8:30am	AA1-TuM-3 Plasma-Assisted ALD of Cobalt Phosphate: Process Development and Electro-Catalytic Activity Towards Oxygen Evolution Reaction, <i>V Di Palma</i> , Eindhoven University of Technology, Netherlands; <i>G Zafeiropoulos, R van de Sanden</i> , Dutch Institute for Fundamental Energy Research; <i>E Kessels</i> , Eindhoven University of Technology, Netherlands; <i>M Tsampas</i> , Dutch Institute for Fundamental Energy Research; <i>Mariadriana Creatore</i> , Eindhoven University of Technology, Netherlands	
8:45am	AA1-TuM-4 Improved Electrochemical Activity of Pt Catalyst Fabricated by Vertical Forced-Flow Atomic Layer Deposition, <i>Tzu-Kang Chin, T Perng</i> , National Tsing Hua University, Republic of China	
9:00am	AA1-TuM-5 Improved Catalyst Selectivity and Longevity using Atomic Layer Deposition, <i>C Marshall</i> , Argonne National Laboratory; <i>A Dameron, R Tracy</i> , Forge Nano; <i>C Nicholas, L Abrams, P Barger</i> , Honeywell UOP; <i>T Li, Lu Zheng</i> , Argonne National Laboratory	
9:15am	AA1-TuM-6 Enhancing Co ₂ C Activity for C ₂₊ Oxygenate Production from Syngas using ALD Promoters, <i>Sindhu Nathan, J Singh, A Asundi, S Bent</i> , Stanford University	
9:30am	AA1-TuM-7 Atomic Layer Deposition of Bismuth Vanadate Core-Shell Nanowire Photoanodes, <i>Ashley Bielinski, S Lee, J Branco, S Esarey, A Gayle, E Kazyak, K Sun, B Bartlett, N Dasgupta</i> , University of Michigan	
9:45am	AA1-TuM-8 Improved Photocatalytic Efficiency by Depositing Pt and SiO ₂ on TiO ₂ (P25) using Atomic Layer Deposition in a Fluidized Bed, <i>Dominik Benz, H Nugteren, H Hintzen, M Kreutzer, R van Ommen</i> , Delft University of Technology, Netherlands	
10:00am	Break & Exhibits	
10:15am	Break & Exhibits	
10:30am	Break & Exhibits	
10:45am	AA2-TuM-12 Atomic Layer Deposition of Glassy Lithium Borate-Carbonate Electrolytes for Solid-State Lithium Metal Batteries, <i>E Kazyak, A Davis, S Yu, K Chen, A Sanchez, J Lasso, T Thompson, A Bielinski, D Siegel, Neil P. Dasgupta</i> , University of Michigan	ALD Applications Session AA2-TuM ALD for Batteries I Moderators: Neil P. Dasgupta, University of Michigan, Noemi Leick, National Renewable Energy Laboratory
11:00am	AA2-TuM-13 ALD Interlayers for Stabilization of Li ₁₀ GeP ₂ S ₁₂ Solid Electrolytes Against Li Metal Anodes, <i>Andrew Davis</i> , University of Michigan; <i>K Wood</i> , National Renewable Energy Laboratory; <i>R Garcia-Mendez, E Kazyak, K Chen, J Sakamoto</i> , University of Michigan; <i>G Teeter</i> , National Renewable Energy Laboratory; <i>N Dasgupta</i> , University of Michigan	
11:15am	AA2-TuM-14 ALD and MLD on Lithium Metal – A Practical Approach Toward Enabling Safe, Long Lasting, High Energy Density Batteries, <i>Andrew Lushington</i> , Arradance; <i>Y Zhao, L Goncharova, Q Sun, R Li, X Sun</i> , University of Western Ontario, Canada	
11:30am	AA2-TuM-15 Synergistic Effect of 3D Current Collectors and ALD Surface Modification for High Coulombic Efficiency Lithium Metal Anodes, <i>Kuan-Hung Chen, A Sanchez, E Kazyak, A Davis, N Dasgupta</i> , University of Michigan	
11:45am	AA2-TuM-16 Atomic Layer Deposition FeS@CNT from Elemental Sulfur as an Electrode for Lithium-Ion batteries, <i>Hongzheng Zhu, J Liu</i> , University of British Columbia, Canada	

Tuesday Morning, July 23, 2019

Room Grand Ballroom H-K		
8:00am	AF2-TuM-1 Characterizing Water Delivery for ALD Processes, <i>James Maslar, B Sperling, W Kimes</i> , National Institute of Standards and Technology; <i>W Kimmerle, K Kimmerle</i> , NSI; <i>E Woelk, CeeVeeTech</i>	ALD Fundamentals Session AF2-TuM ALD Precursors II Moderators: Jin-Seong Park, Hanyang University, Seán Barry, Carleton University
8:15am	AF2-TuM-2 A Nickel Chloride Adduct Complex as a Precursor for Low-Resistivity Nickel Nitride Thin Films with Tert-butylhydrazine as a Coreactant, <i>K Väyrynen, T Hatanpää, M Mattinen, M Heikkilä, K Mizohata, J Räisänen</i> , University of Helsinki, Finland; <i>J Link, R Stern</i> , National Institute of Chemical Physics and Biophysics, Estonia; <i>M Leskelä, Mikko Ritala</i> , University of Helsinki, Finland	
8:30am	AF2-TuM-3 Simple, Rationally Designed Aluminum Precursors for the Deposition of Low-impurity AlN Films, <i>Sydney Buttera, S Barry</i> , Carleton University, Canada; <i>H Pedersen</i> , Linköping University, Sweden	
8:45am	AF2-TuM-4 Atomic Layer Deposition of Lead(II) Sulfide at Temperatures Below 100 °C, <i>Georgi Popov</i> , University of Helsinki, Finland; <i>G Bačić</i> , Carleton University, Canada; <i>M Mattinen, M Vehkamäki, K Mizohata, M Kemell</i> , University of Helsinki, Finland; <i>S Barry</i> , Carleton University, Canada; <i>J Räisänen, M Leskelä, M Ritala</i> , University of Helsinki, Finland	
9:00am	AF2-TuM-5 Development and Characterization of a Novel Atomic Layer Deposition Process for Transparent p-Type Semiconducting Nickel Oxide using Ni(¹⁸ Bu ₂ DAD) ₂ and Ozone, <i>Konner Holden</i> , Oregon State University; <i>C Dezelah</i> , EMD Performance Materials; <i>J Conley, Jr.</i> , Oregon State University	
9:15am	AF2-TuM-6 Blocking Thermolysis in Diamido Plumbylenes, <i>Goran Bacic</i> , Carleton University, Canada; <i>D Zanders</i> , Ruhr University Bochum, Germany; <i>I Frankel</i> , Carleton University, Canada; <i>J Masuda</i> , Saint Mary's University, Canada; <i>T Zeng</i> , Carleton University, Canada; <i>B Mallick, A Devi</i> , Ruhr University Bochum, Germany; <i>S Barry</i> , Carleton University, Canada	
9:30am	AF2-TuM-7 ALD of Sc ₂ O ₃ with Sc(cp) ₃ and a Novel Heteroleptic Precursors, <i>T Ivanova, Perttu Sippola</i> , ASM, Finland; <i>G Verni, Q Xie</i> , ASM, Belgium; <i>M Givens</i> , ASM, Finland	
9:45am	AF2-TuM-8 A Novel Self-limited Atomic Layer Deposition of WS ₂ based on the Chemisorption and Reduction of bis(t-butylimido)bis(dimethylamino) Complexes, <i>Nicola Pinna</i> , Humboldt-Universität zu Berlin, Germany	
10:00am	Break & Exhibits	
10:15am	Break & Exhibits	
10:30am	Break & Exhibits	
10:45am	INVITED: AS1-TuM-12 Overview of Wet And Dry Selective Processes Driven by Area Activation or Deactivation Down to Below 20nm Critical Dimensions, <i>Silvia Armini</i> , IMEC, Belgium	Area Selective ALD Session AS1-TuM Area-Selective ALD Techniques Moderator: Adrie Mackus, Eindhoven University, Netherlands
11:00am	Invited talk continues.	
11:15am	AS1-TuM-14 Electron-Enhanced Atomic Layer Deposition (EE-ALD) of Cobalt Metal Films at Room Temperature, <i>Zach Sobell, A Cavanagh, S George</i> , University of Colorado - Boulder	
11:30am	AS1-TuM-15 Area Selective Atomic Layer Deposition on Molecular Design, <i>Akihiro Nishida, T Yoshino, N Okada, A Yamashita</i> , ADEKA Corporation, Japan	
11:45am	AS1-TuM-16 From Surface Dependence in Atomic Layer Deposition to Area-Selective Deposition of TiN in Nanoscale Patterns, <i>Annelies Delabie</i> , IMEC, Belgium; <i>D Carbajal</i> , UNAM; <i>J Soethoudt, B Chan, E Altamirano Sanchez, B Meynaerts, J Clerix, S Van Elshocht</i> , IMEC, Belgium	

Tuesday Morning, July 23, 2019

Room Regency Ballroom A-C	
8:00am	INVITED: ALE1-TuM-1 Analyses of Hexafluoroacetylacetone (Hfac) Adsorbed on Transition Metal Surfaces, <i>Tomoko Ito, K Karahashi, S Hamaguchi</i> , Osaka University, Japan
8:15am	Invited talk continues.
8:30am	ALE1-TuM-3 Thermal Atomic Layer Etching of Silicon Nitride using an Oxidation and "Conversion-Etch" Mechanism, <i>Aziz Abdulagatov, S George</i> , University of Colorado - Boulder
8:45am	ALE1-TuM-4 Thermal Dry Atomic Layer Etching of Cobalt with Sequential Exposure to Molecular Chlorine and Diketones, <i>M Konh, C He, X Lin</i> , University of Delaware; <i>X Guo, V Pallem</i> , American Air Liquide; <i>R Opila, Andrew Teplyakov, Z Wang, B Yuan</i> , University of Delaware
9:00am	ALE1-TuM-5 Spontaneous Etching of B ₂ O ₃ and TiO ₂ by HF: Removal Reaction in WO ₃ ALE and TiN ALE, <i>Austin Cano</i> , University of Colorado - Boulder; <i>S Natarajan</i> , Tyndall National Institute, Ireland; <i>J Clancey</i> , University of Colorado - Boulder; <i>S Elliot</i> , Schrödinger Inc; <i>S George</i> , University of Colorado - Boulder
9:15am	ALE1-TuM-6 Thermal Based Atomic Layer Etching of Aluminum Oxide and Titanium Nitride, <i>Varun Sharma, T Blomberg, M Tuominen, S Haukka</i> , ASM, Finland
9:30am	ALE1-TuM-7 Thermal Atomic Layer Etching of Amorphous and Crystalline Hafnium Oxide, Zirconium Oxide and Hafnium Zirconium Oxide, <i>Jessica A. Murdzek, S George</i> , University of Colorado - Boulder
9:45am	ALE1-TuM-8 Isotropic Atomic Layer Etching of Cobalt with Smooth Etched Surfaces by using Cyclic Repetition of Plasma Oxidation and Organometallization, <i>Sumiko Fujisaki</i> , Hitachi R&D Group, Japan
10:00am	Break & Exhibits
10:15am	Break & Exhibits
10:30am	Break & Exhibits
10:45am	ALE2-TuM-12 Atomic Layer Etching for Germanium using Halogen Neutral Beam =Comparison between Br and Cl Chemistry=, <i>T Fujii, Daisuke Ohori</i> , Tohoku University, Japan; <i>S Noda</i> , National Institute of Advanced Industrial Science and Technology, Japan; <i>Y Tanimoto, D Sato, H Kurihara</i> , Showa Denko K.k.; <i>W Mizubayashi, K Endo</i> , National Institute of Advanced Industrial Science and Technology, Japan; <i>Y Li</i> , National Chiao Tung University; <i>Y Lee</i> , National Nano Device Laboratories; <i>T Ozaki, S Samukawa</i> , Tohoku University, Japan
11:00am	
11:15am	ALE2-TuM-14 A New Etching / Passivation Process in Cyclic Mode for Spacer Etching in 3D CMOS Integrations, <i>O Pollet</i> , CEA-LETI, France; <i>N Posseme</i> , Univ. Grenoble Alpes, CEA, LETI, France; <i>V Ah-Leung, Valentin Bacquie</i> , CEA-LETI, France
11:30am	ALE2-TuM-15 Atomic Layer Etching of Transition Metals with Gas Cluster Ion Beam Irradiation and Acetylacetone, <i>Noriaki Toyoda, K Uematsu</i> , University of Hyogo, Japan
11:45am	ALE2-TuM-16 Atomic Layer Etching at Atmospheric Pressure, <i>Eugen Shkura, D Theirich, K Brinkmann, T Haeger</i> , University of Wuppertal, Germany; <i>J Schneidewind, M Siebert</i> , SENTECH Instruments GmbH, Germany; <i>T Riedl</i> , University of Wuppertal, Germany

**Atomic Layer Etching
Session ALE1-TuM
ALE: Gas-phase and/or Thermal ALE
Moderators:** Steven M. George, University of Colorado at Boulder, Venkateswara Pallem, AirLiquide

**Atomic Layer Etching
Session ALE2-TuM
Alternative Methods to ALE
Moderators:** Jean-François de Marneffe, IMEC, Satoshi Hamaguchi, Osaka University, Japan

Tuesday Afternoon, July 23, 2019

Room Grand Ballroom A-C		
1:30pm	AF-TuA-1 Low Temperature High Quality Silicon Dioxide by Neutral Beam Enhanced Atomic Layer Deposition, <i>Hua-Hsuan Chen, D Ohori, T Ozaki</i> , Tohoku University, Japan; <i>M Utsuno, T Kubota, T Nozawa</i> , ASM Japan K.K., Japan; <i>S Samukawa</i> , Tohoku University, Japan	ALD Fundamentals Session AF-TuA Plasma ALD: Growth and Characterization Moderators: HyeongTag Jeon, Hanyang University, Korea, Jiyoung Kim, University of Texas at Dallas
1:45pm	AF-TuA-2 Radical Surface Recombination Probabilities during Plasma ALD of SiO ₂ , TiO ₂ and Al ₂ O ₃ Determined from Film Conformality, <i>Karsten Arts</i> , Eindhoven University of Technology, Netherlands; <i>M Utriainen</i> , VTT Technical Research Centre of Finland, Finland; <i>R Puurunen</i> , Aalto University, Finland; <i>E Kessels</i> , Eindhoven University of Technology, Netherlands; <i>H Knoops</i> , Oxford Instruments Plasma Technology, UK	
2:00pm	AF-TuA-3 A Robust Method for In-situ Gas Monitoring of ALD Processes using Optical Emission Spectroscopy of a Pulsed Remote Plasma, <i>Joe Brindley, B Daniel, V Bellido-Gonzalez</i> , Genco Limited, UK; <i>R Potter, B Peek</i> , University of Liverpool, UK	
2:15pm	AF-TuA-4 Near Room Temperature Plasma Enhanced Atomic Layer Deposition of Gold Metal, <i>Michiel Van Daele</i> , Ghent University, Belgium; <i>M Griffiths</i> , Carleton University, Canada; <i>A Raza</i> , Ghent University - IMEC, Belgium; <i>M Minjauw</i> , Ghent University, Belgium; <i>S Barry</i> , Carleton University, Canada; <i>R Baets</i> , Ghent University - IMEC, Belgium; <i>C Detavernier, J Dendooven</i> , Ghent University, Belgium	
2:30pm	AF-TuA-5 Low-Temperature Deposition of Gallium Oxide and Aluminum Oxide with Arrays of Microcavity Plasma Enhanced Atomic Layer Deposition, <i>Jinhong Kim, A Mironov, S Park, J Eden</i> , University of Illinois at Urbana-Champaign	
2:45pm	AF-TuA-6 The Effects of Varying Plasma Conditions on Plasma Assisted Atomic Layer Epitaxy, <i>David Boris, V Wheeler, N Nepal, S Rosenberg, J Avila, J Woodward, V Anderson, S Walton, C Eddy, Jr.</i> , U.S. Naval Research Laboratory	
3:00pm	INVITED: AF-TuA-7 Plasma-Enhanced Atomic Layer Epitaxy of Ultra-wide Bandgap Ga ₂ O ₃ and (Al _x Ga _{1-x}) ₂ O ₃ Films, <i>Virginia Wheeler, N Nepal, D Boris, S Walton, S Qadri, J Avila, D Meyer, B Downey, V Gokhale</i> , U.S. Naval Research Laboratory; <i>L Nyakiti</i> , Texas A&M University; <i>M Tadjer</i> , U.S. Naval Research Laboratory; <i>M Goorsky</i> , University of California Los Angeles; <i>C Eddy Jr.</i> , U.S. Naval Research Laboratory	
3:15pm	Invited talk continues.	
3:30pm	Break & Exhibits	
3:45pm	Break & Exhibits	
4:00pm	INVITED: AA3-TuA-11 Doped Hi-K ALD Films of HfO _x and ZrO _x for Advanced Ferroelectric and Anti-Ferroelectric Memory Device Applications; <i>Niloy Mukherjee, J Mack, S Rathi</i> , Eugenius, Inc.; <i>Z Wang, A Gaskell, N Tasneem, A Khan</i> , Georgia Institute of Technology; <i>M Dopita, D Kriegner</i> , Charles University	ALD Applications Session AA3-TuA ALD for Memory Applications I Moderators: Scott B. Clendenning, Intel Corp., Adrien LaVoie, Lam Research Corp.
4:15pm	Invited talk continues.	
4:30pm	AA3-TuA-13 ALD of La-Doped HfO ₂ Films for Ferroelectric Applications, <i>Tatiana Ivanova, P Sippola, M Givens</i> , ASM, Finland; <i>H Sprey</i> , ASM, Belgium; <i>T Büttner, P Polakowski, K Seidel</i> , Fraunhofer IPMS-CNT, Germany	
4:45pm	AA3-TuA-14 Characterization of Multi-Domain Ferroelectric ZrO ₂ Thin Films for Negative Capacitance and Inductive Responses, <i>Yu-Tung Yin, P Cheng, Y Jiang, J Shieh, M Chen</i> , National Taiwan University, Republic of China	
5:00pm	AA3-TuA-15 Scaling Ferroelectric Hf _{0.5} Zr _{0.5} O ₂ on Metal-Ferroelectric-Metal (MFM) and Metal-Ferroelectric-Insulator-Semiconductor (MFIS) Structures, <i>Jaidah Mohan, H Hernandez-Arriaga, H Kim, A Khosravi, A Sahota</i> , The University of Texas at Dallas; <i>R Wallace</i> , University of Texas at Dallas; <i>J Kim</i> , The University of Texas at Dallas	
5:15pm	AA3-TuA-16 Interface Characteristics of MIM Capacitors using Vanadium Nitride Electrode and ALD-grown ZrO ₂ High-k Dielectric Film, <i>Jae Hyoung Choi, Y Kim, H Lee, H Lim, K Hwang, S Nam, H Kang</i> , Samsung Electronics, Republic of Korea	

Tuesday Afternoon, July 23, 2019

Room Grand Ballroom E-G		
1:30pm	INVITED: AA1-TuA-1 Atomic Layer Deposition of Indium Gallium Zinc Oxide (IGZO) Semiconductor Thin Films: From Precursor to Thin Film Transistor Application, <i>Jin-Seong Park</i> , Hanyang University, Republic of Korea	ALD Applications Session AA1-TuA Emerging Applications I Moderators: Anjana Devi, Ruhr University Bochum, Han-Bo-Ram Lee, Incheon National University
1:45pm	Invited talk continues.	
2:00pm	AA1-TuA-3 ALD Growth of Ultra-thin Co Layers on the Topological Insulator Sb ₂ Te ₃ , <i>Emanuele Longo</i> , <i>R Mantovan</i> , <i>R Cecchini</i> , CNR-IMM Unit of Agrate Brianza, Italy; <i>M Overbeek</i> , Wayne State University; <i>M Longo</i> , CNR-IMM Unit of Agrate Brianza, Italy; <i>L Lazzarini</i> , CNR-IMEM, Italy; <i>M Fanciulli</i> , Università degli Studi di Milano-Bicocca, Italy; <i>C Winter</i> , Wayne State University; <i>C Wiemer</i> , CNR-IMM Unit of Agrate Brianza, Italy	
2:15pm	AA1-TuA-4 Modifying Interfacial Chemistry of Cellulose-Reinforced Epoxy Resin Composites using Atomic Layer Deposition (ALD), <i>Jamie Wooding</i> , <i>Y Li</i> , <i>K Kalaitzidou</i> , <i>M Losego</i> , Georgia Institute of Technology	
2:30pm	AA1-TuA-5 Atomic Layer Deposition of Au Nanoparticles on Titania, <i>Fatemeh S.M. Hashemi</i> , Delft University of Technology, Netherlands; <i>F Grillo</i> , ETH Zurich, Switzerland; <i>V Ravikumar</i> , <i>D Benz</i> , <i>A Shekhar</i> , Delft University of Technology, Netherlands; <i>M Griffiths</i> , <i>S Barry</i> , Carleton University, Canada; <i>J van Ommen</i> , Delft University of Technology, Netherlands	
2:45pm	AA1-TuA-6 Multi-layer Protective Coatings on Silver for Protection of Historic Silver Artifacts, <i>E Breitung</i> , Metropolitan Museum of Art; <i>S Creange</i> , Rijks Museum, Netherlands; <i>G Pribil</i> , J.A. Woollam; <i>A Bertuch</i> , <i>Ritwik Bhatia</i> , Veeco-CNT	
3:00pm	AA1-TuA-7 Nonlinear Optical Properties of TiO ₂ -Based ALD Thin Films, <i>Theodosia Gougousi</i> , <i>R Kuis</i> , <i>I Basaldua</i> , <i>P Burkins</i> , <i>J Kropp</i> , <i>A Johnson</i> , University of Maryland, Baltimore County	
3:15pm	AA1-TuA-8 Atomic Layer Deposition to Alter the Wetting and Thermal Properties of Lumber, <i>Shawn Gregory</i> , <i>C McGettigan</i> , <i>E McGuinness</i> , <i>D Rodin</i> , <i>S Yee</i> , <i>M Losego</i> , Georgia Institute of Technology	
3:30pm	Break & Exhibits	
3:45pm	Break & Exhibits	
4:00pm	AA2-TuA-11 Tunable Electrical Properties of Lithium Fluoride Thin Films using Different Fluorine Sources, <i>Devika Choudhury</i> , <i>A Mane</i> , <i>J Elam</i> , Argonne National Laboratory	ALD Applications Session AA2-TuA ALD for Batteries II Moderator: Yong Qin, Institute of Coal Chemistry, Chinese Academy of Sciences
4:15pm	AA2-TuA-12 The Role of Al ₂ O ₃ ALD Precursor Chemistry on the Electrochemical Performance of Lithium Ion Battery Cathode Materials, <i>Donghyeon Kang</i> , <i>A Mane</i> , <i>J Elam</i> , Argonne National Laboratory; <i>R Warburton</i> , <i>J Greeley</i> , Purdue University	
4:30pm	AA2-TuA-13 Spatial Atomic Layer Deposition of Hybrid Nanolaminates for High Capacity Li-ion Battery Electrodes, <i>E Balder</i> , <i>L Haverkate</i> , <i>M Tulodziecki</i> , <i>F van den Bruele</i> , <i>S Unnikrishnan</i> , <i>Paul Poedt</i> , TNO/Holst Center, Netherlands	
4:45pm	AA2-TuA-14 Lithium Organic Thin Films for Various Battery Components, <i>Juho Heiska</i> , <i>M Karppinen</i> , Aalto University, Finland	
5:00pm	AA2-TuA-15 ALD Infiltration of LiCoO ₂ for High Rate Lithium Ion Batteries, <i>Ian Povey</i> , <i>M Modreanu</i> , <i>S O'Brien</i> , Tyndall National Institute, Ireland; <i>T Teranishi</i> , <i>Y Yoshikawa</i> , <i>M Yoneda</i> , <i>A Kishimoto</i> , Okayama University, Japan	
5:15pm	AA2-TuA-16 ALD Al ₂ O ₃ and MoS ₂ Coated TiO ₂ Nanotube Layers as Anodes for Lithium Ion Batteries, <i>H Sopha</i> , University of Pardubice, Czech Republic; <i>A Tesfaye</i> , Ecole Nationale Supérieure des Mines de Saint-Etienne, France; <i>R Zazpe</i> , University of Pardubice, Czech Republic; <i>T Djenizian</i> , Ecole Nationale Supérieure des Mines de Saint-Etienne, France; <i>Jan Macak</i> , University of Pardubice, Czech Republic	

Tuesday Afternoon, July 23, 2019

Room Grand Ballroom H-K		
1:30pm	AS1-TuA-1 Elucidating Mechanisms of Selective ALD of Al ₂ O ₃ by a Comparative Study of Precursors, <i>Il-Kwon Oh</i> , T Liu, Stanford University; <i>T Sandoval</i> , Technical University Federico Santa Maria; <i>R Tonner</i> , Philipps-Universität Marburg, Germany; <i>S Bent</i> , Stanford University	Area Selective ALD Session AS1-TuA Area-Selective ALD by Area-Deactivation Moderators: Rong Chen, Huazhong University of Science and Technology, Jessica Kachian, Intel Corp.
1:45pm	AS1-TuA-2 Area-Selective Atomic Layer Deposition using Dodecanethiols: Comparison of Monolayer versus Multilayer, <i>Tzu-Ling Liu</i> , Stanford University; <i>K Nardi</i> , N Draeger, D Hausmann, Lam Research Corp.; <i>S Bent</i> , Stanford University	
2:00pm	AS1-TuA-3 Mechanism for Breakdown in Selectivity During Area-Selective Atomic Layer Deposition of ZrO ₂ on a SiO ₂ Surface Functionalized with a Blocking Layer, <i>Wanxing Xu</i> , Colorado School of Mines; <i>P Lemaire</i> , K Sharma, D Hausmann, Lam Research Corp.; <i>S Agarwal</i> , Colorado School of Mines	
2:15pm	AS1-TuA-4 Area Selective Chemical Vapor Deposition of Co from the Co (CO) Precursor: Use of Ammonia to Afford Dielectric-Dielectric Selectivity, <i>Zhejun Zhang</i> , S Liu, G Girolami, J Abelson, University of Illinois at Urbana-Champaign	
2:30pm	AS1-TuA-5 Area-Selective ALD of Silicon Oxide using Inhibitors in Four-step Cycles for Metal/Dielectric Selectivity, <i>Marc Merckx</i> , R Jongen, Eindhoven University of Technology, Netherlands; <i>A Mameli</i> , TNO/Holst Center, Netherlands; <i>D Hausmann</i> , Lam Research Corp.; <i>E Kessels</i> , A Mackus, Eindhoven University of Technology, Netherlands	
2:45pm	AS1-TuA-6 Selective Area Growth of Deactivating Polymers, <i>Rudy Wojtecki</i> , IBM Research - Almaden; <i>T Pattison</i> , University of Melbourne, Australia; <i>A Hess</i> , N Arellano, A Friz, IBM Research - Almaden	
3:00pm	AS1-TuA-7 Area-Selective ALD of ZnO Films Patterned by Electrohydrodynamic Jet Printing of Polymers with Sub-Micron Resolution, <i>Tae Cho</i> , N Farjam, C Pannier, C Huber, O Trejo, C Allemang, E Kazzyak, R Peterson, K Barton, N Dasgupta, University of Michigan	
3:15pm	AS1-TuA-8 Selective Deposition of Silicon Nitride, <i>Han Wang</i> , B Hendrix, T Baum, Entegris Inc.	
3:30pm	Break & Exhibits	
3:45pm	Break & Exhibits	
4:00pm	AS2-TuA-11 Area-Selective Deposition and Smoothing of Ru by Combining Atomic Layer Deposition and Selective Etching, <i>Martijn Vos</i> , Eindhoven University of Technology, Netherlands; <i>S Chopra</i> , University of Texas at Austin; <i>M Verheijen</i> , Eindhoven University of Technology, Netherlands; <i>J Ekerdt</i> , University of Texas at Austin; <i>S Agarwal</i> , Colorado School of Mines; <i>E Kessels</i> , A Mackus, Eindhoven University of Technology, Netherlands	Area Selective ALD Session AS2-TuA Area-Selective ALD: Combinations with Etching Moderators: Silvia Armini, IMEC, Dennis Hausmann, Lam Research
4:15pm	AS2-TuA-12 Single Batch Strategies for the Development of an Area Selective Deposition Process with the Deposition/Etch Approach, <i>Christophe Vallée</i> , M Bonvalot, LTM-UGA, France; <i>R Gassilloud</i> , CEA-Leti, France; <i>V Pesce</i> , A Chaker, S Belahcen, LTM-UGA, France; <i>N Possémé</i> , CEA-Leti, France; <i>B Pelissier</i> , P Gonon, A Bsiesy, LTM-UGA, France	
4:30pm	AS2-TuA-13 Surface Halogenation of Amorphous Carbon for Defect-free Area-Selective Deposition of Metal Oxides, <i>Mikhail Krishtab</i> , KU Leuven, Belgium; <i>S Armini</i> , IMEC, Belgium; <i>S De Gendt</i> , KU Leuven/IMEC, Belgium; <i>R Ameloot</i> , KU Leuven, Belgium	
4:45pm	AS2-TuA2-14 Real-time Grazing Incidence Small-angle X-ray Scattering Studies of Indium Aluminum Nitride Growth, <i>Jeffrey M. Woodward</i> , S Rosenberg, ASEE (residing at U.S. Naval Research Laboratory); <i>S Johnson</i> , N Nepal, U.S. Naval Research Laboratory; <i>Z Robinson</i> , SUNY College at Brockport; <i>K Ludwig</i> , Boston University; <i>C Eddy</i> , U.S. Naval Research Laboratory	Area Selective ALD Session AS2-TuA2 Late Breaking Abstracts Moderators: Silvia Armini, IMEC, Dennis Hausmann, Lam Research
5:00pm	AS2-TuA2-15 Expanding the Materials Library of Sequential Infiltration Synthesis: Conductive Indium and Gallium Oxides Grown in Polymers, <i>Ruben Waldman</i> , University of Chicago; <i>N Jeon</i> , D Mandia, O Heinonen, S Darling, A Martinson, Argonne National Laboratory	
5:15pm	AS2-TuA2-16 Highly Efficient and Stable Organic – Inorganic Halide Perovskite Solar Cells with ALD-grown Charge Transport Layers, <i>Hyunjung Shin</i> , Sungkyunkwan University, Republic of Korea	

Tuesday Afternoon, July 23, 2019

Room Regency Ballroom A-C		
1:30pm	INVITED: ALE1-TuA-1 Atomic Layer Etching of Nanostructures, <i>Sabbir Khan</i> , Niels Bohr Institute, University of Copenhagen, Denmark; <i>D Suyatin</i> , Lund University, Sweden; <i>J Sundqvist</i> , Fraunhofer Institute for Ceramic Technologies and Systems IKTS, Germany	Atomic Layer Etching Session ALE1-TuA Modeling & Instrumentation I Moderators: Ankur Agarwal, KLA-Tencor, Alok Ranjan, TEL Technology Center, America, LLC
1:45pm	Invited talk continues.	
2:00pm	ALE1-TuA-3 Selectivity during Plasma ALE of Si-Compounds: Reaction Mechanism Studied by in-situ Surface Spectroscopy, <i>René Vervuurt</i> , ASM; <i>K Nakane</i> , <i>T Tsutsumi</i> , <i>M Hori</i> , <i>N Kobayashi</i> , Nagoya University, Japan	
2:15pm	ALE1-TuA-4 Chamber Vacuum Strategies to Enable High Productivity ALE, <i>Declan Scanlan</i> , <i>D Stephenson</i> , <i>A Stover</i> , Edwards Vacuum, Ireland	
2:30pm	ALE1-TuA-5 Mechanistic Study of the Thermal Atomic Layer Etch of Cobalt Metal Using Propene and CO, <i>Suresh Kondati Natarajan</i> , <i>M Nolan</i> , Tyndall National Institute, Ireland; <i>P Theofanis</i> , <i>C Mokhtarzadeh</i> , <i>S Clendinning</i> , Intel Corp.	
2:45pm	ALE1-TuA-6 Selective Quasi-ALE of SiO ₂ over Si ₃ N ₄ via Bottom-up Si ₃ N ₄ Passivation: A Computational Study, <i>Du Zhang</i> , <i>Y Tsai</i> , <i>Y Shi</i> , <i>M Wang</i> , TEL Technology Center, America, LLC	
3:00pm	INVITED: ALE1-TuA-7 Insights of Different Etching Properties between CW and ALE Processes using 3D Voxel-Slab Model, <i>Nobuyuki Kuboi</i> , <i>T Tatsumi</i> , <i>J Komachi</i> , <i>S Yamakawa</i> , Sony Semiconductor Solutions Corp., Japan	
3:15pm	Invited talk continues.	
3:30pm	Break & Exhibits	
3:45pm	Break & Exhibits	
4:00pm	ALE2-TuA-11 First-principles Understanding of Atomic Layer Etching of Silicon Nitride using Hydrofluorocarbons, <i>Gyeong Hwang</i> , <i>E Cheng</i> , University of Texas at Austin; <i>S Sridhar</i> , TEL Technology Center, America; <i>P Ventzek</i> , <i>A Ranjan</i> , Tokyo Electron America Inc.	Atomic Layer Etching Session ALE2-TuA Modeling & Instrumentation II Moderators: Dmitry Suyatin, Lund University, Tetsuya Tatsumi, Sony Semiconductor Solutions Corporation
4:15pm	ALE2-TuA-12 An Extended Knudsen Diffusion Model for Aspect Ratio Dependent Atomic Layer Etching, <i>Luiz Felipe Aguinis</i> , <i>P Manstetten</i> , TU Wien, Austria; <i>A Hössinger</i> , Silvaco Europe Ltd., UK; <i>S Selberherr</i> , <i>J Weinbub</i> , TU Wien, Austria	
4:30pm	ALE2-TuA-13 Thermodynamics-Based Screening Approach for Atomic Layer Etching, <i>Nagraj Kulkarni</i> , Unaffiliated	
4:45pm	ALE2-TuA-14 Always in Competition: Self-limiting Versus Continuous Reactions in ALD and ALET, <i>Simon D. Elliott</i> , Schrödinger, Inc.; <i>S Natarajan</i> , <i>R Mullins</i> , <i>M Nolan</i> , Tyndall National Institute, Ireland; <i>A Cano</i> , <i>J Clancey</i> , <i>S George</i> , University of Colorado - Boulder	
5:00pm	ALE2-TuA-15 Variation of Etched Depth per Cycle and Removal of Reactive Species in Atomic-Layer Etching (ALE) : Molecular Dynamics Study, <i>Satoshi Hamaguchi</i> , <i>E Tinacba</i> , <i>S Shigeno</i> , <i>Y Okada</i> , <i>M Isobe</i> , <i>T Ito</i> , <i>K Karahashi</i> , Osaka University, Japan	

ALD Applications

Room Evergreen Ballroom & Foyer - Session AA1-TuP

Energy Harvesting and Storage Poster Session

5:30pm

AA1-TuP-1 Study on Atomic Layer Deposited Al₂O₃, TiO₂ and ZnO for the Application in Silicon Photovoltaics, *Arun Haridas, M Sreenivasan*, Hind High Vacuum Company Pvt. Ltd., India; *A Antony*, Indian Institute of Technology Bombay, India

AA1-TuP-2 Nitrogen-Doped TiO₂ Film Deposited using Plasma-Enhanced Atomic Layer Deposition to Improve the Electrical Conductivity for Surface Passivation of Crystalline Silicon, *E Song*, Korea Institute of Materials Science, Republic of Korea; *J Ahn*, Korea Maritime and Ocean University, Republic of Korea; *Jung-Dae Kwon*, Korea Institute of Materials Science, Republic of Korea

AA1-TuP-3 Multilayer Encapsulation for Highly Stable Perovskite Solar Cells with Atomic Layer Deposited Al₂O₃ and Chemical Vapor Deposited Flowable Oxide, *Jungwoo Kim, H Hwangbo, S Kim, J Jang, H Tran Vo, H Chae*, Sungkyunkwan University (SKKU), Republic of Korea

AA1-TuP-5 Oxide Buffer Layers for Perovskite Solar Cells Grown with a 200 mm Commercial ALD System Using Low-Temperature Process, *P Rajbhandari, Tara Dhakal*, Binghamton University

AA1-TuP-6 Ultra-thin Nickel Films for Energy Harvesting Applications, *Ken Bosnick, P Motamedi*, National Research Council Canada, Canada; *K Cadien*, University of Alberta, Canada; *K Harris, J Cho*, National Research Council Canada, Canada

AA1-TuP-7 MoNx-Deposited on High-surface N-doped Carbon Coated-Carbon Cloth Substrates: The Best Possible Option for ALD in View of Energy Storage Application, *S Sawant, D Nandi, R Rahul, S Kim, Moo Hwan Cho*, Yeungnam University, Republic of Korea

AA1-TuP-8 ALD Coatings for Nano Imprint Masks, *Thomas Seidel*, Seitek50

AA1-TuP-9 The Investigation of Al₂O₃ Passivation Characteristics in the Condition of Growth Temperature and Ozone Concentration, *Young Joon Cho, H Chang*, Chungnam National University, Republic of Korea

AA1-TuP-10 Effect of Al₂O₃ Passivation on n-type Si Solar Cell with Passivated Emitter and Rear Cell (PERC), *Kiryun Kim, H Chang*, Chungnam National University, Republic of Korea

AA1-TuP-11 High Quality CaF₂ from a New ALD Process: Enabling New Approaches in Battery Technology and Optical Applications, *Max Gebhard, A Mane, J Elam*, Argonne National Laboratory

AA1-TuP-12 Properties of Molybdenum Oxide Deposited by Plasma Enhanced Atomic Layer Deposition for High Efficiency Solar Cells, *Taewon Lim, H Chang*, Chungnam National University, Republic of Korea

AA1-TuP-13 Understanding and Mitigating F Migration in ALD Nanocomposite Coatings, *Anil Mane, M Gebhard, J Elam*, Argonne National Laboratory; *M Popecki, T Cremer*, Incom Inc.; *M Minot*, Incom

AA1-TuP-14 Ultrathin Metal Oxide Passivation by Atomic Layer Deposition Enhances Stability and Performance of Visible Solar Water Splitting on Solution-Processed Organic Semiconductor Thin Films, *L Wang, D Yan*, Stony Brook University; *D Shaffer*, Brookhaven National Laboratory; *X Ye*, Stony Brook University; *B Layne, J Concepcion, M Liu, Chang-Yong Nam*, Brookhaven National Laboratory

AA1-TuP-15 Enhancement of Photovoltaic Efficiency using a Novel Nickel-4 Mercaptophenol Hybrid Interfacial Layer, *S Mo, Jinseon Park, N Long, H Thu*, Hanyang University, Republic of Korea

AA1-TuP-16 Enhancement of Photovoltaic Properties of Metal/III-V Schottky Solar Cells using Al₂O₃ Anti-Reflection and Passivation Layer, *A Ghods, V Saravade, C Zhou, Ian Ferguson*, Missouri University of Science and Technology

AA1-TuP-17 Investigation of ALD-grown i-ZnO Buffer Layer Properties for CIGS Solar Cell Application, *Jeha Kim, V Arepalli*, Cheongju University, Republic of Korea; *W Lee, Y Chung*, Electronics and Telecommunications Research Institute, Republic of Korea

AA1-TuP-18 Atomic Layer Deposited Zirconium-doped ZnO Transparent Conductive Oxides for Silicon Solar Cells, *Geedhika Kallidil Poduval, M Hossain, B Hoex*, University of New South Wales, Australia

AA1-TuP-19 Atomic Layer Deposition of Few-Atom Cluster Arrays for Solar Fuel Catalysis, *David Mandia, N Guisinger, A Martinson*, Argonne National Laboratory

ALD Applications

Room Evergreen Ballroom & Foyer - Session AA2-TuP

Microelectronics Poster Session

5:30pm

AA2-TuP-1 Chemically and Mechanically Activated Carbonaceous Materials for Supercapacitor, *D Lam, J Kim, Seung-Mo Lee*, Korea Institute of Machinery and Materials, South Korea

AA2-TuP-2 Diamond Field Effect Transistors with Different Gate Lengths of HfO₂ Deposited by Atomic Layer Deposition, *Changzhi Gu*, Institute of Physics, Chinese Academy of Sciences, China

AA2-TuP-3 Atomic Layer Deposition of IGZO Thin Films for BEOL Applications, *Shóna Doyle*, Tyndall National Institute, Ireland

AA2-TuP-4 Preparation and Electrical Properties of Polymer-based High-density MIM Capacitors by Plasma-Enhanced Atomic Layer Deposition, *C Fang, M Wang, Chang Liu, D Wu, A Li*, Nanjing University, China

AA2-TuP-5 High Voltage MIM Capacitor based on ALD Deposited Crystalline HfAlO_x Film, *Valentina Korchnoy*, Technion - Israel Institute of Technology, Israel; *M Lisiansky*, Tower Semiconductor Ltd., Israel; *I Popov, V Uvarov*, The Hebrew University of Jerusalem, Israel; *B Meyler*, Technion - Israel Institute of Technology, Israel

AA2-TuP-6 Improved Performance of GaN Metal-Oxide-Semiconductor Capacitors by Plasma ALD of AlN Interlayer, *Dilini Hemakumara, X Li, K Floros, S Cho*, University of Glasgow, UK; *I Guinney, C Humphreys*, University of Cambridge, UK; *I Thayne*, University of Glasgow, UK; *A O'Mahony*, Oxford Instruments Plasma Technology; *H Knoops*, Oxford Instruments Plasma Technology, UK; *D Moran*, University of Glasgow, UK

AA2-TuP-7 2-Dimensional Perovskite Oxide Thin Films Deposited by ALD for High-k Application, *J Ahn, Seung-Won Lee*, Korea Maritime and Ocean University, Republic of Korea; *C Kim, S Kwon*, Pusan National University, Republic of Korea

AA2-TuP-8 High Performance Atomic Layer Deposition (ALD) of Gate Dielectrics for 4H-SiC Power Device Application, *B Lee, M Kang*, North Carolina State University; *Adam Bertuch*, Veeco-CNT; *V Misra*, North Carolina State University

AA2-TuP-9 Atomic Layer Deposited TiO₂-Based Memristors using In-situ Fabricated Al Doped ZnO Thin Film as Electrodes, *Kai Zhang, P Lin*, Old Dominion University; *A Pradhan*, Advance Material Solution LLC; *H Baumgart*, Old Dominion University

AA2-TuP-10 Homogeneously Doped Atomic Layer Deposition Zinc Tin Oxide Thin Films for Improving Contact Resistance in Semiconductor Device Applications, *Alex Ma*, University of Alberta, Canada; *T Muneshwar*, Synthergy Inc., Canada; *D Barlage, K Cadien*, University of Alberta, Canada

AA2-TuP-11 AlGaIn/GaN Layers Obtained by Atomic Layer Deposition Targeting Thin Film HEMT, *Joaquin Alvarado, M Chávez*, Benemérita Universidad Autónoma de Puebla, Mexico; *S Gallardo*, CINVESTAV-IPN, Mexico; *Y Sheng, D Muenstermann*, Lancaster University, UK

AA2-TuP-12 High-Temperature Thermal Stability of ALD-TiN Metal Gate on In-situ Al₂O₃/Y₂O₃/(In)GaAs(001): Toward the Self-Aligned Gate-First Process, *Lawrence Boyu Young, H Wan, J Huang, K Lin, J Liu, Y Lin*, National Taiwan University, Republic of China; *J Kwo*, National Tsing Hua University, Republic of China; *M Hong*, National Taiwan University, Republic of China

AA2-TuP-13 Identification of Interfacial Defect in ALD Grown Al₂O₃/GeO₂/Ge Gate Stack, *Jinjuan Xiang, L Zhou, X Wang, X Ma, T Li, W Wang*, Institute of Microelectronics of Chinese Academy of Sciences, China

AA2-TuP-14 Modifications of the Electrical Properties of MOS Capacitors Based on Bilayer Gate Metallization - WC_n Capped by CVD Molybdenum on SiO₂ and on ALD Al₂O₃, *Ekaterina Zoubenko*, Technion - Israel Institute of Technology, Israel; *I Fisher, S Thombare, P Van-Cleemput, M Danek*, Lam Research Corp.; *M Eizenberg*, Technion - Israel Institute of Technology, Israel

AA2-TuP-15 Effect of Metal-insulator Interface on Dielectric Properties of Ultrathin Al₂O₃ and MgO Fabricated using In-situ Sputtering and Atomic Layer Deposition, *Jagaran Acharya, J Wilt, R Goul, B Liu, J Wu*, The University of Kansas

AA2-TuP-16 Thermal and Plasma ALD Al₂O₃ Gate Insulator for GaN Electronic Devices Characterized by CV-Stress Measurements, *Nicole Bickel, E Bahat Treidel, I Ostermay, O Hilt, O Krüger*, Ferdinand-Braun-Institut, Germany; *F Naumann, H Gargouri*, SENTECH Instruments GmbH, Germany; *J Würfl, G Tränkle*, Ferdinand-Braun-Institut, Germany

Tuesday Afternoon Poster Sessions, July 23, 2019

AA2-TuP-17 Variable Morphology Highly-Conformal Diffusion Barriers for Advanced Memory and Logic Applications, *Hae Young Kim, S Rathi, B Nie, N Naghibolashrafi, Y Okuyama, S Chugh, J Heo, S Jung, J Mack, N Mukherjee*, Eugenius, Inc.

AA2-TuP-18 Room Temperature Deposition of Hafnium Oxide by Atomic Layer Deposition for Gating Applications, *Pragya Shekhar, S Shamim, S Hartinger, J Kleinlein, R Schlereth, H Buhmann, L Molenkamp*, University of Wuerzburg, Germany

AA2-TuP-19 Influence of Surface Cleaning Process on Initial Growth of ALD- Al_2O_3 and Electrical Properties of $\text{Pt}/\text{Al}_2\text{O}_3/\beta\text{-Ga}_2\text{O}_3$ MOS Capacitors, *Masafumi Hirose*, Shibaura Institute of Technology, Japan; *T Nabatame*, National Institute for Materials Science, Japan; *E Maeda*, Shibaura Institute of Technology, Japan; *A Ohi, N Ikeda, Y Irokawa, Y Koide*, National Institute for Materials Science, Japan; *H Kiyono*, Shibaura Institute of Technology, Japan

AA2-TuP-20 Reliable Gate Stack Development Employing Plasma Assisted Atomic Layer Deposited HfO_xN_y on InGaAs Substrate, *Sukeun Eom, M Kong, K Seo*, Seoul National University, Republic of Korea

ALD Applications

Room Evergreen Ballroom & Foyer - Session AA3-TuP Catalysis and Sensor Applications Poster Session 5:30pm

AA3-TuP-1 Highly Dispersed Uniform Pt Catalysts on Carbon Support by Atomic Layer Deposition with Fluidized Bed Reactor(FBR), *Jung-Yeon Park, W Hong, S Oh*, Hyundai Motor Group, Republic of Korea; *W Lee, S Kwon*, Pusan National University, Republic of Korea

AA3-TuP-3 Stabilizing Ultrasmall Colloidal Platinum Diphosphide (PtP_2) Nanocrystals with Atomic Layer Deposition Oxide for Neutral H_2O_2 Electrosynthesis, *Hui Li, S Geyer*, Wake Forest University

AA3-TuP-5 Synthesis of Core Shell Nanocatalysts using Atomic Layer Deposition with Fluidized Bed Reactor for PEMFC, *Seung-Jeong Oh, W Hong, J Park*, Hyundai Motor Group, Republic of Korea; *W Lee, S Kwon*, Pusan National University, Republic of Korea

AA3-TuP-6 Porous Nanomembranes Grown by Atomic Layer Deposition: Self-Rolling in Solvent and their Sensing Applications, *F Ma, Y Zhao, G Huang, Yong Feng Mei*, Fudan University, China

AA3-TuP-7 Fabrication and Characterization of Atomic Layer Deposited ZnO-based Ultra-thin Films for Hydrogen Sensing, *Yan-Qiang Cao, A Li*, Nanjing University, China

ALD Applications

Room Evergreen Ballroom & Foyer - Session AA4-TuP Protective Coatings, Barrier Films, Membranes and Flexible Substrates Poster Session 5:30pm

AA4-TuP-1 ALD for Membrane Applications, *Matthieu Weber, M Bechelany*, Institut Européen des Membranes, France

AA4-TuP-2 Nano-Hardness of ALD Films, *James Daubert, W Sweet, J Kelliher*, Northrop Grumman

AA4-TuP-3 High Acid Corrosion Resistance of Nb_2O_5 Thin Film Deposited by Room Temperature ALD, *Kazuki Yoshida, K Saito, M Miura, K Kanomata, B Ahmad, S Kubota, F Hirose*, Yamagata University, Japan

AA4-TuP-4 Effects of Composition Ratios on Mechanical and Electrical Properties of AZO – Zincone Composite Thin Film Deposited on Transparent Polyimide Film Using Atomic and Molecular Layer Depositions., *Seung Hak Song, B Choi*, Korea University, Republic of Korea

AA4-TuP-5 Room-temperature Atomic Layer Deposition of Aluminosilicate Thin Film on Flexible Films, *Yoshiharu Mori, K Yoshida, K Kanomata, M Miura, B Ahmad Arima, S Kubota, F Hirose*, Yamagata University, Japan

AA4-TuP-6 ALD Layers for Reduced Wear on Micro Cutting Tools, *T Junghans, Hans-Dieter Schnabel*, Westsächsische Hochschule Zwickau, Germany

AA4-TuP-7 Fabrication of Atomic Layer Deposited Alumina as Protective Coating of Silver, *Gwon Deok Han, J Park, J Koo, J Shim*, Korea University, Republic of Korea

AA4-TuP-8 Characterization of Laminated Thin Films for Encapsulation using Single Si Precursor by PEALD, *Joong Jin Park, S Lee, H Lim, S Jang, S Kim, G Park, S Lee, M Kim*, DNF Co. Ltd, Republic of Korea

AA4-TuP-9 Low-cost Fabrication of Flexible Transparent Electrodes based on Sprayed Nanocomposites Silver Nanowires and Al Doped ZnO Deposited by Spatial ALD, *V Nguyen, J Resende, D Papanastasiou, C Jimenez, D Bellet*, LMGP Grenoble INP/CNRS, France; *S Aghazadehchors*, LMGP, France; *N Nguyen*, Université de Liège; *David Muñoz-Rojas*, LMGP Grenoble INP/CNRS, France

AA4-TuP-10 Nanomechanical Properties of Crystalline Anatase Titanium Oxide Films Synthesized using Atomic Layer Deposition, *Yousuf Mohammed, P Lin, K Zhang, H Baumgart, A Elmustafa*, Old Dominion University

AA4-TuP-11 Encapsulation of Magnetic Nanostructures by ALD for Improved Stability and Performance, *Devika Choudhury, Y Zhang, K Gao, A Mane, J Elam*, Argonne National Laboratory

AA4-TuP-12 Diffusion Barrier Properties of ALD TiSiN Films, *Jerry Mack, J Heo, S Chugh, H Kim, S Rathi, N Mukherjee*, Eugenius, Inc.

ALD Applications

Room Evergreen Ballroom & Foyer - Session AA5-TuP Emerging Applications Poster Session 5:30pm

AA5-TuP-1 Bottom up Stabilization of Perovskite Quantum Dots LED via Atomic Layer Deposition, *Rong Chen, K Cao, Q Xiang, B Zhou*, Huazhong University of Science and Technology, China

AA5-TuP-2 ALD Bilayers for X-ray Windows with Long Lifetime, *Agnieszka Kurek, Y Shu*, Oxford Instruments Plasma Technology; *H Knoops*, Oxford Instruments Plasma Technology, UK; *A O'Mahony, O Thomas, R Gunn*, Oxford Instruments Plasma Technology; *Y Alivov, C McKenzie, B Grigsby, A Degtyaryov*, Oxford Instruments X-ray Technology

AA5-TuP-3 ALD for 3D Nano MEMS Applications, *Dorothee Dietz*, Fraunhofer Institute for Microelectronic Circuits and Systems IMS, Germany

AA5-TuP-4 Tribological Properties of Plasma Enhanced Atomic Layer Deposition TiMoN , *Mark Sowa*, Veeco-CNT; *A Kozen*, U.S. Naval Research Laboratory; *B Krick, N Strandwitz*, Lehigh University

AA5-TuP-5 Thickness Optimization of Alumina Thin Film for Microchannel Plate Detector, *Baojun Yan, S Liu*, Institute of High Energy Physics, Chinese Academy of Sciences, China

AA5-TuP-6 Optical Coatings Deposited on Nonlinear Crystals by Atomic Layer Deposition, *Ramutis Drazdys, R Buzelis, M Drazdys*, Center for Physical Sciences and Technology, Lithuania

AA5-TuP-7 Atomic Layer Deposition of Nickel and Nickel Oxide Thin-Films for Astronomical X-ray Optics Applications, *Hossein Salami, A Uy, A Vadapalli*, University of Maryland; *V Dwivedi*, NASA Goddard Space Flight Center; *R Adomaitis*, University of Maryland

AA5-TuP-8 Atomic Layer Deposition and Chemical Vapor Deposition of Zirconium Boride for Various Applications: New Work Function, Barrier Metal, Hard Mask and Area Selective Deposition, *Jun-Hee Cho, J Park, W Chae, J Park, S Lee, M Kim*, DNF Co. Ltd, Republic of Korea

AA5-TuP-9 Comparative Study of $\text{Mo}_{1-x}\text{W}_x\text{S}_2$ Alloy Gas Sensor by Atomic Layer Deposition, *Minjo Lee, Y Kim, J Park, H Kim*, Yonsei University, Republic of Korea

AA5-TuP-10 Fabrication of High-Aspect-Ratio Nanometric Gold Gratings, *O Makarova*, Creatv MicroTech Inc; *Ralu Divan, L Stan*, Argonne National Laboratory; *C Tang*, Creatv MicroTech Inc

Area Selective ALD

Room Evergreen Ballroom & Foyer - Session AS-TuP Area Selective ALD Poster Session 5:30pm

AS-TuP-1 Laterally-Structured Dielectrics by Area-Selective Atomic-Layer-Deposition on 3D Substrates, *Philip Klement, D Anders, F Michel, J Schörmann, S Chatterjee*, Justus Liebig University Giessen, Germany

AS-TuP-2 Light Assisted Area Selective Atomic Layer Deposition on Plasmonic Nanoantennas, *Chengwu Zhang, T Gao, B Willis*, University of Connecticut

AS-TuP-3 Area-Specific Atomic Layer Deposition (ALD) of Cobalt As Mediated by Thermally Induced Dehydrocoupled Self-Assembled Monolayers (SAMs), *Barry Arkles, J Goff, C Brick*, Gelest, Inc.; *A Kaloyeros*, SUNY Polytechnic Institute

Tuesday Afternoon Poster Sessions, July 23, 2019

AS-TuP-4 Investigation of *In-situ* Surface Cleaning of Cu Films using O₃/O₂ and N₂H₄, **Su Min Hwang**, A Kondusamy, Q Zhiyang, H Kim, L Peña, K Tan, J Veyan, University of Texas at Dallas; D Alvarez, J Spiegelman, RASIRC; J Kim, University of Texas at Dallas

AS-TuP-5 Area-Selective Deposition of SiO₂ based on Spatial ALD with Interleaved Etching Steps to Obtain High Selectivity, **Alfredo Mamei**, TNO/Holst Center, Netherlands; F Roozeboom, Eindhoven University of Technology and TNO, Netherlands; P Poedt, TNO/Holst Center, Netherlands

AS-TuP-6 Defect Mitigation Solution for Area-Selective Atomic Layer Deposition of Ru on TiN/SiO₂ Nanopatterns, J Soethoudt, KU Leuven – University of Leuven/IMEC, Belgium; F Grillo, ETH Zurich, Switzerland; E Marques, R van Ommen, Delft University of Technology, Netherlands; B Briggs, H Hody, V Spampinato, A Franquet, B Chan, **Annelies Delabie**, IMEC, Belgium

Nanostructure Synthesis and Fabrication

Room Evergreen Ballroom & Foyer - Session NS-TuP

Nanostructures Synthesis and Fabrication Poster Session

5:30pm

NS-TuP-1 Molybdenum Disulfides and Diselenides by Atomic Layer Deposition, **Raul Zazpe**, J Prikryl, M Krbal, J Charvat, F Dvorak, F Bures, J Macak, University of Pardubice, Czech Republic

NS-TuP-2 Wafer-scale MoS₂ Thin Film Deposition via H₂S Plasma Sulfurization of ALD-grown MoO₃ at Low Temperature, J Ahn, **Jeong-Hun Choi**, Korea Maritime and Ocean University, Republic of Korea

NS-TuP-3 ALD-based Synthesis of Few-layer Transition Metal Disulfides with Wafer-scale Uniformity for Device Integration, **Tao Chen**, Y Wang, H Zhu, L Chen, Q Sun, D Zhang, Fudan University, China

NS-TuP-4 Overcoming Agglomeration and Adhesion in Particle ALD, **Benjamin Greenberg**, J Wollmershauser, B Feigelson, U.S. Naval Research Laboratory

NS-TuP-5 Density Function Theory for Nucleation of MoF₆ with Oxide Surfaces in Atomic Layer Deposition of MoS₂, **Matthew Lawson**, Boise State University

Special Events Wednesday

Special Events Wednesday

- 10:00 AM Break & Exhibits/Evergreen Ballroom & Foyer
- 12:00 PM Lunch Break and Exhibits/Evergreen Ballroom & Foyer
- 3:30 PM Break/Evergreen Ballroom & Foyer
- 4:45 PM Closing Remarks/Grand E-K (plus D)

Wednesday Morning, July 24, 2019

Room Grand Ballroom A-C		
8:00am	EM1-WeM-1 Molecular Layer Deposition of Titanicene Films using TiCl and Fumaric or Maleic Acid: Growth Mechanism and Ambient Stability, <i>Yan-Qiang Cao, A Li</i> , Nanjing University, China	Emerging Materials Session EM1-WeM Molecular Layer Deposition Moderators: Stacey F. Bent, Stanford University, Charles L. Dezelah, ASM
8:15am	EM1-WeM-2 Temperature Dependent Surface Chemistry in Molecular Layer Deposition of Polyimide on Cu and Si, <i>Chao Zhang, M Leskelä, M Ritala</i> , University of Helsinki, Finland	
8:30am	EM1-WeM-3 Integrated MLD Supercycle for the Direct Deposition of Zeolitic Imidazolate Framework Films, <i>Alexander John Cruz, I Stassen, R Ameloot</i> , KU Leuven, Belgium	
8:45am	EM1-WeM-4 Understanding Molecular Layer Deposition Nucleation Mechanisms in Polyurea via Time Domain Thermoreflectance, <i>Rachel Nye, M Fusco</i> , North Carolina State University; <i>E Radue, A Kelliher, P Hopkins</i> , University of Virginia; <i>G Parsons</i> , North Carolina State University	
9:00am	EM1-WeM-5 Molecular Layer Deposition of Indicene Thin film using Indium Precursor and Hydroquinone, <i>Seung-Hwan Lee, G Baek, J Lee</i> , Hanyang University, Republic of Korea; <i>T Ngoc Van, B Shong</i> , Hongik University, Republic of Korea; <i>J Park</i> , Hanyang University, Republic of Korea	
9:15am	EM1-WeM-6 Air Stable Alucone Thin Film Deposited by Molecular Layer Deposition using Hetero Bifunctional Organic Reactant, <i>GeonHo Baek, S Lee, J Lee, J Park</i> , Hanyang University, Republic of Korea	
9:30am	EM1-WeM-7 Molecular Layer Deposition of “Magnesicene”, a Magnesium-based Hybrid Material, as a Matrix Material for Solid Composite Electrolytes, <i>Jeroen Kint, F Mattelaer, M Minjauw</i> , Ghent University, Belgium; <i>P Vereecken</i> , IMEC, Belgium; <i>J Dendooven, C Detavernier</i> , Ghent University, Belgium	
9:45am	EM1-WeM-8 Molecular Layer Deposition of Polyamide Films on Particles Using a Rotating Cylinder Reactor, <i>Tyler Myers, S George</i> , University of Colorado - Boulder	
10:00am	Break & Exhibits	
10:15am	Break & Exhibits	
10:30am	Break & Exhibits	
10:45am	EM2-WeM-12 Vapor Phase Infiltration: A Route for Making Insulating Polymer Fibers Conductive, <i>Mato Knez</i> , CIC nanoGUNE, Spain; <i>I Azpitarte</i> , CTECHnano, Spain	Emerging Materials Session EM2-WeM Organic-Inorganic Hybrid Materials Moderators: Gregory N. Parsons, North Carolina State University, Jonas Sundqvist, Fraunhofer Institute for Ceramic Technologies and Systems IKTS
11:00am	EM2-WeM-13 Vapor Phase Infiltration of Metal Oxides into Microporous Polymers for Organic Solvent Separation Membranes, <i>Emily McGuinness, F Zhang, Y Ma, R Lively, M Losego</i> , Georgia Institute of Technology	
11:15am	EM2-WeM-14 ZnO-Infiltrated Hybrid Polymer Thin Films with Enhanced Gravimetric Water and Oxygen Vapor Sensing Properties, <i>E Muckley, L Collins, A Ievlev</i> , Oak Ridge National Laboratory; <i>X Ye, K Kisslinger</i> , Brookhaven National Laboratory; <i>B Sumpter, N Lavrik</i> , Oak Ridge National Laboratory; <i>Chang-Yong Nam</i> , Brookhaven National Laboratory; <i>I Ivanov</i> , Oak Ridge National Laboratory	
11:30am	EM2-WeM-15 Physically Interpenetrated Organic-Inorganic Sub-Surface Layers Created via Vapor Phase Infiltration for Improved Film Adhesion, <i>Mark Losego, S Dwarakanath, R Tummala</i> , Georgia Institute of Technology	
11:45am	EM2-WeM-16 Inorganic-Organic Thin Film Layer-Structures and Thermal Conductivity, <i>Fabian Krahl</i> , Aalto University, Finland; <i>A Giri, P Hopkins</i> , University of Virginia; <i>M Karppinen</i> , Aalto University, Finland	

Wednesday Morning, July 24, 2019

Room Grand Ballroom E-G		
8:00am	AM1-WeM-1 Impact of Operating Parameters on Precursor Separation in “Air Hockey” Spatial Atomic Layer Deposition Reactor, <i>John Grasso, B Willis</i> , University of Connecticut	ALD for Manufacturing Session AM1-WeM Spatial ALD, Fast ALD, and Large-Area ALD Moderators: John F. Conley, Jr., Oregon State University, Paul Poodt, Holst Centre / TNO
8:15am	AM1-WeM-2 Plasma Enhanced Spatial ALD of Silver Thin Films at Atmospheric Pressure, <i>Tim Hasselmann</i> , University of Wuppertal, Germany; <i>N Boysen</i> , Ruhr University Bochum, Germany; <i>D Theirich</i> , University of Wuppertal, Germany; <i>A Devi</i> , Ruhr University Bochum, Germany; <i>T Riedl</i> , University of Wuppertal, Germany	
8:30am	INVITED: AM1-WeM-3 Low Temperature Spatial PEALD of Silicon Nitride Films from Aminosilane Precursors and DC Direct Plasma, <i>Eric Dickey</i> , Lotus Applied Technology	
8:45am	Invited talk continues.	
9:00am	AM1-WeM-5 Development and Characterization of an Atmospheric Pressure Plasma Reactor Compatible with Open-Air Spatial ALD, <i>H Rabat, F Zoubian, O Aubry, N Dumuis, S Dozias</i> , GREMI Université d'Orléans/CNRS, France; <i>C Masse de la Huerta, A Sekkat, V Nguyen</i> , LMGP Grenoble INP/CNRS, France; <i>M Bonvalot, C Vallée</i> , LTM-UGA, France; <i>D Hong</i> , GREMI Université d'Orléans/CNRS, France; <i>David Muñoz-Rojas</i> , LMGP Grenoble INP/CNRS, France	
9:15am	AM1-WeM-6 Fast Plasma ALD Employing de Laval Nozzles for High Velocity Precursor Injection, <i>Abhishekkumar Thakur, J Sundqvist</i> , Fraunhofer Institute for Ceramic Technologies and Systems IKTS, Germany; <i>S Wege</i> , Plasway Technologies GmbH, Germany	
9:30am	AM1-WeM-7 Development of a Meter Scale ALD Optical Coating Tool for Astronomical Mirror (and other) Applications, <i>D Fryauf</i> , University of California Santa Cruz; <i>A Phillips</i> , University of California Observatories; <i>A Feldman</i> , Structured Material Industries, Inc.; <i>N Kobayashi</i> , University of California Santa Cruz; <i>Gary Tompa</i> , Structured Material Industries, Inc.	
9:45am	AM1-WeM-8 From Wet-lab to Cleanroom: An Integrated ALD-CVD Process for the Large-area Deposition of Ultrathin Zeolitic Imidazolate Framework Films, <i>Ivo Stassen, A Cruz, R Ameloot</i> , KU Leuven, Belgium	
10:00am	Break & Exhibits	
10:15am	Break & Exhibits	
10:30am	Break & Exhibits	
10:45am	EM3-WeM-12 Atomic Layer Epitaxy of Zinc Oxide on C-plane Sapphire from Diethylzinc and Water using Pulsed-Heating Atomic Layer Deposition, <i>Brandon Piercy, M Losego</i> , Georgia Institute of Technology	Emerging Materials Session EM3-WeM Epitaxial Growth and III-V Materials Moderator: John Ekerdt, University of Texas at Austin
11:00am	EM3-WeM-13 Growth of AlN Barriers in Al/AlN/Al SIS Josephson Junctions by Low Temperature Atomic Layer Epitaxy, <i>Charles Eddy, Jr.</i> , U.S. Naval Research Laboratory; <i>D Pennachio, J Lee, A McFadden</i> , University of California, Santa Barbara; <i>S Rosenberg</i> , U.S. Naval Research Laboratory; <i>Y Chang, C Palmstrom</i> , University of California, Santa Barbara	
11:15am	EM3-WeM-14 Investigating Plasma Parameters and Influence of Argon to the Crystallinity of GaN Films Grown by Plasma-Assisted ALD, <i>Deepa Shukla, I Saidjafarzoda, A Mohammad, B Brian Willis, N Biyikli</i> , University of Connecticut	
11:30am	EM3-WeM-15 Ultrathin GaN Epilayer by Low-temperature Atomic Layer Annealing and Epitaxy, <i>Wei-Chung Kao, W Lee, Y Yin</i> , National Taiwan University, Republic of China; <i>J Shyue</i> , Academia Sinica; <i>H Lin, M Chen</i> , National Taiwan University, Republic of China	
11:45am	EM3-WeM-16 High Quality ALD Formation of Group-III Nitrides and their Applications in FTO-based Thin Film Solar Cells, <i>Xinhe Zheng, H Wei, P Qiu, M Peng, S Liu, Y He, Y Song, Y An</i> , University of Science and Technology Beijing, China	

Wednesday Morning, July 24, 2019

Room Grand Ballroom H-K	
8:00am	INVITED: AA1-WeM-1 ALD/ALE Process in Commercially Available Leading-Edge Logic and Memory Devices, <i>Rajesh Krishnamurthy</i> , TechInsights
8:15am	Invited talk continues.
8:30am	AA1-WeM-3 Atomic Layer Deposited Crystalline Zinc Oxide for Silver-based Ultra-Steep Threshold Switching Selector, <i>Harrison Sejoon Kim, A Sahota, J Mohan, H Hernandez-Arriaga, J Kim</i> , The University of Texas at Dallas
8:45am	AA1-WeM-4 ALD Ge-Se-Te OTS Selectors with Controlled Composition for PCM Applications, <i>Valerio Adinolfi, L Cheng, R Clarke, S Balatti, K Littau</i> , Intermolecular, Inc.
9:00am	AA1-WeM-5 Pulsed CVD of Amorphous GeSe for Application as OTS Selector, <i>Ali Haider</i> , IMEC, Belgium; <i>S Deng</i> , ASM, Belgium; <i>E Schapmans</i> , IMEC, Belgium; <i>J Maes</i> , ASM, Belgium; <i>J Girard</i> , Air Liquide Advanced Materials, France; <i>G Khalil</i> , imec; <i>G Kar, L Goux, R Delhougne</i> , IMEC; <i>M Caymax</i> , IMEC, Belgium
9:15am	INVITED: AA1-WeM-6 Thin Film Challenges in 3D NAND Scaling, <i>Jessica Kachian, D Pavlopoulos, D Kioussis</i> , Intel Corporation
9:30am	Invited talk continues.
9:45am	
10:00am	Break & Exhibits
10:15am	Break & Exhibits
10:30am	Break & Exhibits
10:45am	INVITED: AA2-WeM-12 The Journey of ALD High-k Metal Gate from Research to High Volume Manufacturing, <i>Dina Triyoso, R Clark, S Consiglio, K Tapily, C Wajda, G Leusink</i> , TEL Technology Center, America, LLC
11:00am	Invited talk continues.
11:15am	AA2-WeM-14 Effects of Er Doping on Structural and Electrical Properties of HfO ₂ Grown by Atomic Layer Deposition., <i>Soo Hwan Min, B Park, C Lee</i> , Yonsei University, Republic of Korea; <i>W Noh</i> , Air Liquide Laboratories Korea, South Korea; <i>I Oh</i> , Yonsei University, Republic of Korea; <i>W Kim</i> , Hanyang University, Republic of Korea; <i>H Kim</i> , Yonsei University, Republic of Korea
11:30am	AA2-WeM-15 Improvement of Electrical Performances of Atomic Layer Deposited ZrO ₂ MIM Capacitors with Ru Bottom Electrode, <i>Jaehwan Lee, B Park</i> , Yonsei University, Republic of Korea; <i>W Noh</i> , Air Liquide Laboratories Korea, South Korea; <i>I Oh</i> , Yonsei University, Republic of Korea; <i>W Kim</i> , Hanyang University, Republic of Korea; <i>H Kim</i> , Yonsei University, Republic of Korea
11:45am	AA2-WeM-16 Perfecting ALD-Y ₂ O ₃ /GaAs(001) Interface with Ultra-High Vacuum Annealing, <i>Keng-Yung Lin, Y Lin, W Chen, H Wan, L Young</i> , National Taiwan University, Republic of China; <i>C Cheng</i> , National Chia-Yi University, Republic of China; <i>T Pi</i> , National Synchrotron Radiation Research Center, Republic of China; <i>J Kwo</i> , National Tsing Hua University, Republic of China; <i>M Hong</i> , National Taiwan University, Republic of China

ALD Applications
Session AA1-WeM
ALD for Memory Applications II
Moderators: Seung Wook Ryu, SK Hynix, Myung Mo Sung, Hanyang University

ALD Applications
Session AA2-WeM
ALD for ULSI Applications I
Moderators: Ravindra Kanjolia, EMD Performance Materials, Han-Jin Lim, Samsung Electronics

Wednesday Morning, July 24, 2019

Room Regency Ballroom A-C		
8:00am	INVITED: ALE1-WeM-1 ALD and Etch Synergy to Enable the Next Scaling Innovations, <i>Angeliqwe Raley, K Lee, X Sun, Q Lou, Y Lu, M Edley, S Oyola-Reynoso, P Ventzek, R Clark, P Biolsi, H Masanobu, A Ranjan</i> , TEL Technology Center, America, LLC	Atomic Layer Etching Session ALE1-WeM Integration & Application of ALE Moderators: Bert Ellingboe, Dublin City University, Wei Tian, Applied Materials Inc.
8:15am	Invited talk continues.	
8:30am	INVITED: ALE1-WeM-3 On the Role of Individual Etching Components in Selective Atomic Layer Processing: Etch and Deposit to Obtain High Selectivity, <i>Alfredo Mameli</i> , TNO/Holst Center, Netherlands; <i>F Roozeboom</i> , Eindhoven University of Technology and TNO, Netherlands; <i>P Poodt</i> , TNO/Holst Center, Netherlands	
8:45am	Invited talk continues.	
9:00am	ALE1-WeM-5 Area-Selective Deposition of TiO ₂ on Various Surfaces by Isothermal Integration of Thermal TiO ₂ ALD and ALE, <i>Seung Keun Song, G Parsons</i> , North Carolina State University	
9:15am	ALE1-WeM-6 Limited Dose ALE and ALD Processes for Local Film Coatings on 3D Structures, <i>Thomas Seidel</i> , Seitek50; <i>M Current</i> , Current Scientific	
9:30am	ALE1-WeM-7 Formation of Ohmic Contacts to Si using In-situ Chemical Cleaning of the Substrate, <i>Sara Iacopetti</i> , Technion - Israel Institute of Technology, Israel; <i>R Tarafdar, S Lai, M Danek</i> , Lam Research Corp.; <i>M Eizenberg</i> , Technion - Israel Institute of Technology, Israel	
9:45am	ALE1-WeM-8 SADP Spacer Profile Engineering by Quasi-Atomic Layer Etching, <i>Tsai Wen (Maggie) Sung, C Yan, H Chung, J Lo, D Desai, P Lembesis, R Pakulski, M Yang</i> , Mattson Technology, Inc.	
10:00am	Break & Exhibits	
10:15am	Break & Exhibits	
10:30am	Break & Exhibits	
10:45am	ALE2-WeM-12 Dynamic Temperature Control Enabled Atomic Layer Etching of Titanium Nitride, <i>He Zhang, Y Kim, D Paeng</i> , Lam Research Corp.	Atomic Layer Etching Session ALE2-WeM Materials Selective ALE Moderators: Fred Roozeboom, TNO-Holst Centre & Eindhoven University of Technology, The Netherlands, Geun Young Yeom, Sungkyunkwan University
11:00am	INVITED: ALE2-WeM-13 Rapid Thermal-Cyclic Atomic Layer Etching of Thin Films with Highly Selective, Self-Limiting, and Conformal Characteristics, <i>Kazunori Shinoda</i> , Hitachi, Japan; <i>H Kobayashi</i> , Hitachi; <i>N Miyoshi, M Izawa</i> , Hitachi High-Technologies; <i>K Ishikawa, M Hori</i> , Nagoya University, Japan	
11:15am	Invited talk continues.	
11:30am	ALE2-WeM-15 Atomic Layer Etching of HfO ₂ with Selectivity to Si by Utilizing Material-Selective Deposition Phenomena, <i>Kang-Yi Lin, C Li</i> , University of Maryland; <i>S Engelmann, R Bruce, E Joseph</i> , IBM T.J. Watson Research Center; <i>D Metzler</i> , IBM Research - Albany; <i>G Oehrlein</i> , University of Maryland	
11:45am	ALE2-WeM-16 Enhancing Etch Selectivity in Plasma-Assisted ALE of Silicon-Based Dielectrics using Surface Functionalization, <i>Ryan Gasvoda</i> , Colorado School of Mines; <i>S Wang, E Hudson</i> , Lam Research Corp.; <i>S Agarwal</i> , Colorado School of Mines	

Wednesday Afternoon, July 24, 2019

	ALD Applications Room Grand Ballroom A-C - Session AA1-WeA Emerging Applications II Moderators: Arrelaine Dameron, Forge Nano, Se-Hun Kwon, Pusan National University	ALD Applications Room Grand Ballroom H-K - Session AA2-WeA ALD for ULSI Applications II Moderators: Iian Buchanan, Versum Materials, UK, Robert Clark, TEL Technology Center, America, LLC
1:30pm	AA1-WeA-1 Atomic Layer Deposited Nano-Coatings to Protect SrAl ₂ O ₄ Based Long-Life Phosphors from Environmental Degradation, Erkul Karacaoglu , Georgia Institute of Technology; E Ozturk , Karamanoglu Mehmetbey University, Turkey; M Uyaner , Necmettin Erbakan University, Turkey; M Losego , Georgia Institute of Technology	INVITED: AA2-WeA-1 Silicon-Based Low k Dielectric Materials with Remote Plasma ALD, Hyeongtag Jeon , Hanyang University, Republic of Korea
1:45pm	AA1-WeA-2 Enhanced Interfacial Fracture Toughness of Polymer-Epoxy Interfaces using ALD Surface Treatments, Yuxin Chen , N Ginga , W LePage , E Kazyak , A Gayle , J Wang , M Thouless , N Dasgupta , University of Michigan	Invited talk continues.
2:00pm	AA1-WeA-3 Atomic Layer Deposition of Pd on ZnO Nanorods for High Performance Photocatalysts, Jong Seon Park , B Kim , G Han , K Park , E Kang , H Park , J Shim , Korea University, Republic of Korea	AA2-WeA-3 SiOC Films by PEALD with Excellent Conformality and Wet Etch Resistance, Young Chol Byun , E Shero , ASM
2:15pm	AA1-WeA-4 Accelerating Light Beam (ALB) Generation through Dielectric Optical Device Fabricated by Low Temperature Atomic Layer Deposition (ALD), W Zhu , C Zhang , A Agrawal , H Lezec , National Institute of Standards and Technology; Huazhi Li , Arradance LLC	AA2-WeA-4 ALD TiN for Superconducting Through-Silicon Vias, Kestutis Grigoras , S Simbierowicz , L Grönberg , J Govenius , V Vesterinen , M Prunnila , J Hassel , VTT Technical Research Centre of Finland Ltd, Finland
2:30pm	AA1-WeA-5 Tunable Plasmonic Colours Preserved and Modified by Atomic Layer Deposition of Alumina, J Guay , A Lesina , G Killaire , University of Ottawa, Canada; Peter Gordon , Carleton University, Canada; C Hahn , University of Ottawa, Canada; S Barry , Carleton University, Canada; L Ramunno , P Berini , A Weck , University of Ottawa, Canada	AA2-WeA-5 Physical and Electronic Properties of Annealed ALD-deposited Ru from Ru(DMBD)(CO) ₃ and Oxygen, Michael H. Hayes , Oregon State University; C Dezelah , J Woodruff , EMD Performance Materials; J Conley, Jr. , Oregon State University
2:45pm	AA1-WeA-6 TFE of OLED Displays by Time-Space-Divided (TSD) PE-ALD and PE-CVD Hybrid System, Bongsik Kim , JUSUNG Engineering, Republic of Korea	AA2-WeA-6 Fluorine Free Boron-Containing Composite Layers for Shallow Dopant Source Applications, Anil Mane , D Choudhury , K Pupek , R Langeslay , M Delferro , J Elam , Argonne National Laboratory
3:00pm	AA1-WeA-7 Tailoring the Ferroelectricity of ZrO ₂ Thin Films using Ultrathin Interfacial Layers Prepared by Plasma-Enhanced Atomic Layer Deposition, Sheng-Han Yi , B Lin , T Hsu , J Shieh , M Chen , National Taiwan University, Republic of China	AA2-WeA-7 Impact of Medium Energy Ions on the Microstructure and Physical Properties of TiN Thin Layers Grown by Plasma Enhanced Atomic Layer Deposition (PE-ALD), S Belahcen , C Vallée , A Bsiesy , Marceline Bonvalot , LTM-UGA, France
3:15pm	AA1-WeA-8 Spin-Hall-Active Platinum Thin Films Grown Via Atomic Layer Deposition, Michaela Lammel , IFW Dresden, Germany; R Schlitz , Technische Universität Dresden, Germany; A Amusan , IFW Dresden, Germany; S Schlicht , FAU Erlangen, Germany; T Tynell , IFW Dresden, Germany; J Bachmann , FAU Erlangen, Germany; G Woltersdorf , Martin-Luther-Universität Halle-Wittenberg, Germany; K Nielsch , IFW Dresden, Germany; S Goennenwein , Technische Universität Dresden, Germany; A Thomas , IFW Dresden, Germany	AA2-WeA-8 ALD Process Monitoring for 3D Device Structures, Jiangtao Hu , Lam Research Corp.

Wednesday Afternoon, July 24, 2019

Emerging Materials Room Regency Ballroom A-C - Session EM1-WeA Ternary and Quaternary Oxide Materials Moderator: Bart Macco, Eindhoven University of Technology		Nanostructure Synthesis and Fabrication Room Grand Ballroom E-G - Session NS-WeA 2D Nanomaterials by ALD (including Transition Metal Dichalcogenides) Moderators: Annelies Delabie, IMEC, Harm Knoop, Eindhoven University of Technology	
1:30pm	EM1-WeA-1 Rhenium(III)-based Ternary Oxides: Novel Materials from Straightforward Synthesis <i>via</i> ALD Comprising Uncommon Reaction Pathways, Max Gebhard , <i>S Letourneau, D Mandia, D Choudhury, A Yanguas-Gil, A Mane, A Sattelberger, J Elam</i> , Argonne National Laboratory	NS-WeA-1 Modified ALD Process to Achieve Crystalline MoS ₂ Thin Films, Li Zeng , <i>C Maclsaac, J Shi, N Ricky, I Oh, S Bent</i> , Stanford University	
1:45pm	EM1-WeA-2 Growth Behavior and Electronic Characterization of PbZrO ₃ and PbZr _x Ti _{1-x} O ₃ Grown by Atomic Layer Deposition with Several Zr Precursors, Nicholas Strnad , University of Maryland; <i>D Potrepka</i> , U.S. Army Research Laboratory; <i>A Leff</i> , General Technical Services, LLC; <i>J Pulskamp</i> , U.S. Army Research Laboratory; <i>R Phaneuf</i> , University of Maryland; <i>R Polcawich</i> , U.S. Army Research Laboratory	NS-WeA-2 Nucleation and Growth of ALD MoS ₂ Films on Dielectric Surfaces, <i>E Graugnard</i> , Boise State University; Steven Letourneau , <i>A Mane, J Elam</i> , Argonne National Laboratory	
2:00pm	EM1-WeA-3 Understanding Growth Characteristics of ALD NiAl _y O _x : The Role of Ozone, Jonathan Baker , <i>J Schneider, S Bent</i> , Stanford University	INVITED: NS-WeA-3 Plasma-Enhanced Atomic Layer Deposition of Transition Metal Dichalcogenides: From 2D Monolayers to 3D Vertical Nanofins, Ageeth Bol , Eindhoven University of Technology, Netherlands	
2:15pm	EM1-WeA-4 Atomic Layer Deposition of B _x Mg _{1-x} O Films: Progress Towards Shallow Boron Doping, David Mandia , <i>D Choudhury, M Gebhard</i> , Argonne National Laboratory; <i>J Liu</i> , Northwestern University; <i>A Yanguas-Gil, A Mane, A Nassiri, J Elam</i> , Argonne National Laboratory	Invited talk continues.	
2:30pm	EM1-WeA-5 Enhanced Doping Control of Metal Oxide Thin Films Using a Modified ALD Process, <i>E Levrau</i> , IBM TJ Watson Research Center; Yohei Ogawa , ULVAC, Japan; <i>M Frank, M Hopstaken, E Cartier</i> , IBM T.J. Watson Research Center; <i>K Schmidt</i> , IBM Research - Almaden; <i>M Hatanaka</i> , ULVAC, Japan; <i>J Rozen</i> , IBM T.J. Watson Research Center	NS-WeA-5 Atomic Layer Deposition of Emerging 2D Semiconductors HfS ₂ and ZrS ₂ , Miika Mattinen , <i>G Popov, M Vehkamäki, P King, K Mizohata, P Jalkanen, J Räisänen, M Leskelä, M Ritala</i> , University of Helsinki, Finland	
2:45pm	EM1-WeA-6 As Deposited Epitaxial LaNiO ₃ and La(Ni,Cu)O ₃ with Controllable Electric Properties, Henrik Hovde Sønsteby , University of Oslo / Argonne Natl. Labs, Norway; <i>O Nilsen, H Fjellvåg</i> , University of Oslo, Norway	NS-WeA-6 Low Temperature ALD for Phase-controlled Synthesis of 2D Transition Metal (M=Ti, Nb) <i>di-</i> (MX ₂) and <i>Tri-</i> (MX ₃) Sulfides, Saravana Balaji Basuvalingam , <i>M Verheijen, E Kessels, A Bol</i> , Eindhoven University of Technology, Netherlands	
3:00pm	EM1-WeA-7 Time Dependence of Pyroelectric Response in Ferroelectric Hf _{0.58} Zr _{0.42} O ₂ Films, Sean Smith , <i>M Henry, M Rodriguez</i> , Sandia National Laboratories; <i>J Ihlefeld</i> , University of Virginia	NS-WeA-7 ALD Boron Nitride Coated and Infiltrated Carbon Materials for Environmental Applications, <i>W Hao, C Journet, A Brioude</i> , Université Lyon, France; <i>H Okuno</i> , Université Grenoble-Alpes, France; Catherine Marichy , Université Lyon, France	
3:15pm	EM1-WeA-8 Tailoring Nickel Oxide Conductivity by Introducing Transition Metals: From First-principles to Experimental Demonstration, Md. Anower Hossain , <i>T Zhang, D Lambert</i> , University of New South Wales, Australia; <i>Y Zakaria</i> , Hamad Bin Khalifa University, Qatar; <i>P Burr</i> , University of New South Wales, Australia; <i>S Rashkeev, A Abdallah</i> , Hamad Bin Khalifa University, Qatar; <i>B Hoex</i> , University of New South Wales, Australia		

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