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-TuA1: 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

Atomic Layer Etching
Room Evergreen Ballroom & Foyer - Session ALE-SuP
Atomic Layer Etching Poster Session
6:00pm

ALE-SuP1 Mechanistic Thermal Desorption Studies of Thermal Dry Etching Reactions for Cobalt and Iron Thin Films, ***Mahsa Konh***, *A. Teplyakov,* University of Delaware

ALE-SuP2 Mechanistic Study of the Thermal Atomic Layer Etch of Tungsten Metal Using O_2 and WCl_6, ***Suresh Kondati Natarajan***, *M. Nolan,* Tyndall National Institute, Ireland; *P. Theofanis, C. Mokhtarzadeh, S.B. Clendenning,* Intel Corp.

ALE-SuP3 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-SuP4 Atomic Layer Etching of Silicon Using a Conventional ICP Etch Chamber for Failure Analysis Applications, ***John Mudrick***, *R. Shul, K.D. Greth, R. Goeke, D. Adams,* Sandia National Laboratories

ALE-SuP5 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-SuP6 A Mechanistic Study of the HF Pulse in the Thermal Atomic Layer Etch of HfO_2 and ZrO_2, ***Rita Mullins***, *S. Kondati Natarajan, M. Nolan,* Tyndall National Institute, Ireland

ALE-SuP7 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-SuP8 Surface Reaction Analysis for Atomic-Layer Etching and Deposition by Means of Beam Experiments, ***Kazuhiro Karahashi***, *T. Ito, S. Hamaguchi,* Osaka University, Japan

ALE-SuP9 Atomic Layer Etching of SiO_2 and Si_3N_4 with Fluorocarbon, Hydrofluorocarbon and Fluoroether Compounds, *H. Chae,* ***Yongjae Kim***, *T. Cha, Y. Cho,* Sungkyunkwan University (SKKU), Republic of Korea

ALE-SuP10 Cyclic Etching of Copper Thin Films using Two Sequential Steps, ***Eun Tack Lim***, *J.S. Choi, J.S. Ryu, M.H. Cha, C.W. Chung,* Inha University, Republic of Korea

ALE-SuP11 Analysis of Mechanisms Involved in Cryogenic ALE, ***Thomas Tillocher***, *G. Antoun, P. Lefaucheux, 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-SuP12 Study on Dry Etching Characteristics of Germanium Oxide by Atomic Layer Deposition, ***Donghyuk Shin***, *J. Jeong, H. Song, H. Park, D.-H. Ko,* Yonsei University, Republic of Korea

ALE-SuP13 Laser Isotropic Atomistic Removal of Germanium, *D. Paeng,* ***He Zhang***, *Y.S. Kim,* Lam Research Corp.

ALE-SuP14 Anisotropic Atomic Layer Etching of Tungsten using Reactive Ion Beam, ***Doo San Kim***, *J.E. Kim, W.O. Lee, Y.J. Gill, B.H. Jeong, G.Y. Yeom,* Sungkyunkwan University, Republic of Korea

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 Corp.
8:45am	**INVITED: PS1-MoM2** Atomic Scale Processing: From Understanding to Innovation, ***Erwin Kessels,*** Eindhoven University of Technology, Netherlands	
9:00am	Invited talk continues.	
9:15am	Invited talk continues.	
9:30am	**INVITED: PS1-MoM5** Elucidating the Mechanisms for Atomic Layer Growth through In Situ Studies, ***Jeffrey W. Elam,*** 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-MoM11** Mapping the Future Evolution of Atomic Scale Processing to enable the World of Artificial Intelligence, ***Eric A. Joseph,*** IBM T.J. Watson Research Center	**Plenary Session** **Session PS2-MoM** **ALE Plenary Session** **Moderators:** Craig Huffman, Micron Technology, Gottlieb S. Oehrlein, University of Maryland
11:15am	Invited talk continues.	
11:30am	Invited talk continues.	
11:45am		
12:00pm		

Monday Afternoon, July 22, 2019

	Room Grand Ballroom A-C	
1:30pm	**AA1-MoA1** Atomic Layer Deposition on Pharmaceutical Particles for Inhaled Drug Delivery, ***Damiano La Zara,*** Delft University of Technology, Netherlands*; D. Zhang, M.J. Quayle, G. Petersson, S. Folestad,* AstraZeneca, Sweden*; J.R. van Ommen,* 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-MoA2** The Use of Atomic Layer Deposition to Increase the Availability of Medical Radio-Isotopes*,* ***Ruud van Ommen****, J. Moret, B. Wolterbeek, E. Pidko, A. Denkova,* Delft University of Technology, Netherlands	
2:00pm	**AA1-MoA3** Atomic Layer Deposition for Biosensing Applications*, O. Graniel,* ***Matthieu Weber****, S. Balme, P. Miele, M. Bechelany,* Institut Européen des Membranes, France	
2:15pm	**AA1-MoA4** Multi-layer Stacked ALD Coating for Hermetic Encapsulation of Implantable Biomedical Microdevices*,* ***Joonsoo Jeong,*** Pusan National University, Republic of Korea*; S. Sigurdsson, F. Laiwalla,* Brown University*; R. Ritasalo, M. Pudas, T. McKee, T. Pilvi,* Picosun Oy, Finland*; A. Nurmikko,* Brown University	
2:30pm	**AA1-MoA5** Modification of Spaceflight Radiator Coating Pigments by Atomic Layer Deposition for Thermal Applications*,* ***Vivek Dwivedi,*** NASA Goddard Space Flight Center*; R. Adomaitis, H. Salami, A. Uy,* University of Maryland*; M. Hasegawa,* NASA Goddard Space Flight Center	
2:45pm	**AA1-MoA6** Novel Atomic Layer Deposition Process/Hardware for Superconducting Films for NASA Applications*,* ***Frank Greer****, D. Cunnane,* Jet Propulsion Laboratory	
3:00pm	**AA1-MoA7** Fluoride-based ALD Materials System for Optical Space Applications*,* ***John Hennessy,*** Jet Propulsion Laboratory, California Institute of Technology	
3:15pm	**AA1-MoA8** Atomic Layer Deposition of Aluminum Fluoride for use in Astronomical Optical Devices*,* ***Alan Uy****, H. Salami, A. Vadapalli, C. Grob, R. Adomaitis,* University of Maryland*; V. Dwivedi,* NASA Goddard Space Flight Center	
3:30pm	**Break & Exhibits**	
3:45pm	**Break & Exhibits**	
4:00pm	**AA2-MoA11** Nucleation Layer for Atomic Layer Deposition Enabling High Efficiency and Flexible Monolithic All-Perovskite Tandem Solar Cells*,* ***Axel F. Palmstrom****, G. Eperon, T. Leijtens,* National Renewable Energy Laboratory*; R. Prasanna,* Stanford University*; S. Nanayakkara, S. Christensen, K. Zhu,* National Renewable Energy Laboratory*; M. McGehee,* University of Colorado Boulder*; D. Moore, J.J. Berry,* National Renewable Energy Laboratory	**ALD Applications** **Session AA2-MoA** **ALD for Solar Cells, Fuel Cells, and H_2 Storage** **Moderators:** Christophe Detavernier, Ghent University, Nicholas Strandwitz, Lehigh University
4:15pm	**AA2-MoA12** Perovskite Solar Cells Fabricated using Atomic Layer Deposited Doped ZnO as a Transparent Electrode*,* ***Louise Ryan****, M. McCarthy, S. Monaghan, M. Modreanu, S. O'Brien, M. Pemble, I. Povey,* Tyndall National Institute, Ireland	
4:30pm	**AA2-MoA13** Metal Oxide Barrier and Buffer Layers by Atomic Layer Deposition and Pulsed-Chemical Vapor Deposition for Semi-Transparent Perovskite Solar Cells*,* ***Helen Hejin Park****, T. Eom, R.E. Agbenyeke, S.M. Yeo, G.J. Kim, S.S. Shin, T.-Y. Yang, N.J. Jeon, Y.K. Lee, C.G. Kim, T.-M. Chung, J. Seo,* Korea Research Institute of Chemical Technology (KRICT), Republic of Korea	
4:45pm	**AA2-MoA14** Particle Atomic Layer Deposition of Tungsten Nitride Environmental Barrier Coatings from Bis(t-butylimido)bis(dimethylamino)tungsten(VI) and Ammonia*,* ***Sarah Bull****, A. Weimer,* University of Colorado - Boulder	
5:00pm	**AA2-MoA15** Atomic Layer Deposition on $Mg(BH_4)_2$: A Route to Improved Automotive H_2storage*,* ***Noemi Leick,*** National Renewable Energy Laboratory*; K. Gross,* H₂ Technology Consulting LLC*; T. Gennett, S. Christensen,* National Renewable Energy Laboratory	
5:15pm	**AA2-MoA16** Plasmonic Mediated Hydrogen Desorption from Metal Hydrides*,* ***Katherine Hurst****, A. Gaulding, M. Martinez, N. Leick, S. Christensen, T. Gennett,* National Renewable Energy Laboratory	
5:30pm	**AA2-MoA17** Surface Modification of Solid Oxide Fuel Cell Cathodes by Atomic Layer Deposition*,* ***Dong Hwan Kim****, H.J. Choi, J. Koo,* Korea University, Republic of Korea*; J.H. Park, J.-W. Son,* Korea Institute of Science and Technology (KIST), Republic of Korea*; J.H. Shim,* Korea University, Republic of Korea	

Monday Afternoon, July 22, 2019

	Room Grand Ballroom E-G	
1:30pm	**INVITED: AF2-MoA1** The Materials Supplier Challenge: Flawless Execution from Precursor Design to High Volume Manufacturing, ***Madhukar B. Rao***, 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-MoA3** Precursor and Co-Reactant Selection: A Figure of Merit, ***Seán Barry***, *M. Griffiths,* Carleton University, Canada	
2:15pm	**AF2-MoA4** Designing Thermal Atomic Layer Deposition Processes for Gold Metal using New Organogold Precursors and Co-reageants, ***Matthew Griffiths***, *G. Bačić, A. Varga, S. Barry,* Carleton University, Canada	
2:30pm	**AF2-MoA5** A New Carbene Based Silver Precursor Applied in APP-ALD Yielding Conductive and Transparent Ag Films: A Promising Precursor Class for Ag Metal ALD, ***Nils Boysen***, Ruhr University Bochum, Germany; *T. Hasselmann, D. Theirich, T. Riedl,* University of Wuppertal, Germany; *A. Devi,* Ruhr University Bochum, Germany	
2:45pm	**AF2-MoA6** Transition Metal β-ketoiminates: A Promising Precursor Class for Atomic Layer Deposition of Binary and Ternary Oxide Thin Films, ***Dennis Zywitzki***, *A. Devi,* Ruhr University Bochum, Germany	
3:00pm	**AF2-MoA7** A New and Promising ALD Process for Molybdenum Oxide Thin Films: From Process Development to Hydrogen Gas Sensing Applications, ***Jan-Lucas Wree***, Ruhr University Bochum, Germany; *M. Mattinen,* University of Helsinki, Finland; *E. Ciftyürek, K.D. Schierbaum,* Heinrich Heine University Düsseldorf, Germany; *M. Ritala, M. Leskelä,* University of Helsinki, Finland; *A. Devi,* Ruhr University Bochum, Germany	
3:15pm	**AF2-MoA8** Atomic Layer Deposition of Gallium Oxide Thin Films using Pentamethylcyclopentadienyl Gallium and Combinations of H_2O and O_2 Plasma, ***Fumikazu Mizutani***, *S. Higashi,* Kojundo Chemical Laboratory Co., Ltd., Japan; *M. Inoue, T. Nabatame,* National Institute for Materials Science, Japan	
3:30pm	**Break & Exhibits**	
3:45pm	**Break & Exhibits**	
4:00pm	**AF3-MoA11** Understanding Elemental Steps of ALD on Oxidation Catalysts, ***Kristian Knemeyer***, *M. Piernavieja Hermida, R. Naumann d'Alnoncourt,* Technische Universität Berlin, Germany; *A. Trunschke, R. Schlögl,* Fritz Haber Institute of the Max Planck Society, Germany; *M. Driess,* Technische Universität Berlin, Germany; *F. Rosowski,* BASF SE, Germany	**ALD Fundamentals** **Session AF3-MoA** **Growth and Characterization I** **Moderators:** Somilkumar Rathi, Eugenus, Inc., Sumit Agarwal, Colorado School of Mines
4:15pm	**AF3-MoA12** Advanced Lateral High Aspect Ratio Test Structures for Conformality Characterization by Optical Microscopy, ***Oili Ylivaara***, *P. Hyttinen,* VTT Technical Research Centre of Finland Ltd, Finland; *K. Arts,* Eindhoven University of Technology, Netherlands; *F. Gao,* VTT Technical Research Centre of Finland Ltd, Finland; *W.M.M. Kessels,* Eindhoven University of Technology, Netherlands; *R. Puurunen,* Aalto University, Finland; *M. Utriainen,* VTT Technical Research Centre of Finland Ltd, Finland	
4:30pm	**AF3-MoA13** Dopant Concentration Analysis of ALD Thin Films in 3D Structures by ToF-SIMS, *A.M. Kia,* ***Wenke Weinreich***, Fraunhofer-Institut fur Photonische Mikrosysteme (IPMS), Germany; *M. Utriainen,* VTT Technical Research Centre of Finland Ltd, Finland; *R. Puurunen,* Aalto University, Finland; *N. Haufe,* Fraunhofer-Institut fur Photonische Mikrosysteme (IPMS), Germany	
4:45pm	**AF3-MoA14** Metallic Ruthenium Coating on SiO_2 Powder by Atomic Layer Deposition using H_2O Reactant., ***Chi Thang Nguyen***, Incheon National University, Republic of Korea	
5:00pm	**AF3-MoA15** Low Energy Ion Scattering Study of Pt@Al_2O_3 Nanoparticle Coarsening, ***Philipp Brüner***, IONTOF GmbH, Germany; *E. Solano,* ALBA Synchrotron Light Source, Spain; *C. Detavernier, J. Dendooven,* Ghent University, Belgium	
5:15pm	**AF3-MoA16** Physical and Electrical Characterization of ALD Chalcogenide Materials for 3D Memory Applications, ***Vijay K. Narasimhan***, *V. Adinolfi, L. Cheng, M.E. McBriarty,* Intermolecular, Inc.; *M. Utriainen, F. Gao,* VTT Technical Research Centre of Finland Ltd, Finland; *R. Puurunen,* Aalto University, Finland; *K. Littau,* Intermolecular, Inc.	
5:30pm	**AF3-MoA17** The Tailoring of the Single Metal Atom-Oxide Interface, ***Bin Zhang***, *Y. Qin,* Institute of Coal Chemistry, Chinese Academy of Sciences, China	

	Room Grand Ballroom H-K	
1:30pm	**AF1-MoA1** Hybrid Computational Fluid Dynamics / Machine Learning Approaches to Reactor Scale Simulations and Optimization of ALD, ALEt, and LPCVD Processes, ***Angel Yanguas-Gil,*** *S. Letourneau, A. Lancaster, J.W. Elam,* Argonne National Laboratory	**ALD Fundamentals** **Session AF1-MoA** **ALD Growth Mechanisms I** **Moderators:** Simon Elliot, Schrödinger, Inc., Angel Yanguas-Gil, Argonne National Laboratory
1:45pm	**AF1-MoA2** Scalable Kinetic Monte-Carlo Model for Parasitic Reactions in Silicon Nitride Growth using 3DMAS Precursor, ***Gem Shoute,*** *T. Muneshwar,* Synthergy Inc., Canada*; D. Barlage, K. Cadien,* University of Alberta, Canada	
2:00pm	**INVITED: AF1-MoA3** Diffusion and Aggregation in Island-Growth and Area-Selective Deposition, ***Fabio Grillo,*** ETH Zurich, Switzerland	
2:15pm	Invited talk continues.	
2:30pm	**AF1-MoA5** Surface Kinetics in ALD and ALE: Computing the Cooperative Effect by Automated Enumeration of Reaction Pathways with Spectator Adsorbates, ***Thomas Mustard,*** Schrödinger, Inc.*; S. Elliot,* Schrödinger, Inc.*; T. Hughes, A. Bochevarov, L. Jacobson, S. Kwak,* Schrödinger, Inc.*; T. Morisato,* Schrödinger K.K., Japan*; J. Gavartin,* Schrödinger, Inc., UK*; S. Pandiyan,* Schrödinger, Inc., India*; M. Halls,* Schrödinger, Inc.	
2:45pm	**AF1-MoA6** An Immiscible Fluids Approach for Correctly Predicting Agglomerate Dynamics during Particle Atomic Layer Deposition (Particle ALD), ***Julia Hartig,*** *A. Weimer,* University of Colorado - Boulder	
3:00pm	**INVITED: AF1-MoA7** The Time-Resolved Interface between ALD and CVD, ***Henrik Pedersen,*** Linköping University, Sweden	
3:15pm	Invited talk continues.	
3:30pm	**Break & Exhibits**	
3:45pm	**Break & Exhibits**	
4:00pm	**INVITED: AF4-MoA11** Monolithic Integration of Single Crystal Perovskites on Semiconductors with ALD, ***John Ekerdt,*** University of Texas at Austin	**ALD Fundamentals** **Session AF4-MoA** **Growth Mechanisms II** **Moderators:** Viljami Pore, ASM, Mikko Ritala, University of Helsinki
4:15pm	Invited talk continues.	
4:30pm	**AF4-MoA13** Introducing the Concept of Pulsed Vapor Phase Copper-free Surface Click-chemistry using the ALD Technique, ***Iva Saric,*** *R. Peter, M. Kolympadi Markovic, I. Jelovica Badovinac,* University of Rijeka, Croatia*; C. Rogero,* Materials Physics Center (CSIC-UPV/EHU), Spain*; M. Ilyn,* Donostia International Physics Center (DIPC), Spain*; M. Knez,* CIC nanoGUNE, Spain*; G. Ambrozic,* University of Rijeka, Croatia	
4:45pm	**AF4-MoA14** Surface Enhanced Raman Spectroscopy Studies of Aluminum ALD Precursors for Al_2O_3 Growth, ***Michael Foody,*** Illinois Institute of Technology	
5:00pm	**AF4-MoA15** Atomic Layer Deposition of Aluminum, Hafnium and Zirconium Oxyfluoride Films with Tunable Stoichiometry, ***Neha Mahuli,*** *J. Wallas, S.M. George,* University of Colorado - Boulder	
5:15pm	**AF4-MoA16** Fundamental Study on the SiO_2 Growth Mechanism of Electronegativity Difference of Metal-O in the High-*k* Underlayers by PE-ALD Method, ***Erika Maeda,*** Shibaura Institute of Technology, Japan*; T. Nabatame,* National Institute for Materials Science, Japan*; M. Hirose,* Shibaura Institute of Technology, Japan*; M. Inoue, A. Ohi, N. Ikeda,* National Institute for Materials Science, Japan*; M. Takahashi, K. Ito,* Osaka University, Japan*; H. Kiyono,* Shibaura Institute of Technology, Japan	
5:30pm	**AF4-MoA17** Low Temperature Aluminium Nitride Deposition: Comparing Hydrazine and Ammonia, ***Aswin L.N. Kondusamy,*** *S.M. Hwang, A.T. Lucero, Z. Qin, X. Meng,* The University of Texas at Dallas*; D. Alvarez, J. Spiegelman,* RASIRC*; J. Kim,* The University of Texas at Dallas	

Monday Afternoon, July 22, 2019

	Room Regency Ballroom A-C	
1:30pm	**INVITED: ALE1-MoA1** Atomic Layer Etching – Advancing Its Application with a New Regime, ***Samantha Tan**, W. Yang, K.J. Kanarik, Y. Pan, R. Gottscho,* Lam Research Corp.	**Atomic Layer Etching** **Session ALE1-MoA** **Energy-enhanced ALE** **Moderators:** Keren J. Kanarik, Lam Research Corp., Harm Knoops, Oxford Instruments Plasma Technology
1:45pm	Invited talk continues.	
2:00pm	**ALE1-MoA3** Control of the Interface Layer in ALE Process by Alternating O_2 Plasma with Fluorocarbon Deposition for High Selectivity Etching, ***Takayoshi Tsutsumi**, A. Kobayashi,* Nagoya University, Japan*; N. Kobayashi,* ASM Japan K.K., Japan*; M. Hori,* Nagoya University, Japan	
2:15pm	**ALE1-MoA4** Self-limiting Atomic Layer Etching of SiO_2 using Low Temperature Cyclic Ar/CHF_3 Plasma, ***Stefano Dallorto**,* Lawrence Berkeley National Laboratory*; A. Goodyear, M. Cooke,* Oxford Instruments Plasma Technology, UK*; S. Dhuey,* Lawrence Berkeley National Laboratory*; J. Szornel,* Lawrence Livermore National Laboratory*; I. Rangelow,* Ilmenau University of Technology, Germany*; S. Cabrini,* Lawrence Berkeley National Laboratory	
2:30pm	**ALE1-MoA5** Evolution of Photoresist Layer Structure and Surface Morphology in a Fluorocarbon-Plasma-Based Atomic Layer Etching Process, ***Adam Pranda**, K-Y. Lin, S. Gutierrez Razo, J. Fourkas, G.S. Oehrlein,* University of Maryland	
2:45pm	**ALE1-MoA6** Optimized Radical Composition of C4F8/Ar Plasma to Improve Atomic Layer Etching of SiO_2, ***Young-Seok Lee**, J.-J. Lee, S.-W. Yoo, S.-H. Lee, I.-H. Seong, C.-H. Cho, S.-J. Kim, J.-P. Son, S-J. You,* Chungnam National University, Korea	
3:00pm	**ALE1-MoA7** Atomic Layer Etching of Silicon Nitride with Ultrahigh Etching Selectivity over Silicon and Oxide Materials by Utilizing Novel Etch Gas Molecule, ***Xiangyu Guo**,* American Air Liquide*; N. Stafford,* Air Liquide*; V. Pallem,* American Air Liquide	
3:15pm	**ALE1-MoA8** Atomic Layer Etching at Low Substrate Temperature, ***Gaëlle Antoun**, T. Tillocher, P. Lefaucheux, 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	
3:30pm	**Break & Exhibits**	
3:45pm	**Break & Exhibits**	
4:00pm	**INVITED: ALE2-MoA11** Developments of Atomic Layer Etch Processes and their Applications in Fabricating III-V Compound Semiconductor Devices, ***Xu Li**, Y.-C. Fu, S.-J. Cho, D. Hemakumara, K. Floros, D. Moran, I. Thayne,* 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-MoA13** GaN and Ga_2O_3 Thermal Atomic Layer Etching Using Sequential Surface Reactions, *N. Johnson, Y. Lee,* ***Steven M. George**,* University of Colorado - Boulder	
4:45pm	**ALE2-MoA14** Selective GaN Etching Process using Self-limiting Cyclic Approach for Power Device Applications, ***Frédéric Le Roux**, N. Posseme, P. Burtin, S. Barnola, A. Torres,* Univ. Grenoble Alpes, CEA, LETI, France	
5:00pm	**ALE2-MoA15** ALE of GaN (0001) by Sequential Oxidation and H_2/N_2 Plasma, ***Kevin Hatch**, D. Messina, H. Fu, K. Fu, X. Wang, M. Hao, Y. Zhao, R. Nemanich,* Arizona State University	
5:15pm	**ALE2-MoA16** Comparative Study of Two Atomic Layer Etching Processes for GaN, ***Cédric Mannequin**, C. You,* University of Tsukuba, Japan*; G. Jacopin, T. Chevolleau, C. Durand,* University Grenoble-Alpes, France*; C. Vallée,* LTM-UGA, France*; C. Dussarat, T. Teramoto,* Air Liquide Laboratories, Japan*; H. Mariette,* University Grenoble-Alpes, France*; K. Akimoto, M. Sasaki,* University of Tsukuba, Japan*; E. Gheeraert,* University Grenoble-Alpes, France	
5:30pm	**ALE2-MoA17** Chlorinated Surface Layer of GaN in Quasi Atomic Layer Etching of Cyclic Processes of Chlorine Adsorption and Ion Irradiation, ***Masaki Hasegawa**, T. Tsutsumi,* Nagoya University, Japan*; A. Tanide,* SCREEN Holdings Co., Ltd.*; H. Kondo, M. Sekine, K. Ishikawa, M. Hori,* Nagoya University, Japan	

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

AF1-MoP1 Atomic Layer Deposition of Molybdenum Films from Molybdenum Pentachloride Precursor, ***Changwon Lee***, *S.-W. Lee, M.-S. Kim,* Versum Materials, Republic of Korea; *S. Ivanov,* Versum Materials, Inc.

AF1-MoP2 Atomic Layer Deposition of Silver Metal Films: Synthesis and Characterization of Thermally Stable Silver Metal Precursors, ***Harshani J. Arachchilage***, *C.H. Winter,* Wayne State University

AF1-MoP3 Atomic Layer Deposition of Lanthanum Oxide Using Heteroleptic La Precursors, ***Daehyeon Kim***, *J. Lee, W. Noh,* Air Liquide Laboratories Korea, South Korea

AF1-MoP4 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-MoP6 A Novel Hf Precursor with Linked Cyclopentadienyl-Amido Ligand for Thermal Atomic Layer Deposition of HfO_2 Thin Film, ***Jeong do Oh***, *M.-H. Nim, J.-S. An, J.-H. Seok, J.-W. Park,* Hansol Chemical, Republic of Korea

AF1-MoP7 Atomic Layer Deposition of WS_2 using a New Metal-Organic Precursor and H_2S Molecules, ***Deok Hyun Kim***, *D.K. Nandi, S.-H. Kim,* Yeungnam University, Republic of Korea

AF1-MoP8 Recent Advances in the Development of Metal Organic Precursors for Atomic Layer Deposition, ***Anjana Devi***, *L. Mai, D. Zywitzki, S.M.J. Beer, N. Boysen, D. Zanders, J.-L. Wree, M. Wilken, H. Parala,* Ruhr University Bochum, Germany

AF1-MoP9 Synthesis of Group VI Oxyhalide Adducts and Mo Metal Film Growth on TiN Surfaces, ***David Ermert***, *R. Wright Jr., T. Baum,* Entegris, Inc.

AF1-MoP10 Gallium Precursor Development for ALD Film Applications, ***Atsushi Sakurai***, *M. Hatase, N. Okada, A. Yamashita,* ADEKA Corporation, Japan

AF1-MoP11 Design and Optimization of Heteroleptic Zirconium Precursors by Density Function Theory Calculation, ***Romel Hidayat***, Sejong University, Republic of Korea; *J.-H. Cho, H.-D. Lim, B.-I. Yang, J.J. Park, W.-M. Chae,* DNF Co. Ltd, Republic of Korea; *H.-L. Kim,* Sejong University, Republic of Korea; *S.I. Lee,* DNF Co. Ltd, Republic of Korea; *W.-J. Lee,* Sejong University, Republic of Korea

AF1-MoP12 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-MoP13 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-MoP14 Gallium ALD Precursor Development based on Mechanistic Study, *M. Foody, Y. Zhao,* ***Adam Hock***, Illinois Institute of Technology

AF1-MoP15 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-MoP1 Atomic Layer Deposition of Cyclopentadienyl Based Hf Precursor With Various Oxidants, ***Jooho Lee***, *D. Kim, W. Noh,* Air Liquide Laboratories Korea, South Korea

AF2-MoP2 Atomic Layer Deposition of Magnesium Oxide Thin Films by using Bis(ethylcyclopentadienyl)Magnesium Precursor and H_2O, O_2 Plasma and O_3 Reactants, ***Moo-Sung Kim***, *S.-W. Lee,* Versum Materials Korea, Republic of Korea; *S. Ivanov,* Versum Materials, Inc.

AF2-MoP3 Comparative Study between $CpTi(OMe)_3$ and $CpTi(NMe_2)_3$ for Atomic Layer Deposition of Titanium Oxide, ***Jaemin Kim***, *S. Kim, R. Hidayat, Y. Choi, H.-L. Kim, W.-J. Lee,* Sejong University, Republic of Korea

AF2-MoP4 Tin Nitride Atomic Layer Deposition using Hydrazine, ***Ann Greenaway***, *A. Tamboli, S. Christensen,* National Renewable Energy Laboratory

AF2-MoP5 Growing Polycrystalline Indium Oxide Film by Atomic Layer Deposition, ***Chien-Wei Chen***, ITRC, NARL, Republic of China

AF2-MoP6 Low Temperature Tin Oxide by Atomic Layer Deposition, ***Yu-Chiao Lin***, *B.-H. Liu, Y.-S. Yu, C.-C. Kei, C.-L. Lin,* National Applied Research Laboratories, Republic of China

AF2-MoP7 Dielectric ALD with Hydrogen Peroxide: Comparitive Study of Growth and Film Characteristics for Anhydrous H_2O_2, H_2O_2/H_2O Mixtures and H_2O, ***Daniel Alvarez***, RASIRC; *K. Andachi, G. Tsuchibuchi, K. Suzuki,* Taiyo Nippon Sanso Corporation; *J. Spiegelman,* RASIRC

AF2-MoP8 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-MoP9 DFT Study on Atomic Layer Deposition of Al_2O_3 with Various Oxidants, ***Seunggi Seo***, *T. Nam,* Yonsei University, Republic of Korea; *H.B.R. Lee,* Incheon National University, Republic of Korea; *B. Shong,* Hongik University, Republic of Korea; *H. Kim,* Yonsei University, Republic of Korea

AF2-MoP10 Effect of Heteroleptic Structure on Atomic Layer Deposited HfO_2 Using $Hf(N(CH_3)_2)_4$ and $CpHf(N(CH_3)_2)_3$ Precursors, ***Sung Min Park***, *B.-E. Park, S. Lee, H. Yoon,* Yonsei University, Republic of Korea; *M.Y. Lee, S.-H. Kim,* Yeungnam University, Republic of Korea; *H. Kim,* Yonsei University, Republic of Korea

AF2-MoP11 Effect of Co-Reactant on the Atomic Layer Deposition of Copper Oxide, ***Jason Avila***, *N. Nepal, V. Wheeler,* U.S. Naval Research Laboratory

AF2-MoP12 A Systematic Study on Atomic Layer Deposition of ZrO_2 Thin Films, *X. Wang, J. Cai,* ***Xiangbo Meng***, University of Arkansas

AF2-MoP13 Hydrophobic SiO_x Thin Film Deposition using Low-Temperature Atomic Layer Deposition, ***Taewook Nam***, *H. Kim,* Yonsei University, Republic of Korea

AF2-MoP14 Characteristics of High-temperature ALD SiO_2 Thin Films Using a Si Precursor with Excellent Thermal Stability, ***Jae-Seok An***, *J.-R. Park, M.-H. Nim,* Hansol Chemical, Republic of Korea; *Y. Kim, J. Gu, S. Kim,* Sejong University, Republic of Korea; *J.-H. Seok, J.-W. Park,* Hansol Chemical, Republic of Korea; *W.-J. Lee,* Sejong University, Republic of Korea

AF2-MoP15 Developing Routes Toward Atomic Layer Deposition of Tungsten using Fluorine-Free W Precursor and Various Reactants with Density Functional Theory, ***Tae Hyun Kim***, *D.K. Nandi, M.Y. Lee,* Yeungnam University, Republic of Korea; *R. Hidayat, S. Kim, W.-J. Lee,* Sejong University, Republic of Korea; *S.-H. Kim,* Yeungnam University, Republic of Korea

AF2-MoP16 ALD HfO_2 with Anhydrous H_2O_2 in a 300 mm Cross-flow Reactor – Comparison with H_2O and O_3 Oxidants, ***Steven Consiglio***, *R. Clark, C. Wajda, G. Leusink,* TEL Technology Center, America, LLC

AF2-MoP17 Atomic Layer Deposition of Copper (I) Chloride using Liquid 1-Chlorobutane Precursor, ***Richard Krumpolec***, *D. Cameron, D. Bača, J. Humlíček, O. Caha,* Masaryk University, Czech Republic

AF2-MoP18 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.-S. 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-MoP1 Langasite Crystal Microbalance (LCM) for In-situ Process Monitoring of ALD up to 440 º 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-MoP2 In-Situ Process Monitoring of Precursor Delivery Using Infra-Red Spectroscopic Method, ***Robert Wright***, *T. Baum,* Entegris, Inc.

AF3-MoP3 Quantitative Analysis of High-k ALD Precursors for Trace Elemental Impurities by Inductively Coupled Plasma – Mass Spectrometry (ICP-MS), ***Jinjin Wang***, *L. Mey-Ami, F. Li,* Air Liquide Electronics – Balazs NanoAnalysis

AF3-MoP4 Numerical Studies of the Fluid Dynamics and Chemical Kinetics of Spatial Atomic Layer Deposition of Al_2O_3, ***Dongqing Pan***, University of North Alabama

AF3-MoP5 Mechanistic Understanding of Dicholosilane 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-MoP6 New Challenges of the Channeled Spectroscopic Ellipsometry for ALD Applications, ***Gai Chin***, ULVAC Inc., Japan

AF3-MoP7 *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-MoP8 Reaction Mechanisms of Thermal and Plasma-Modified ALD Growth Studied by *In-Situ* Mass Spectrometry, ***Thomas J. Larrabee****, L.B. Ruppalt,* U.S. Naval Research Laboratory

AF3-MoP10 In-situ Quartz Crystal Microbalance Study of Poly(3,4-ethylenedioxythiophene) (PEDOT) by Oxidative Molecular Layer Deposition (o-MLD), ***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-MoP1 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-MoP2 Plasma Enhanced Atomic Layer Deposition of Silicon Nitride Thin Film by Organosilane Precursor and Process Engineering, ***Se-Won Lee****, C. Lee, M.-S. Kim,* Versum Materials Korea, Republic of Korea*; S. Yi, X. Lei,* Versum Materials, Inc.

AF4-MoP3 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-MoP4 Plasma Enhanced Atomic Layer Deposition of Aluminum and Aluminum Fluoride, ***Daniel Messina****, Z. Haung, B. Eller, F. Koeck, P. Scowen, R. Nemanich,* Arizona State University

AF4-MoP5 High-temperature Hollow Cathode Plasma Enhanced Atomic Layer Deposition of Silicon Nitride (SiN_x) Thin Films using Hexachlorodisilane (HCDS), ***Su Min Hwang****, A.L.N. Kondusamy, Q. Zhiyang, H.S. Kim, J. Kim,* University of Texas at Dallas*; X. Zhou, B.K. Hwang,* Dow Chemicals

AF4-MoP6 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-MoP8 Microwave Generated Plasma Enhanced Atomic Layer Deposition of Oxides, ***Ji Hye Kim****, Y.D. Tak, Y.B. Lee,* ISAC Research Inc., Republic of Korea*; A. Poruba, J. Dolak,* SVCS Process Innovation s.r.o., Czech Republic*; H.S. Park,* ISAC Research Inc., Republic of Korea

AF4-MoP9 Epitaxial Growth of GaN by Plasma-Enhanced Atomic Layer Deposition, ***Sanjie Liu****, X. Zheng,* University of Science and Technology Beijing, China

AF4-MoP10 Improving Plasma Enhanced Atomic Layer Deposition of Silicon Nitride with A Halodisilane, *B.K. Hwang, C. Lee,* ***Xiaobing Zhou****, A.E. Foss,* DuPont*; T.L. Sunderland, A.R. Millward,* Dow Chemicals*; S.M. Hwang, J.Y. Kim, A.T. Lucero, A.L.N. Kondusamy,* University of Texas at Dallas

AF4-MoP11 Characteristics of Silicon Nitride Film Deposited by Multi-electrode VHF (162 MHz)-PEALD, ***Ki Hyun Kim****, K.S. Kim, Y.J. Ji, J.Y. Byun,* Sungkyunkwan University, Republic of Korea*; A.R. Ellingboe,* Dublin City University*; G.Y. Yeom,* Sungkyunkwan University, Republic of Korea

AF4-MoP12 Characteristics of Low Damage Cobalt Films Deposited by Very High Frequency Plasma Enhanced Atomic Layer Deposition, ***Changhoon Song****, W.K. Yeom, Y. Shin, G.W. Kim, G.Y. Yeom,* Sungkyunkwan University, Republic of Korea

ALD Fundamentals
Room Evergreen Ballroom & Foyer - Session AF5-MoP
Characterization of ALD Films Poster Session
5:45pm

AF5-MoP1 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-MoP2 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.R. 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.E. 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-MoP3 Nanoscale Chemical Characterization of Ultrathin Films via PiFM, ***Sung Park****, D. Nowak, W. Morrison,* Molecular Vista

AF5-MoP4 The Effect of Impurities on Film Properties in the $Y(MeCp)_3/O_3$ Process, *J. Kalliomäki, T. Lehto, M. Kääriä, T. Sarnet,* ***Jani Kivioja****,* Picosun Oy, Finland

AF5-MoP6 Internal Photoemission Spectroscopy Measurement of Barrier Heights between ALD Ru and Al_2O_3, ***Melanie Jenkins****, M.H. Hayes, K. Holden, J.F. Conley, Jr.,* Oregon State University

AF5-MoP7 Growth and Characterization: Low Temperature ALD, ***Birol Kuyel****, A. Alphonse, K.P. Hong, J. Marshall,* Nano-Master, Inc.

AF5-MoP8 Etch Rate Characterization of Oxide ALD Films, ***Martin M. Winterkorn****, H.J. Kim, J. Provine, F. Prinz, T.W. Kenny,* Stanford University

AF5-MoP10 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-MoP1 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-MoP2 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-MoP3 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-MoP4 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-MoP5 Design and Manufacturing of ICP-Type Remote Plasma ALD, ***Dohyun Go****, J.W. Shin, B.C. Yang, H.J. Kim,* Seoul National University of Science and Technology, Republic of Korea

AM-MoP6 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-MoP8 Process Control and Mass Delivery Optimization from Low Vapor Pressure Precursors, ***Jeffrey Spiegelman****, C. Ramos, D. Alvarez, Z. Shamsi,* RASIRC

AM-MoP9 Scaling Low-temperature Thermal ALD of SiO_2 to Batch, *J. Kalliomäki, M. Mäntymäki, T. Lehto, S. Shukla, M. Kääriä, T. Sarnet,* ***Juhana Kostamo****,* Picosun Oy, Finland

AM-MoP10 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-MoP1 Structure and Magnetism of Electrospun a -Fe_2O_3 Nanofibers SiO_2-Coated by ALD, *F. Pantò,* CNR-Istituto di Tecnologie Avanzate per l'Energia (ITAE), Italy*; H. Raza,* Humboldt-Universität zu Berlin, Germany*; A.M. 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-MoP2 Fluidized Bed Molecular Layer Deposition of Ultrathin Poly(ethylene terephthalate) Films on TiO_2 P25 Nanoparticles, ***Damiano La Zara****, M. Bailey, D. Benz,* Delft University of Technology, Netherlands*; M.J. Quayle, G. Petersson, S. Folestad,* AstraZeneca, Sweden*; J.R. van Ommen,* Delft University of Technology, Netherlands

EM-MoP3 Fabrication and Characterization of Organic-Inorganic Hybrid Thin Films, ***Chu Huong****,* Hanyang University, Republic of Korea

EM-MoP4 High Performance Encapsulation Polymer-Al_2O_3 Hybrid Thin Layer by Atomic Layer Infiltration, ***Hong Rho Yoon****, J. Park, N.V. Long, C. Huong,* Hanyang University, Republic of Korea

EM-MoP5 ALD of Metal Oxides Fabricated by using $La(NO_3)_3{\cdot}6H_2O$ Oxidant and their Applications, ***In-Sung Park****, S.Y. Kim, T. Lee, S. Seong, Y.C. Jung, J. Ahn,* Hanyang University, Republic of Korea

EM-MoP6 Bringing Higher Etch-resistance to Metal-infiltrated Polymer, ***Norikatsu Sasao****, K. Asakawa, S. Sugimura,* Toshiba Memory Corporation

EM-MoP7 Magnetic and Electric Properties of Atomic Layer Deposited ZrO_2-based Thin Films, ***Kristjan Kalam****, H. Seemen, P. Ritslaid, T. Jõgiaas, 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-MoP8 Vapor Phase Infiltration as a New Approach in the Fabrication of Advanced Hybrid Thermoelectric Materials, ***Jaime DuMont****, M. Knez,* CIC nanoGUNE, Spain

EM-MoP9 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-MoP10 Atomic Layer Deposition of Molybdenum Oxide Carbide and Molybdenum Carbide Films, ***Michael D. Overbeek****, C.H. Winter,* Wayne State University

EM-MoP11 Solid Phase Epitaxy of ALD-Grown $PrAlO_3$ Films, ***Navoda Jayakodiarachchi****, W.L.I. Waduge,* Wayne State University*; Y. Chen, P. Zuo, T.F.T. Kuech, S.E. Babcock, P.G. Evans,* University of Wisconsin-Madison*; C.H. Winter,* Wayne State University

EM-MoP12 Homogenous Distribution of Dopants in ALD Films: Tin-Doped Zinc Oxide (ZTO) Case Study, ***Triratna Muneshwar****, D. Barlage, K. Cadien,* University of Alberta, Canada

EM-MoP13 Uniform, Thermal ALD of Al_2O_3 and ZnO on Zirconia Particles, ***Dhruv Shah****, D. Patel, J. O'Tani, M. Linford,* Brigham Young University

EM-MoP14 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.J. Baik,* Hankyong National University, Republic of Korea*; W. Koh,* UP Chemical Co., Ltd., Republic of Korea*; W.-J. Lee,* Sejong University, Republic of Korea

EM-MoP15 Study on The Crystallinity and The Dielectric Constant of $Zr_xGe_{1-x}O_2$ 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

Tuesday Morning, July 23, 2019

	Room Grand Ballroom A-C	
8:00am	**AF1-TuM1** Surface Chemistry during ALD of Nickel Sulfide, ***Xinwei Wang,*** Peking University, China	**ALD Fundamentals** **Session AF1-TuM** **In-Situ Characterization of ALD Processes** **Moderators:** Christophe Vallée, LTM-UGA, Erwin Kessels, Eindhoven University of Technology
8:15am	**AF1-TuM2** In situ and In vacuo Studies on Plasma Enhanced Atomic Layer Deposited Cobalt Films, ***Johanna Reif****, M. Knaut, S. Killge, N.A. Hampel, M. Albert, J.W. Bartha,* Technische Universität Dresden, Germany	
8:30am	**AF1-TuM3** 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, ***David Zanders****,* Ruhr University Bochum, Germany*; E. Ciftyurek,* Heinrich Heine University Düsseldorf, Germany*; C. Bock, A. Devi,* Ruhr University Bochum, Germany*; K.D. Schierbaum,* Heinrich Heine University Düsseldorf, Germany	
8:45am	**AF1-TuM4** Surface Science Studies of GaN Substrates Subjected to Plasma-Assisted Atomic Layer Processes, ***Samantha G. Rosenberg****,* ASEE*; D.J. Pennachio,* University of California, Santa Barbara*; E.C. Young, Y.H. Chang, H.S. Inbar,* University of California Santa Barbara*; J.M. Woodward,* U.S. Naval Research Laboratory*; Z.R. Robinson,* SUNY College at Brockport*; J. Grzeskowiak,* University at Albany-SUNY*; C.A. Ventrice, Jr.,* SUNY Polytechnic Institute*; C.J. Palmstrøm,* University of California Santa Barbara*; C.R. Eddy, Jr.,* U.S. Naval Research Laboratory	
9:00am	**AF1-TuM5** Infrared and Optical Emission Spectroscopy on Atmospheric-Pressure Plasma-Enhanced Spatial ALD of Al_2O_3, ***Maria Antonietta Mione****, R. Engeln, W.M.M. Kessels,* Eindhoven University of Technology, Netherlands*; F. Roozeboom,* Eindhoven University of Technology and TNO, Netherlands	
9:15am	**AF1-TuM6** Fingerprinting of ALD Reaction Products with Time-Resolved In situ Mass Spectrometry, ***Andreas Werbrouck****, F. Mattelaer, J. Dendooven, C. Detavernier,* Ghent University, Belgium	
9:30am	**INVITED: AF1-TuM7** Studying Pt and Pd Nanoparticle ALD through X-ray based In situ Characterization, ***Jolien Dendooven****, J.-Y. Feng,* Ghent University, Belgium*; E. Solano,* ALBA Synchrotron Light Source, Spain*; R. Ramachandran, M. Minjauw, M. Van Daele,* Ghent University, Belgium*; D. Hermida-Merino,* ESRF European Synchrotron, France*; A. Coati,* Synchrotron SOLEIL, France*; C. Detavernier,* Ghent University, Belgium	
9:45am	Invited talk continues.	
10:00am	**Break & Exhibits**	
10:15am	**Break & Exhibits**	
10:30am	**Break & Exhibits**	
10:45am	**AF3-TuM12** Enabling Nucleation Phenomena Studies of ALD Deposited Films by In-situ High-Resolution TEM, ***Stephanie Burgmann****, A. Dadlani, A. Bin Afif,* Norwegian University of Science and Technology, Norway*; J. Provine,* Aligned Carbon*; A.T.J. van Helvoort, J. Torgesen,* Norwegian University of Science and Technology, Norway	**ALD Fundamentals** **Session AF3-TuM** **Growth and Characterization II** **Moderators:** Jolien Dendooven, Ghent University, Henrik Pedersen, Linköping University
11:00am	**AF3-TuM13** *In-situ* ellipsometric analysis of plasma assisted ALD grown-stoichiometric and crystalline AlN films, ***Adnan Mohammad****, D. Shukla, S. Ilhom, B. Willis,* University of Connecticut*; B. Johs,* Film Sense LLC*; A.K. Okyay,* Stanford University*; N. Biyikli,* University of Connecticut	
11:15am	**AF3-TuM14** Film Properties of ALD SiNx Deposited by Trisilylamine and N_2 Plasma, ***Markus Bosund****, E. Salmi, K. Niiranen,* Beneq Oy, Finland	
11:30am	**AF3-TuM15** Comparison of Properties of Conductive Nitride Films Prepared by PEALD using Quartz and Sapphire Plasma Sources, *I. Krylov, X. Xu, K. Weinfeld,* ***Valentina Korchnoy****, D. Ritter, M. Eizenberg,* Technion - Israel Institute of Technology, Israel	
11:45am	**AF3-TuM16** Role of Hydrogen Radicals in the Surface Reactions of Trimethyl-Indium (TMI) with Ar/N_2 Plasma in Hollow-Cathode Plasma-Assisted ALD, ***Saidjafarzoda Ilhom****, 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-TuM1** ALD for Solar Fuels: Rendering Halide Perovskites Acid-Compatible + Precision Cluster Electrocatalysts, ***Alex Martinson***, *I.S. Kim, M. Pellin,* 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-TuM3** Plasma-Assisted ALD of Cobalt Phosphate: Process Development and Electro-Catalytic Activity Towards Oxygen Evolution Reaction, *V. Di Palma,* Eindhoven University of Technology, Netherlands; *G. Zafeiropoulos, R. van de Sanden,* Dutch Institute for Fundamental Energy Research; *W.M.M. Kessels,* Eindhoven University of Technology, Netherlands; *M. Tsampas,* Dutch Institute for Fundamental Energy Research; ***Mariadriana Creatore***, Eindhoven University of Technology, Netherlands	
8:45am	**AA1-TuM4** Improved Electrochemical Activity of Pt Catalyst Fabricated by Vertical Forced-Flow Atomic Layer Deposition, ***Tzu-Kang Chin***, *T.-P. Perng,* National Tsing Hua University, Republic of China	
9:00am	**AA1-TuM5** Improved Catalyst Selectivity and Longevity using Atomic Layer Deposition, *C. Marshall,* Argonne National Laboratory; *A. Dameron, R. Tracy,* Forge Nano; *C. Nicholas, L. Abrams, P. Barger,* Honeywell UOP; *T. Li,* ***Lu Zheng***, Argonne National Laboratory	
9:15am	**AA1-TuM6** Enhancing Co_2C Activity for C_{2+} Oxygenate Production from Syngas using ALD Promoters, ***Sindhu Nathan***, *J. Singh, A. Asundi, S.F. Bent,* Stanford University	
9:30am	**AA1-TuM7** Atomic Layer Deposition of Bismuth Vanadate Core-Shell Nanowire Photoanodes, ***Ashley Bielinski***, *S. Lee, J. Brancho, S. Esarey, A. Gayle, E. Kazyak, K. Sun, B. Bartlett, N.P. Dasgupta,* University of Michigan	
9:45am	**AA1-TuM8** Improved Photocatalytic Efficiency by Depositing Pt and SiO_2 on TiO_2 (P25) using Atomic Layer Deposition in a Fluidized Bed, ***Dominik Benz***, *H. Nugteren, H. Hintzen, M. Kreutzer, R. van Ommen,* Delft University of Technology, Netherlands	
10:00am	**Break & Exhibits**	
10:15am	**Break & Exhibits**	
10:30am	**Break & Exhibits**	
10:45am	**AA2-TuM12** Atomic Layer Deposition of Glassy Lithium Borate-Carbonate Electrolytes for Solid-State Lithium Metal Batteries, *E. Kazyak, A. Davis, S. Yu, K.-H. Chen, A. Sanchez, J. Lasso, T. Thompson, A. Bielinski, D. Siegel,* ***Neil P. Dasgupta***, 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-TuM13** ALD Interlayers for Stabilization of $Li_{10}GeP_2S_{12}$ Solid Electrolytes Against Li Metal Anodes, ***Andrew Davis***, University of Michigan; *K. Wood,* National Renewable Energy Laboratory; *R. Garcia-Mendez, E. Kazyak, K.-H. Chen, J. Sakamoto,* University of Michigan; *G. Teeter,* National Renewable Energy Laboratory; *N.P. Dasgupta,* University of Michigan	
11:15am	**AA2-TuM14** ALD and MLD on Lithium Metal – A Practical Approach Toward Enabling Safe, Long Lasting, High Energy Density Batteries, ***Andrew Lushington***, Arradiance; *Y. Zhao, L. Goncharova, Q. Sun, R. Li, X. Sun,* University of Western Ontario, Canada	
11:30am	**AA2-TuM15** Synergistic Effect of 3D Current Collectors and ALD Surface Modification for High Coulombic Efficiency Lithium Metal Anodes, ***Kuan-Hung Chen***, *A. Sanchez, E. Kazyak, A. Davis, N.P. Dasgupta,* University of Michigan	
11:45am	**AA2-TuM16** Atomic Layer Deposition FeS@CNT from Elemental Sulfur as an Electrode for Lithium-Ion batteries, ***Hongzheng Zhu***, *J. Liu,* University of British Columbia, Canada	

Tuesday Morning, July 23, 2019

	Room Grand Ballroom H-K	
8:00am	**AF2-TuM1** Characterizing Water Delivery for ALD Processes, ***James Maslar***, *B. Sperling, W. Kimes,* National Institute of Standards and Technology*; W. Kimmerle, K. Kimmerle,* NSI*; E. Woelk,* CeeVeeTech	**ALD Fundamentals** **Session AF2-TuM** **ALD Precursors II** **Moderators:** Jin-Seong Park, Hanyang University, Seán Barry, Carleton University
8:15am	**AF2-TuM2** A Nickel Chloride Adduct Complex as a Precursor for Low-Resistivity Nickel Nitride Thin Films with Tert-butylhydrazine as a Coreactant*, K. Väyrynen, T. Hatanpää, M. Mattinen, M.J. Heikkilä, K. Mizohata, J. Räisänen,* University of Helsinki, Finland*; J. Link, R. Stern,* National Institute of Chemical Physics and Biophysics, Estonia*; M. Leskelä,* ***Mikko Ritala****,* University of Helsinki, Finland	
8:30am	**AF2-TuM3** Simple, Rationally Designed Aluminum Precursors for the Deposition of Low-impurity AlN Films*,* ***Sydney Buttera****, S. Barry,* Carleton University, Canada*; H. Pedersen,* Linköping University, Sweden	
8:45am	**AF2-TuM4** Atomic Layer Deposition of Lead(II) Sulfide at Temperatures Below 100 °C*,* ***Georgi Popov****,* University of Helsinki, Finland*; G. Bačić,* Carleton University, Canada*; M. Mattinen, M. Vehkamäki, K. Mizohata, M. Kemell,* University of Helsinki, Finland*; S. Barry,* Carleton University, Canada*; J. Räisänen, M. Leskelä, M. Ritala,* University of Helsinki, Finland	
9:00am	**AF2-TuM5** Development and Characterization of a Novel Atomic Layer Deposition Process for Transparent p-Type Semiconducting Nickel Oxide using Ni(^{tBu2}DAD)$_2$ and Ozone*,* ***Konner Holden****,* Oregon State University*; C.L. Dezelah,* EMD Performance Materials*; J.F. Conley, Jr.,* Oregon State University	
9:15am	**AF2-TuM6** Blocking Thermolysis in Diamido Plumbylenes*,* ***Goran Bacic****,* Carleton University, Canada*; D. Zanders,* Ruhr University Bochum, Germany*; I. Frankel,* Carleton University, Canada*; J. Masuda,* Saint Mary's University, Canada*; T. Zeng,* Carleton University, Canada*; B. Mallick, A. Devi,* Ruhr University Bochum, Germany*; S. Barry,* Carleton University, Canada	
9:30am	**AF2-TuM7** ALD of Sc_2O_3 with $Sc(cp)_3$ and a Novel Heteroleptic Precursors*, T. Ivanova,* ***Perttu Sippola****,* ASM, Finland*; G. Verni, Q. Xie,* ASM, Belgium*; M. Givens,* ASM, Finland	
9:45am	**AF2-TuM8** A Novel Self-limited Atomic Layer Deposition of WS_2 based on the Chemisorption and Reduction of bis(t-butylimido)bis(dimethylamino) Complexes*,* ***Nicola Pinna****,* Humboldt-Universtät zu Berlin, Germany	
10:00am	**Break & Exhibits**	
10:15am	**Break & Exhibits**	
10:30am	**Break & Exhibits**	
10:45am	**INVITED: AS1-TuM12** Overview of Wet And Dry Selective Processes Driven by Area Activation or Deactivation Down to Below 20nm Critical Dimensions*,* ***Silvia Armini****,* IMEC, Belgium	**Area Selective ALD** **Session AS1-TuM** **Area-Selective ALD Techniques** **Moderator:** Adrie Mackus, Eindhoven University of Technology
11:00am	Invited talk continues.	
11:15am	**AS1-TuM14** Electron-Enhanced Atomic Layer Deposition (EE-ALD) of Cobalt Metal Films at Room Temperature*,* ***Zach Sobell****, A. Cavanagh, S.M. George,* University of Colorado - Boulder	
11:30am	**AS1-TuM15** Area Selective Atomic Layer Deposition on Molecular Design*,* ***Akihiro Nishida****, T. Yoshino, N. Okada, A. Yamashita,* ADEKA Corporation, Japan	
11:45am	**AS1-TuM16** From Surface Dependence in Atomic Layer Deposition to Area-Selective Deposition of TiN in Nanoscale Patterns*,* ***Annelies Delabie****,* IMEC, Belgium*; D. Carbajal,* UNAM*; J. Soethoudt, B.T. Chan, E. Altamirano Sanchez, B. Meynaerts, J.-W. Clerix, S. Van Elshocht,* IMEC, Belgium	

Tuesday Morning, July 23, 2019

	Room Regency Ballroom A-C	
8:00am	**INVITED: ALE1-TuM1** Analyses of Hexafluoroacetylacetone (Hfac) Adsorbed on Transition Metal Surfaces, ***Tomoko Ito***, *K. Karahashi, S. Hamaguchi,* Osaka University, Japan	**Atomic Layer Etching** **Session ALE1-TuM** **ALE: Gas-phase and/or Thermal ALE** **Moderators:** Steven M. George, University of Colorado - Boulder, Venkateswara Pallem, American Air Liquide
8:15am	Invited talk continues.	
8:30am	**ALE1-TuM3** Thermal Atomic Layer Etching of Silicon Nitride using an Oxidation and "Conversion-Etch" Mechanism, ***Aziz Abdulagatov***, *S.M. George,* University of Colorado - Boulder	
8:45am	**ALE1-TuM4** Thermal Dry Atomic Layer Etching of Cobalt with Sequential Exposure to Molecular Chlorine and Diketones, *M. Konh, C. He, X. Lin,* University of Delaware; *X. Guo, V. Pallem,* American Air Liquide; *R. Opila,* ***Andrew Teplyakov***, *Z. Wang, B. Yuan,* University of Delaware	
9:00am	**ALE1-TuM5** Spontaneous Etching of B_2O_3 and TiO_2 by HF: Removal Reaction in WO_3 ALE and TiN ALE, ***Austin Cano***, University of Colorado - Boulder; *S.K. Natarajan,* Tyndall National Institute, Ireland; *J. Clancey,* University of Colorado - Boulder; *S. Elliot,* Schrödinger Inc; *S.M. George,* University of Colorado - Boulder	
9:15am	**ALE1-TuM6** Thermal Based Atomic Layer Etching of Aluminum Oxide and Titanium Nitride, ***Varun Sharma***, *T. Blomberg, M. Tuominen, S. Haukka,* ASM, Finland	
9:30am	**ALE1-TuM7** Thermal Atomic Layer Etching of Amorphous and Crystalline Hafnium Oxide, Zirconium Oxide and Hafnium Zirconium Oxide, ***Jessica A. Murdzek***, *S.M. George,* University of Colorado - Boulder	
9:45am	**ALE1-TuM8** Isotropic Atomic Layer Etching of Cobalt with Smooth Etched Surfaces by using Cyclic Repetition of Plasma Oxidation and Organometallization, ***Sumiko Fujisaki***, Hitachi R&D Group, Japan	
10:00am	**Break & Exhibits**	
10:15am	**Break & Exhibits**	
10:30am	**Break & Exhibits**	
10:45am	**ALE2-TuM12** Atomic Layer Etching for Germanium using Halogen Neutral Beam =Comparison between Br and Cl Chemistry=, *T. Fujii,* ***Daisuke Ohori***, Tohoku University, Japan; *S. Noda,* National Institute of Advanced Industrial Science and Technology, Japan; *Y. Tanimoto, D. Sato, H. Kurihara,* Showa Denko K.k.; *W. Mizubayashi, K. Endo,* National Institute of Advanced Industrial Science and Technology, Japan; *Y. Li,* National Chiao Tung University; *Y.-J. Lee,* National Nano Device Laboratories; *T. Ozaki, S. Samukawa,* Tohoku University, Japan	**Atomic Layer Etching** **Session ALE2-TuM** **Alternative Methods to ALE** **Moderators:** Jean-François de Marneffe, IMEC VZW, Satoshi Hamaguchi, Osaka University
11:00am		
11:15am	**ALE2-TuM14** A New Etching / Passivation Process in Cyclic Mode for Spacer Etching in 3D CMOS Integrations, *O. Pollet,* CEA-LETI, France; *N. Posseme,* Univ. Grenoble Alpes, CEA, LETI, France; *V. Ah-Leung,* ***Valentin Bacquie***, CEA-LETI, France	
11:30am	**ALE2-TuM15** Atomic Layer Etching of Transition Metals with Gas Cluster Ion Beam Irradiation and Acetylacetone, ***Noriaki Toyoda***, *K. Uematsu,* University of Hyogo, Japan	
11:45am	**ALE2-TuM16** Atomic Layer Etching at Atmospheric Pressure, ***Eugen Shkura***, *D. Theirich, K. Brinkmann, T. Haeger,* University of Wuppertal, Germany; *J. Schneidewind, M. Siebert,* SENTECH Instruments GmbH, Germany; *T. Riedl,* University of Wuppertal, Germany	

Tuesday Afternoon, July 23, 2019

	Room Grand Ballroom A-C	
1:30pm	**AF-TuA1** Low Temperature High Quality Silicon Dioxide by Neutral Beam Enhanced Atomic Layer Deposition, ***Hua-Hsuan Chen***, *D. Ohori, T. Ozaki*, Tohoku University, Japan; *M. Utsuno, T. Kubota, T. Nozawa,* ASM Japan K.K., Japan; *S. Samukawa,* Tohoku University, Japan	**ALD Fundamentals** **Session AF-TuA** **Plasma ALD: Growth and Characterization** **Moderators:** Hyeongtag Jeon, Hanyang University, Jiyoung Kim, The University of Texas at Dallas
1:45pm	**AF-TuA2** Radical Surface Recombination Probabilities during Plasma ALD of SiO_2, TiO_2 and Al_2O_3 Determined from Film Conformality, ***Karsten Arts***, Eindhoven University of Technology, Netherlands; *M. Utriainen,* VTT Technical Research Centre of Finland, Finland; *R. Puurunen,* Aalto University, Finland; *W.M.M. Kessels,* Eindhoven University of Technology, Netherlands; *H. Knoops,* Oxford Instruments Plasma Technology, UK	
2:00pm	**AF-TuA3** A Robust Method for In-situ Gas Monitoring of ALD Processes using Optical Emission Spectroscopy of a Pulsed Remote Plasma, ***Joe Brindley***, *B. Daniel, V. Bellido-Gonzalez,* Gencoa Limited, UK; *R. Potter, B. Peek,* University of Liverpool, UK	
2:15pm	**AF-TuA4** Near Room Temperature Plasma Enhanced Atomic Layer Deposition of Gold Metal, ***Michiel Van Daele***, Ghent University, Belgium; *M. Griffiths,* Carleton University, Canada; *A. Raza,* Ghent University - IMEC, Belgium; *M. Minjauw,* Ghent University, Belgium; *S. Barry,* Carleton University, Canada; *R. Baets,* Ghent University - IMEC, Belgium; *C. Detavernier, J. Dendooven,* Ghent University, Belgium	
2:30pm	**AF-TuA5** Low-Temperature Deposition of Gallium Oxide and Aluminum Oxide with Arrays of Microcavity Plasma Enhanced Atomic Layer Deposition, ***Jinhong Kim***, *A. Mironov, S.-J. Park, J.G. Eden,* University of Illinois at Urbana-Champaign	
2:45pm	**AF-TuA6** The Effects of Varying Plasma Conditions on Plasma Assisted Atomic Layer Epitaxy, ***David Boris***, *V. Wheeler, N. Nepal, S.G. Rosenberg, J. Avila, J.M. Woodward, V. Anderson, S. Walton, C.R. Eddy, Jr.,* U.S. Naval Research Laboratory	
3:00pm	**INVITED: AF-TuA7** Plasma-Enhanced Atomic Layer Epitaxy of Ultra-wide Bandgap Ga_2O_3 and $(Al_xGa_{1-x})_2O_3$ Films, ***Virginia Wheeler***, *N. Nepal, D. Boris, S. Walton, S. Qadri, J. Avila, D. Meyer, B. Downey, V. Gokhale,* U.S. Naval Research Laboratory; *L. Nyakiti,* Texas A&M University; *M. Tadjer,* U.S. Naval Research Laboratory; *M. Goorsky,* University of California Los Angeles; *C.R. Eddy Jr.,* U.S. Naval Research Laboratory	
3:15pm	Invited talk continues.	
3:30pm	**Break & Exhibits**	
3:45pm	**Break & Exhibits**	
4:00pm	**INVITED: AA3-TuA11** Doped Hi-K ALD Films of HfO_X and ZrO_X for Advanced Ferroelectric and Anti-Ferroelectric Memory Device Applications:, ***Niloy Mukherjee***, *J. Mack, S. Rathi,* Eugenus, Inc.; *Z. Wang, A. Gaskell, N. Tasneem, A. Khan,* Georgia Institute of Technology; *M. Dopita, D. Kriegner,* 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-TuA13** ALD of La-Doped HfO_2 Films for Ferroelectric Applications, ***Tatiana Ivanova***, *P. Sippola, M. Givens,* ASM, Finland; *H. Sprey,* ASM, Belgium; *T.M. Büttner, P. Polakowski, K. Seidel,* Fraunhofer IPMS-CNT, Germany	
4:45pm	**AA3-TuA14** Characterization of Multi-Domain Ferroelectric ZrO_2 Thin Films for Negative Capacitance and Inductive Responses, ***Yu-Tung Yin***, *P.-H. Cheng, Y.-S. Jiang, J. Shieh, M.J. Chen,* National Taiwan University, Republic of China	
5:00pm	**AA3-TuA15** Scaling Ferroelectric $Hf_{0.5}Zr_{0.5}O_2$ on Metal-Ferroelectric-Metal (MFM) and Metal-Ferroelectric-Insulator-Semiconductor (MFIS) Structures, ***Jaidah Mohan***, *H. Hernandez-Arriaga, H.S. Kim, A. Khosravi, A. Sahota,* The University of Texas at Dallas; *R. Wallace,* University of Texas at Dallas; *J. Kim,* The University of Texas at Dallas	
5:15pm	**AA3-TuA16** Interface Characteristics of MIM Capacitors using Vanadium Nitride Electrode and ALD-grown ZrO_2 High-k Dielectric Film, ***Jae Hyoung Choi***, *Y. Kim, H.I. Lee, H.-J. Lim, K. Hwang, S.W. Nam, H.-K. Kang,* Samsung Electronics, Republic of Korea	

Tuesday Afternoon, July 23, 2019

	Room Grand Ballroom E-G	
1:30pm	**INVITED: AA1-TuA1** Atomic Layer Deposition of Indium Gallium Zinc Oxide (IGZO) Semiconductor Thin Films: From Precursor to Thin Film Transistor Application, ***Jin-Seong Park,*** 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-TuA3** ALD Growth of Ultra-thin Co Layers on the Topological Insulator Sb_2Te_3, ***Emanuele Longo,*** *R. Mantovan, R. Cecchini,* CNR-IMM Unit of Agrate Brianza, Italy*; M.D. Overbeek,* Wayne State University*; M. Longo,* CNR-IMM Unit of Agrate Brianza, Italy*; L. Lazzarini,* CNR-IMEM, Italy*; M. Fanciulli,* Università degli Studi di Milano-Bicocca, Italy*; C.H. Winter,* Wayne State University*; C. Wiemer,* CNR-IMM Unit of Agrate Brianza, Italy	
2:15pm	**AA1-TuA4** Modifying Interfacial Chemistry of Cellulose-Reinforced Epoxy Resin Composites using Atomic Layer Deposition (ALD), ***Jamie Wooding,*** *Y. Li, K. Kalaitzidou, M. Losego,* Georgia Institute of Technology	
2:30pm	**AA1-TuA5** Atomic Layer Deposition of Au Nanoparticles on Titania, ***Fatemeh S.M. Hashemi,*** Delft University of Technology, Netherlands*; F. Grillo,* ETH Zurich, Switzerland*; V. Ravikumar, D. Benz, A. Shekhar,* Delft University of Technology, Netherlands*; M. Griffiths, S. Barry,* Carleton University, Canada*; J.R. van Ommen,* Delft University of Technology, Netherlands	
2:45pm	**AA1-TuA6** Multi-layer Protective Coatings on Silver for Protection of Historic Silver Artifacts, *E. Breitung,* Metropolitan Museum of Art*; S. Creange,* Rijks Museum, Netherlands*; G. Pribil,* J.A. Woollam*; A. Bertuch,* ***Ritwik Bhatia,*** Veeco-CNT	
3:00pm	**AA1-TuA7** Nonlinear Optical Properties of TiO_2-Based ALD Thin Films, ***Theodosia Gougousi,*** *R. Kuis, I. Basaldua, P. Burkins, J.A. Kropp, A. Johnson,* University of Maryland, Baltimore County	
3:15pm	**AA1-TuA8** Atomic Layer Deposition to Alter the Wetting and Thermal Properties of Lumber, ***Shawn Gregory,*** *C. McGettigan, E. McGuinness, D. Rodin, S. Yee, M. Losego,* Georgia Institute of Technology	
3:30pm	**Break & Exhibits**	
3:45pm	**Break & Exhibits**	
4:00pm	**AA2-TuA11** Tunable Electrical Properties of Lithium Fluoride Thin Films using Different Fluorine Sources, ***Devika Choudhury,*** *A. Mane, J.W. Elam,* 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-TuA12** The Role of Al_2O_3 ALD Precursor Chemistry on the Electrochemical Performance of Lithium Ion Battery Cathode Mmaterials, ***Donghyeon Kang,*** *A. Mane, J.W. Elam,* Argonne National Laboratory*; R.F. Warburton, J.P. Greeley,* Purdue University	
4:30pm	**AA2-TuA13** Spatial Atomic Layer Deposition of Hybrid Nanolaminates for High Capacity Li-ion Battery Electrodes, *E. Balder, L. Haverkate, M. Tulodziecki, F. van den Bruele, S. Unnikrishnan,* ***Paul Poodt,*** TNO/Holst Center, Netherlands	
4:45pm	**AA2-TuA14** Lithium Organic Thin Films for Various Battery Components, ***Juho Heiska,*** *M. Karppinen,* Aalto University, Finland	
5:00pm	**AA2-TuA15** ALD Infiltration of $LiCoO_2$ for High Rate Lithium Ion Batteries, ***Ian Povey,*** *M. Modreanu, S. O'Brien,* Tyndall National Institute, Ireland*; T. Teranishi, Y. Yoshikawa, M. Yoneda, A. Kishimoto,* Okayama University, Japan	
5:15pm	**AA2-TuA16** ALD Al_2O_3 and MoS_2 Coated TiO_2 Nanotube Layers as Anodes for Lithium Ion Batteries, *H. Sopha,* University of Pardubice, Czech Republic*; A. Tesfaye,* Ecole Nationale Supérieure des Mines de Saint-Etienne, France*; R. Zazpe,* University of Pardubice, Czech Republic*; T. Djenizian,* Ecole Nationale Supérieure des Mines de Saint-Etienne, France*;* ***Jan Macak,*** University of Pardubice, Czech Republic	

Tuesday Afternoon, July 23, 2019

	Room Grand Ballroom H-K	
1:30pm	**AS1-TuA1** Elucidating Mechanisms of Selective ALD of Al_2O_3 by a Comparative Study of Precursors, ***Il-Kwon Oh***, *T.-L. Liu,* Stanford University; *T. Sandoval,* Technical University Federico Santa Maria; *R. Tonner,* Philipps-Universität Marburg, Germany; *S.F. Bent,* 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-TuA2** Area-Selective Atomic Layer Deposition using Dodecanethiols: Comparison of Monolayer versus Multilayer, ***Tzu-Ling Liu,*** Stanford University; *K. Nardi, N. Draeger, D. Hausmann,* Lam Research Corp.; *S.F. Bent,* Stanford University	
2:00pm	**AS1-TuA3** Mechanism for Breakdown in Selectivity During Area-Selective Atomic Layer Deposition of ZrO_2 on a SiO_2 Surface Functionalized with a Blocking Layer, ***Wanxing Xu,*** Colorado School of Mines; *P.C. Lemaire, K. Sharma, D. Hausmann,* Lam Research Corp.; *S. Agarwal,* Colorado School of Mines	
2:15pm	**AS1-TuA4** Area Selective Chemical Vapor Deposition of Co from the Co (CO) Precursor: Use of Ammonia to Afford Dielectric-Dielectric Selectivity, ***Zhejun Zhang,*** *S. Liu, G. Girolami, J. Abelson,* University of Illinois at Urbana-Champaign	
2:30pm	**AS1-TuA5** Area-Selective ALD of Silicon Oxide using Inhibitors in Four-step Cycles for Metal/Dielectric Selectivity, ***Marc Merkx,*** *R. Jongen,* Eindhoven University of Technology, Netherlands; *A. Mameli,* TNO/Holst Center, Netherlands; *D. Hausmann,* Lam Research Corp.; *W.M.M. Kessels, A.J.M. Mackus,* Eindhoven University of Technology, Netherlands	
2:45pm	**AS1-TuA6** Selective Area Growth of Deactivating Polymers, ***Rudy Wojtecki,*** IBM Research - Almaden; *T. Pattison,* University of Melbourne, Australia; *A. Hess, N. Arellano, A. Friz,* IBM Research - Almaden	
3:00pm	**AS1-TuA7** Area-Selective ALD of ZnO Films Patterned by Electrohydrodynamic Jet Printing of Polymers with Sub-Micron Resolution, ***Tae Cho,*** *N. Farjam, C. Pannier, C. Huber, O. Trejo, C. Allemang, E. Kazyak, R. Peterson, K. Barton, N.P. Dasgupta,* University of Michigan	
3:15pm	**AS1-TuA8** Selective Deposition of Silicon Nitride, ***Han Wang,*** *B. Hendrix, T. Baum,* Entegris Inc.	
3:30pm	**Break & Exhibits**	
3:45pm	**Break & Exhibits**	
4:00pm	**AS2-TuA111** Area-Selective Deposition and Smoothing of Ru by Combining Atomic Layer Deposition and Selective Etching, ***Martijn Vos,*** Eindhoven University of Technology, Netherlands; *S. Chopra,* University of Texas at Austin; *M. Verheijen,* Eindhoven University of Technology, Netherlands; *J. Ekerdt,* University of Texas at Austin; *S. Agarwal,* Colorado School of Mines; *W.M.M. Kessels, A.J.M. Mackus,* Eindhoven University of Technology, Netherlands	**Area Selective ALD** **Session AS2-TuA1** **Area-Selective ALD: Combinations with Etching** **Moderators:** Silvia Armini, IMEC, Dennis Hausmann, Lam Research Corp.
4:15pm	**AS2-TuA112** Single Batch Strategies for the Development of an Area Selective Deposition Process with the Deposition/Etch Approach, ***Christophe Vallée,*** *M. Bonvalot,* LTM-UGA, France; *R. Gassilloud,* CEA-Leti, France; *V. Pesce, A. Chaker, S. Belahcen,* LTM-UGA, France; *N. Possémé,* CEA-Leti, France; *B. Pelissier, P. Gonon, A. Bsiesy,* LTM-UGA, France	
4:30pm	**AS2-TuA113** Surface Halogenation of Amorphous Carbon for Defect-free Area-Selective Deposition of Metal Oxides, ***Mikhail Krishtab,*** KU Leuven, Belgium; *S. Armini,* IMEC, Belgium; *S. De Gendt,* KU Leuven/IMEC, Belgium; *R. Ameloot,* KU Leuven, Belgium	
4:45pm	**AS2-TuA214** Real-time Grazing Incidence Small-angle X-ray Scattering Studies of Indium Aluminum Nitride Growth, ***Jeffrey M. Woodward,*** *S.G. Rosenberg,* ASEE (residing at U.S. Naval Research Laboratory); *S.D. Johnson, N. Nepal,* U.S. Naval Research Laboratory; *Z.R. Robinson,* SUNY College at Brockport; *K.F. Ludwig,* Boston University; *C.R. Eddy,* U.S. Naval Research Laboratory	**Area Selective ALD** **Session AS2-TuA2** **Late Breaking Abstracts** **Moderators:** Silvia Armini, IMEC, Dennis Hausmann, Lam Research Corp.
5:00pm	**AS2-TuA215** Expanding the Materials Library of Sequential Infiltration Synthesis: Conductive Indium and Gallium Oxides Grown in Polymers, ***Ruben Waldman,*** University of Chicago; *N. Jeon, D. Mandia, O. Heinonen, S. Darling, A. Martinson,* Argonne National Laboratory	
5:15pm	**AS2-TuA216** Highly Efficient and Stable Organic – Inorganic Halide Perovskite Solar Cells with ALD-grown Charge Transport Layers, ***Hyunjung Shin,*** Sungkyunkwan University, Republic of Korea	

Tuesday Afternoon, July 23, 2019

	Room Regency Ballroom A-C	
1:30pm	**INVITED: ALE1-TuA1** Atomic Layer Etching of Nanostructures, ***Sabbir Khan,*** Niels Bohr Institute, University of Copenhagen, Denmark*; D. Suyatin,* Lund University, Sweden*; J. Sundqvist,* 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, Tokyo Electron America Inc.
1:45pm	Invited talk continues.	
2:00pm	**ALE1-TuA3** Selectivity during Plasma ALE of Si-Compounds: Reaction Mechanism Studied by in-situ Surface Spectroscopy, ***René Vervuurt,*** ASM*; K. Nakane, T. Tsutsumi, M. Hori, N. Kobayashi,* Nagoya University, Japan	
2:15pm	**ALE1-TuA4** Chamber Vacuum Strategies to Enable High Productivity ALE, ***Declan Scanlan,*** *D. Stephenson, A. Stover,* Edwards Vacuum, Ireland	
2:30pm	**ALE1-TuA5** Mechanistic Study of the Thermal Atomic Layer Etch of Cobalt Metal Using Propene and CO, ***Suresh Kondati Natarajan,*** *M. Nolan,* Tyndall National Institute, Ireland*; P. Theofanis, C. Mokhtarzadeh, S.B. Clendenning,* Intel Corp.	
2:45pm	**ALE1-TuA6** Selective Quasi-ALE of SiO_2 over Si_3N_4 via Bottom-up Si_3N_4 Passivation: A Computational Study, ***Du Zhang,*** *Y. Tsai, Y. Shi, M. Wang,* TEL Technology Center, America, LLC	
3:00pm	**INVITED: ALE1-TuA7** Insights of Different Etching Properties between CW and ALE Processes using 3D Voxel-Slab Model, ***Nobuyuki Kuboi,*** *T. Tatsumi, J. Komachi, S. Yamakawa,* Sony Semiconductor Solutions Corp., Japan	
3:15pm	Invited talk continues.	
3:30pm	**Break & Exhibits**	
3:45pm	**Break & Exhibits**	
4:00pm	**ALE2-TuA11** First-principles Understanding of Atomic Layer Etching of Silicon Nitride using Hydrofluorocarbons, ***Gyeong Hwang,*** *E. Cheng,* University of Texas at Austin*; S. Sridhar,* TEL Technology Center, America*; P. Ventzek, A. Ranjan,* Tokyo Electron America Inc.	**Atomic Layer Etching** **Session ALE2-TuA** **Modeling & Instrumentation II** **Moderators:** Dmitry Suyatin, Lund University, Tetsuya Tatsumi, Sony Semiconductor Solutions Corp.
4:15pm	**ALE2-TuA12** An Extended Knudsen Diffusion Model for Aspect Ratio Dependent Atomic Layer Etching, ***Luiz Felipe Aguinsky,*** *P. Manstetten,* TU Wien, Austria*; A. Hössinger,* Silvaco Europe Ltd., UK*; S. Selberherr, J. Weinbub,* TU Wien, Austria	
4:30pm	**ALE2-TuA13** Thermodynamics-Based Screening Approach for Atomic Layer Etching, ***Nagraj Kulkarni,*** Consultant	
4:45pm	**ALE2-TuA14** Always in Competition: Self-limiting Versus Continuous Reactions in ALD and ALEt, ***Simon D. Elliott,*** Schrödinger, Inc.*; S.K. Natarajan, R. Mullins, M. Nolan,* Tyndall National Institute, Ireland*; A. Cano, J. Clancey, S.M. George,* University of Colorado - Boulder	
5:00pm	**ALE2-TuA15** Variation of Etched Depth per Cycle and Removal of Reactive Species in Atomic-Layer Etching (ALE) : Molecular Dynamics Study, ***Satoshi Hamaguchi,*** *E.J. Tinacba, S. Shigeno, Y. Okada, M. Isobe, T. Ito, K. Karahashi,* Osaka University, Japan	
5:15pm		

ALD Applications
Room Evergreen Ballroom & Foyer - Session AA1-TuP
Energy Harvesting and Storage Poster Session
5:30pm

AA1-TuP1 Study on Atomic Layer Deposited Al_2O_3, TiO_2 and ZnO for the Application in Silicon Photovoltaics, ***Arun Haridas***, *M.G. Sreenivasan,* Hind High Vacuum Company Pvt. Ltd., India; *A. Antony,* Indian Institute of Technology Bombay, India

AA1-TuP2 Nitrogen-Doped TiO_2 Film Deposited using Plasma-Enhanced Atomic Layer Deposition to Improve the Electrical Conductivity for Surface Passivation of Crystalline Silicon, *E.-J. Song,* Korea Institute of Materials Science, Republic of Korea; *J.-H. Ahn,* Korea Maritime and Ocean University, Republic of Korea; ***Jung-Dae Kwon,*** Korea Institute of Materials Science, Republic of Korea

AA1-TuP3 Multilayer Encapsulation for Highly Stable Perovskite Solar Cells with Atomic Layer Deposited Al_2O_3 and Chemical Vapor Deposited Flowable Oxide, ***Jungwoo Kim***, *H. Hwangbo, S.J. Kim, J.H. Jang, H.C. Tran Vo, H. Chae,* Sungkyunkwan University (SKKU), Republic of Korea

AA1-TuP5 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-TuP6 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.-Y. Cho,* National Research Council Canada, Canada

AA1-TuP7 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.Y. Sawant, D.K. Nandi, R. Rahul, S.-H. Kim,* ***Moo Hwan Cho,*** Yeungnam University, Republic of Korea

AA1-TuP8 ALD Coatings for Nano Imprint Masks, ***Thomas Seidel,*** Seitek50

AA1-TuP9 The Investigation of Al_2O_3 Passivation Characteristics in the Condition of Growth Temperature and Ozone Concentration, ***Young Joon Cho***, *H.S. Chang,* Chungnam National University, Republic of Korea

AA1-TuP10 Effect of Al2O3 Passivation on n-type Si Solar Cell with Passivated Emitter and Rear Cell (PERC), ***Kiryun Kim***, *H.S. Chang,* Chungnam National University, Republic of Korea

AA1-TuP11 High Quality CaF_2 from a New ALD Process: Enabling New Approaches in Battery Technology and Optical Applications, ***Max Gebhard***, *A. Mane, J.W. Elam,* Argonne National Laboratory

AA1-TuP12 Properties of Molybdenum Oxide Deposited by Plasma Enhanced Atomic Layer Deposition for High Efficiency Solar Cells, ***Taewan Lim***, *H.S. Chang,* Chungnam National University, Republic of Korea

AA1-TuP13 Understanding and Mitigating F Migration in ALD Nanocomposite Coatings, ***Anil Mane***, *M. Gebhard, J.W. Elam,* Argonne National Laboratory; *M. Popecki, T. Cremer,* Incom Inc.; *M. Minot,* incom

AA1-TuP14 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-TuP15 Enhancement of Photovoltaic Efficiency using a Novel Nickel-4 Mercaptophenol Hybrid Interfacial Layer, ***Jinseon Park***, *N.V. Long, H. Thu,* Hanyang University, Republic of Korea

AA1-TuP16 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-TuP17 Investigation of ALD-grown i-ZnO Buffer Layer Properties for CIGS Solar Cell Application, ***Jeha Kim***, *V. Arepalii,* Cheongju University, Republic of Korea; *W.-J. Lee, Y.-D. Chung,* Electronics and Telecommunications Research Institute, Republic of Korea

AA1-TuP18 Atomic Layer Deposited Zirconium-doped ZnO Transparent Conductive Oxides for Silicon Solar Cells, ***Geedhika Kallidil Poduval***, *M.A. Hossain, B. Hoex,* University of New South Wales, Australia

AA1-TuP19 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-TuP1 Chemically and Mechanically Activated Carbonaceous Materials for Supercapacitor, *D.V. Lam, J.-H. Kim,* ***Seung-Mo Lee,*** Korea Institute of Machinery and Materials, South Korea

AA2-TuP2 Diamond Field Effect Transistors with Different Gate Lengths of HfO_2 Deposited by Atomic Layer Deposition, ***Changzhi Gu,*** Institute of Physics, Chinese Academy of Sciences, China

AA2-TuP3 Atomic Layer Deposition of IGZO Thin Films for BEOL Applications, ***Shóna Doyle,*** Tyndall National Institute, Ireland

AA2-TuP4 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.-D. Li,* Nanjing University, China

AA2-TuP5 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-TuP6 Improved Performance of GaN Metal-Oxide-Semiconductor Capacitors byPplasma ALD of AIN 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-TuP7 2-Dimensional Perovskite Oxide Thin Films Deposited by ALD for High-k Application, ***Seung-Won Lee,*** Korea Maritime and Ocean University, Republic of Korea; *C.-M. Kim, S.-H. Kwon,* Pusan National University, Republic of Korea

AA2-TuP8 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-TuP9 Atomic Layer Deposted TiO_2-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-TuP10 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-TuP11 AlGaN/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-TuP12 High-Temperature Thermal Stability of ALD-TiN Metal Gate on *In-situ* Al_2O_3/Y_2O_3/(In)GaAs(001): Toward the Self-Aligned Gate-First Process, ***Lawrence Boyu Young***, *H.-W. Wan, J.-H. Huang, K.-Y. Lin, J. Liu, Y.-H. 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-TuP13 Identification of Interfacial Defect in ALD Grown Al_2O_3/GeO_x/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-TuP15 Effect of Metal-insulator Interface on Dielectric Properties of Ultrathin Al_2O_3 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-TuP16 Thermal and Plasma ALD Al_2O_3 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

AA2-TuP17 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.H. Jung, J. Mack, N. Mukherjee,* Eugenus, Inc.

AA2-TuP18 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-TuP19 Influence of Surface Cleaning Process on Initial Growth of ALD-Al_2O_3 and Electrical Properties of Pt/Al_2O_3/β-Ga_2O_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-TuP20 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-TuP1 Highly Dispersed Uniform Pt Catalysts on Carbon Support by Atomic Layer Deposition with Fluidized Bed Reactor(FBR)., ***Jung-Yeon Park***, *W.P. Hong, S.-J. Oh,* Hyundai Motor Group, Republic of Korea; *W.-J. Lee, S.-H. Kwon,* Pusan National University, Republic of Korea

AA3-TuP3 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-TuP5 Synthesis of Core Shell Nanocatalysts using Atomic Layer Deposition with Fluidized Bed Reactor for PEMFC, ***Seung-Jeong Oh***, *W.P. Hong, J.Y. Park,* Hyundai Motor Group, Republic of Korea; *W.-J. Lee, S.-H. Kwon,* Pusan National University, Republic of Korea

AA3-TuP6 Porous Nanomembranes Grown by Atomic Layer Deposition: Self-Rolling in Solvent and their Sensing Applications, *F. Ma, Y.T. Zhao, G. Huang,* ***Yong Feng Mei***, Fudan University, China

AA3-TuP7 Fabrication and Characterization of Atomic Layer Deposited ZnO-based Ultra-thin Films for Hydrogen Sensing, ***Yan-Qiang Cao***, *A.-D. 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-TuP1 ALD for Membrane Applications, ***Matthieu Weber***, *M. Bechelany,* Institut Européen des Membranes, France

AA4-TuP2 Nano-Hardness of ALD Films, ***James Daubert***, *W. Sweet, J. Kelliher,* Northrop Grumman

AA4-TuP3 High Acid Corrosion Resistance of Nb_2O_5 Thin Film Deposited by Room Temperature ALD, ***Kazuki Yoshida***, *K. Saito, M. Miura, K. Kanomata, B. Ahmmad, S. Kubota, F. Hirose,* Yamagata University, Japan

AA4-TuP4 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.-H. Choi,* Korea University, Republic of Korea

AA4-TuP5 Room-temperature Atomic Layer Deposition of Aluminosilicate Thin Film on Flexible Films, ***Yoshiharu Mori***, *K. Yoshida, K. Kanomata, M. Miura, B. Ahmmad Arima, S. Kubota, F. Hirose,* Yamagata University, Japan

AA4-TuP6 ALD Layers for Reduced Wear on Micro Cutting Tools, *T. Junghans,* ***Hans-Dieter Schnabel***, Westsächsische Hochschule Zwickau, Germany

AA4-TuP7 Fabrication of Atomic Layer Deposited Alumina as Protective Coating of Silver, ***Gwon Deok Han***, *J.S. Park, J. Koo, J.H. Shim,* Korea University, Republic of Korea

AA4-TuP8 Characterization of Laminated Thin Films for Encapsulation using Single Si Precursor by PEALD, ***Joong Jin Park***, *S.D. Lee, H.-D. Lim, S.J. Jang, S.G. Kim, G.J. Park, S.I. Lee, M.W. Kim,* DNF Co. Ltd, Republic of Korea

AA4-TuP9 Low-cost Fabrication of Flexible Transparent Electrodes based on Sprayed Nanocomposites Silver Nanowires and Al Doped ZnO Deposited by Spatial ALD, *V.H. Nguyen, J. Resende, D. Papanastasiou, C. Jimenez, D. Bellet,* LMGP Grenoble INP/CNRS, France; *S. Aghazadehchors,* LMGP, France; *N.D. Nguyen,* Université de Liège; ***David Muñoz-Rojas***, LMGP Grenoble INP/CNRS, France

AA4-TuP10 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-TuP11 Encapsulation of Magnetic Nanostructures by ALD for Improved Stability and Performance, ***Devika Choudhury***, *Y. Zhang, K. Gao, A. Mane, J.W. Elam,* Argonne National Laboratory

AA4-TuP12 Diffusion Barrier Properties of ALD TiSiN Films, ***Jerry Mack***, *J. Heo, S. Chugh, H.Y. Kim, S. Rathi, N. Mukherjee,* Eugenus, Inc.

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

AA5-TuP1 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-TuP2 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-TuP3 ALD for 3D Nano MEMS Applications, ***Dorothee Dietz***, Fraunhofer Institute for Microelectronic Circuits and Systems IMS, Germany

AA5-TuP4 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-TuP5 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-TuP6 Optical Coatings Deposited on Nonlinear Crystals by Atomic Layer Deposition, ***Ramutis Drazdys***, *R. Buzelis, M. Drazdys,* Center for Physical Sciences and Technology, Lithuania

AA5-TuP7 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-TuP8 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.J. Park, W.-M. Chae, J.-H. Park, S.I. Lee, M.W. Kim,* DNF Co. Ltd, Republic of Korea

AA5-TuP9 Comparative Study of $Mo_{1-x}W_xS_2$ Alloy Gas Sensor by Atomic Layer Deposition, ***Minjoo Lee***, *Y. Kim, J. Park, H. Kim,* Yonsei University, Republic of Korea

AA5-TuP10 Fabrication of High-Aspect-Ratio Nanometric Gold Gratings, *O. Makarova,* Creatv MicroTech Inc; ***Ralu Divan***, *L. Stan,* Argonne National Laboratory; *C.-M. Tang,* Creatv MicroTech Inc

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

AS-TuP1 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-TuP2 Light Assisted Area Selective Atomic Layer Deposition on Plasmonic Nanoantennas, ***Chengwu Zhang***, *T. Gao, B. Willis,* University of Connecticut

AS-TuP3 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

AS-TuP4 Investigation of *In-situ* Surface Cleaning of Cu Films using O_3/O_2 and N_2H_4, ***Su Min Hwang***, *A.L.N. Kondusamy, Q. Zhiyang, H.S. Kim, L.F. Peña, K. Tan, J. Veyan,* University of Texas at Dallas*; D. Alvarez, J. Spiegelman,* RASIRC*; J. Kim,* University of Texas at Dallas

AS-TuP5 Area-Selective Deposition of SiO_2 based on Spatial ALD with Interleaved Etching Steps to Obtain High Selectivity, ***Alfredo Mameli,*** TNO/Holst Center, Netherlands*; F. Roozeboom,* Eindhoven University of Technology and TNO, Netherlands*; P. Poodt,* TNO/Holst Center, Netherlands

AS-TuP6 Defect Mitigation Solution for Area-Selective Atomic Layer Deposition of Ru on TiN/SiO_2 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.T. 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-TuP1 Molybdenum Disulfides and Diselenides by Atomic Layer Deposition*,* ***Raul Zazpe****, J. Prikryl, M. Krbal, J. Charvot, F. Dvorak, F. Bures, J. Macak,* University of Pardubice, Czech Republic

NS-TuP2 Wafer-scale MoS_2 Thin Film Deposition via H_2S Plasma Sulfurization of ALD-grown MoO_3 at Low Temperature*,* ***Jeong-Hun Choi****,* Korea Maritime and Ocean University, Republic of Korea

NS-TuP3 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.Q. Sun, D.W. Zhang,* Fudan University, China

NS-TuP4 Overcoming Agglomeration and Adhesion in Particle ALD*,* ***Benjamin Greenberg****, J. Wollmershauser, B. Feigelson,* U.S. Naval Research Laboratory

NS-TuP5 Density Function Theory for Nucleation of MoF_6 with Oxide Surfaces in Atomic Layer Deposition of MoS_2*,* ***Matthew Lawson****,* Boise State University

Wednesday Morning, July 24, 2019

	Room Grand Ballroom A-C	
8:00am	**EM1-WeM1** Molecular Layer Deposition of Titanicone Films using TiCl and Fumaric or Maleic Acid: Growth Mechanism and Ambient Stability, ***Yan-Qiang Cao**, A.-D. Li,* Nanjing University, China	**Emerging Materials** **Session EM1-WeM** **Molecular Layer Deposition** **Moderators:** Stacey F. Bent, Stanford University, Charles L. Dezelah, ASM
8:15am	**EM1-WeM2** Temperature Dependent Surface Chemistry in Molecular Layer Deposition of Polyimide on Cu and Si, ***Chao Zhang**, M. Leskelä, M. Ritala,* University of Helsinki, Finland	
8:30am	**EM1-WeM3** Integrated MLD Supercycle for the Direct Deposition of Zeolitic Imidazolate Framework Films, ***Alexander John Cruz**, I. Stassen, R. Ameloot,* KU Leuven, Belgium	
8:45am	**EM1-WeM4** Understanding Molecular Layer Deposition Nucleation Mechanisms in Polyurea via Time Domain Thermoreflectance, ***Rachel Nye**, M. Fusco,* North Carolina State University*; E. Radue, A. Kelliher, P. Hopkins,* University of Virginia*; G.N. Parsons,* North Carolina State University	
9:00am	**EM1-WeM5** Molecular Layer Deposition of Indicone Thin film using Indium Precursor and Hydroquinone, ***Seung-Hwan Lee**, G.H. Baek, J.-H. Lee,* Hanyang University, Republic of Korea*; T.T. Ngoc Van, B. Shong,* Hongik University, Republic of Korea*; J.-S. Park,* Hanyang University, Republic of Korea	
9:15am	**EM1-WeM6** Air Stable Alucone Thin Film Deposited by Molecular Layer Deposition using Hetero Bifunctional Organic Reactant, ***GeonHo Baek**, S.-H. Lee, J.-H. Lee, J.-S. Park,* Hanyang University, Republic of Korea	
9:30am	**EM1-WeM7** Molecular Layer Deposition of "Magnesicone", a Magnesium-based Hybrid Material, as a Matrix Material for Solid Composite Electrolytes, ***Jeroen Kint**, F. Mattelaer, M. Minjauw,* Ghent University, Belgium*; P. Vereecken,* IMEC, Belgium*; J. Dendooven, C. Detavernier,* Ghent University, Belgium	
9:45am	**EM1-WeM8** Molecular Layer Deposition of Polyamide Films on Particles Using a Rotating Cylinder Reactor, ***Tyler Myers**, S.M. George,* University of Colorado - Boulder	
10:00am	**Break & Exhibits**	
10:15am	**Break & Exhibits**	
10:30am	**Break & Exhibits**	
10:45am	**EM2-WeM12** Vapor Phase Infiltration: A Route for Making Insulating Polymer Fibers Conductive, ***Mato Knez**,* CIC nanoGUNE, Spain*; I. Azpitarte,* 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-WeM13** Vapor Phase Infiltration of Metal Oxides into Microporous Polymers for Organic Solvent Separation Membranes, ***Emily McGuinness**, F. Zhang, Y. Ma, R. Lively, M. Losego,* Georgia Institute of Technology	
11:15am	**EM2-WeM14** ZnO-Infiltrated Hybrid Polymer Thin Films with Enhanced Gravimetric Water and Oxygen Vapor Sensing Properties, *E. Muckley, L. Collins, A. Ievlev,* Oak Ridge National Laboratory*; X. Ye, K. Kisslinger,* Brookhaven National Laboratory*; B. Sumpter, N. Lavrik,* Oak Ridge National Laboratory*; **Chang-Yong Nam**,* Brookhaven National Laboratory*; I. Ivanov,* Oak Ridge National Laboratory	
11:30am	**EM2-WeM15** Physically Interpenetrated Organic-Inorganic Sub-Surface Layers Created via Vapor Phase Infiltration for Improved Film Adhesion, ***Mark Losego**, S. Dwarakanath, R. Tummala,* Georgia Institute of Technology	
11:45am	**EM2-WeM16** Inorganic-Organic Thin Film Layer-Structures and Thermal Conductivity, ***Fabian Krahl**,* Aalto University, Finland*; A. Giri, P. Hopkins,* University of Virginia*; M. Karppinen,* Aalto University, Finland	

Wednesday Morning, July 24, 2019

	Room Grand Ballroom E-G	
8:00am	**AM1-WeM1** Impact of Operating Parameters on Precursor Separation in "Air Hockey" Spatial Atomic Layer Deposition Reactor, ***John Grasso***, *B. Willis,* 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, TNO/Holst Center
8:15am	**AM1-WeM2** Plasma Enhanced Spatial ALD of Silver Thin Films at Atmospheric Pressure, ***Tim Hasselmann***, University of Wuppertal, Germany*; N. Boysen,* Ruhr University Bochum, Germany*; D. Theirich,* University of Wuppertal, Germany*; A. Devi,* Ruhr University Bochum, Germany*; T. Riedl,* University of Wuppertal, Germany	
8:30am	**INVITED: AM1-WeM3** Low Temperature Spatial PEALD of Silicon Nitride Films from Aminosilane Precursors and DC Direct Plasma, ***Eric Dickey***, Lotus Applied Technology	
8:45am	Invited talk continues.	
9:00am	**AM1-WeM5** Development and Characterization of an Atmospheric Pressure Plasma Reactor Compatible with Open-Air Spatial ALD, *H. Rabat, F. Zoubian, O. Aubry, N. Dumuis, S. Dozias,* GREMI Université d'Orléans/CNRS, France*; C. Masse de la Huerta, A. Sekkat, V.H. Nguyen,* LMGP Grenoble INP/CNRS, France*; M. Bonvalot, C. Vallée,* LTM-UGA, France*; D. Hong,* GREMI Université d'Orléans/CNRS, France*;* ***David Muñoz-Rojas****,* LMGP Grenoble INP/CNRS, France	
9:15am	**AM1-WeM6** Fast Plasma ALD Employing de Laval Nozzles for High Velocity Precursor Injection, ***Abhishekkumar Thakur***, *J. Sundqvist,* Fraunhofer Institute for Ceramic Technologies and Systems IKTS, Germany*; S. Wege,* Plasway Technologies GmbH, Germany	
9:30am	**AM1-WeM7** Development of a Meter Scale ALD Optical Coating Tool for Astronomical Mirror (and other) Applications, *D. Fryauf,* University of California Santa Cruz*; A. Phillips,* University of California Observatories*; A. Feldman,* Structured Material Industries, Inc.*; N. Kobayashi,* University of California Santa Cruz*;* ***Gary Tompa****,* Structured Material Industries, Inc.	
9:45am	**AM1-WeM8** From Wet-lab to Cleanroom: An Integrated ALD-CVD Process for the Large-area Deposition of Ultrathin Zeolitic Imidazolate Framework Films, ***Ivo Stassen***, *A.J. Cruz, R. Ameloot,* KU Leuven, Belgium	
10:00am	**Break & Exhibits**	
10:15am	**Break & Exhibits**	
10:30am	**Break & Exhibits**	
10:45am	**EM3-WeM12** Atomic Layer Epitaxy of Zinc Oxide on C-plane Sapphire from Diethylzinc and Water using Pulsed-Heating Atomic Layer Deposition, ***Brandon Piercy***, *M. Losego,* 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-WeM13** Growth of AlN Barriers in Al/AlN/Al SIS Josephson Junctions by Low Temperature Atomic Layer Epitaxy, ***Charles Eddy, Jr.***, U.S. Naval Research Laboratory*; D.J. Pennachio, J. Lee, A. McFadden,* University of California, Santa Barbara*; S.G. Rosenberg,* U.S. Naval Research Laboratory*; Y.H. Chang, C.J. Palmstrom,* University of California, Santa Barbara	
11:15am	**EM3-WeM14** Investigating Plasma Parameters and Influence of Argon to the Crystallinity of GaN Films Grown by Plasma-Assisted ALD, ***Deepa Shukla***, *I. Saidjafarzoda, A. Mohammad, B. Brian Willis, N. Biyikli,* University of Connecticut	
11:30am	**EM3-WeM15** Ultrathin GaN Epilayer by Low-temperature Atomic Layer Annealing and Epitaxy, ***Wei-Chung Kao***, *W.-H. Lee, Y.-T. Yin,* National Taiwan University, Republic of China*; J.-J. Shyue,* Academia Sinica*; H.-C. Lin, M.J. Chen,* National Taiwan University, Republic of China	
11:45am	**EM3-WeM16** High Quality ALD Formation of Group-III Nitrides and their Applications in FTO-based Thin Film Solar Cells, ***Xinhe Zheng***, *H. Wei, P. Qiu, M. Peng, S. Liu, Y. He, Y. Song, Y. An,* University of Science and Technology Beijing, China	

Wednesday Morning, July 24, 2019

	Room Grand Ballroom H-K	
8:00am	**INVITED: AA1-WeM1** ALD/ALE Process in Commercially Available Leading-Edge Logic and Memory Devices, ***Rajesh Krishnamurthy,*** TechInsights	**ALD Applications** **Session AA1-WeM** **ALD for Memory Applications II** **Moderators:** Seung Wook Ryu, SK Hynix, Myung Mo Sung, Hanyang University
8:15am	Invited talk continues.	
8:30am	**AA1-WeM3** Atomic Layer Deposited Crystalline Zinc Oxide for Silver-based Ultra-Steep Threshold Switching Selector, ***Harrison Sejoon Kim,*** *A. Sahota, J. Mohan, H. Hernandez-Arriaga, J. Kim,* The University of Texas at Dallas	
8:45am	**AA1-WeM4** ALD Ge-Se-Te OTS Selectors with Controlled Composition for PCM Applications, ***Valerio Adinolfi,*** *L. Cheng, R. Clarke, S. Balatti, K. Littau,* Intermolecular, Inc.	
9:00am	**AA1-WeM5** Pulsed CVD of Amorphous GeSe for Application as OTS Selector, *A. Haider,* IMEC, Belgium; ***Shaoren Deng,*** ASM, Belgium; *E. Schapmans,* IMEC, Belgium; *J.W. Maes,* ASM, Belgium; *J.-M. Girard,* Air Liqude Advanced Materials, France; *G. Khalil,* imec; *G.S. Kar, L. Goux, R. Delhougne,* IMEC; *M. Caymax,* IMEC, Belgium	
9:15am	**INVITED: AA1-WeM6** Thin Film Challenges in 3D NAND Scaling, ***Jessica Kachian,*** *D. Pavlopoulos, D. Kioussis,* 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-WeM12** The Journey of ALD High-k Metal Gate from Research to High Volume Manufacturing, ***Dina Triyoso,*** *R. Clark, S. Consiglio, K. Tapily, C. Wajda, G. Leusink,* TEL Technology Center, America, LLC	**ALD Applications** **Session AA2-WeM** **ALD for ULSI Applications I** **Moderators:** Ravindra Kanjolia, EMD Performance Materials, Han-Jin Lim, Samsung Electronics
11:00am	Invited talk continues.	
11:15am	**AA2-WeM14** Effects of Er Doping on Structural and Electrical Properties of HfO_2 Grown by Atomic Layer Deposition., ***Soo Hwan Min,*** *B.-E. Park, C.W. Lee,* Yonsei University, Republic of Korea; *W. Noh,* Air Liquide Laboratories Korea, South Korea; *I.-K. Oh,* Yonsei University, Republic of Korea; *W.-H. Kim,* Hanyang University, Republic of Korea; *H. Kim,* Yonsei University, Republic of Korea	
11:30am	**AA2-WeM15** Improvement of Electrical Performances of Atomic Layer Deposited ZrO_2 MIM Capacitors with Ru Bottom Electrode, ***Jaehwan Lee,*** *B.-E. Park,* Yonsei University, Republic of Korea; *W. Noh,* Air Liquide Laboratories Korea, South Korea; *I.-K. Oh,* Yonsei University, Republic of Korea; *W.-H. Kim,* Hanyang University, Republic of Korea; *H. Kim,* Yonsei University, Republic of Korea	
11:45am	**AA2-WeM16** Perfecting ALD-Y_2O_3/GaAs(001) Interface with Ultra-High Vacuum Annealing, ***Keng-Yung Lin,*** *Y.-H. Lin, W.-S. Chen, H.-W. Wan, L.B. Young,* National Taiwan University, Republic of China; *C.-P. Cheng,* National Chia-Yi University, Republic of China; *T.-W. Pi,* National Synchrotron Radiation Research Center, Republic of China; *J. Kwo,* National Tsing Hua University, Republic of China; *M. Hong,* National Taiwan University, Republic of China	

Wednesday Morning, July 24, 2019

	Room Regency Ballroom A-C	
8:00am	**INVITED: ALE1-WeM1** ALD and Etch Synergy to Enable the Next Scaling Innovations, ***Angelique Raley,*** *K.L. Lee, X. Sun, Q. Lou, Y.T. Lu, M. Edley, S. Oyola-Reynoso, P. Ventzek, R. Clark, P. Biolsi, H. Masanobu, A. Ranjan,* 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
8:15am	Invited talk continues.	
8:30am	**INVITED: ALE1-WeM3** On the Role of Individual Etching Components in Selective Atomic Layer Processing: Etch and Deposit to Obtain High Selectivity, ***Alfredo Mameli,*** TNO/Holst Center, Netherlands*; F. Roozeboom,* Eindhoven University of Technology and TNO, Netherlands*; P. Poodt,* TNO/Holst Center, Netherlands	
8:45am	Invited talk continues.	
9:00am	**ALE1-WeM5** Area-Selective Deposition of TiO_2 on Various Surfaces by Isothermal Integration of Thermal TiO_2 ALD and ALE, ***Seung Keun Song,*** *G.N. Parsons,* North Carolina State University	
9:15am	**ALE1-WeM6** Limited Dose ALE and ALD Processes for Local Film Coatings on 3D Structures, ***Thomas Seidel,*** Seitek50*; M. Current,* Current Scientific	
9:30am	**ALE1-WeM7** Formation of Ohmic Contacts to Si using In-situ Chemical Cleaning of the Substrate, ***Sara Iacopetti,*** Technion - Israel Institute of Technology, Israel*; R. Tarafdar, S. Lai, M. Danek,* Lam Research Corp.*; M. Eizenberg,* Technion - Israel Institute of Technology, Israel	
9:45am	**ALE1-WeM8** SADP Spacer Profile Engineering by Quasi-Atomic Layer Etching, ***Tsai Wen (Maggie) Sung,*** *C. Yan, H. Chung, J. Lo, D. Desai, P. Lembesis, R. Pakulski, M. Yang,* Mattson Technology, Inc.	
10:00am	**Break & Exhibits**	
10:15am	**Break & Exhibits**	
10:30am	**Break & Exhibits**	
10:45am	**ALE2-WeM12** Dynamic Temperature Control Enabled Atomic Layer Etching of Titanium Nitride, ***He Zhang,*** *Y.S. Kim, D. Paeng,* Lam Research Corp.	**Atomic Layer Etching** **Session ALE2-WeM** **Materials Selective ALE** **Moderators:** Fred Roozeboom, Eindhoven University of Technology and TNO, Geun Young Yeom, Sungkyunkwan University
11:00am	**INVITED: ALE2-WeM13** Rapid Thermal-Cyclic Atomic Layer Etching of Thin Films with Highly Selective, Self-Limiting, and Conformal Characteristics, ***Kazunori Shinoda,*** Hitachi, Japan*; H. Kobayashi,* Hitachi*; N. Miyoshi, M. Izawa,* Hitachi High-Technologies*; K. Ishikawa, M. Hori,* Nagoya University, Japan	
11:15am	Invited talk continues.	
11:30am	**ALE2-WeM15** Atomic Layer Etching of HfO_2 with Selectivity to Si by Utilizing Material-Selective Deposition Phenomena, ***Kang-Yi Lin,*** *C. Li,* University of Maryland*; S. Engelmann, R.L. Bruce, E.A. Joseph,* IBM T.J. Watson Research Center*; D. Metzler,* IBM Research - Albany*; G.S. Oehrlein,* University of Maryland	
11:45am	**ALE2-WeM16** Enhancing Etch Selectivity in Plasma-Assisted ALE of Silicon-Based Dielectrics using Surface Functionalization, ***Ryan Gasvoda,*** Colorado School of Mines*; S. Wang, E. Hudson,* Lam Research Corp.*; S. Agarwal,* 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:** Haripin Chandra, Versum Materials, Inc., Robert Clark, TEL Technology Center, America, LLC
1:30pm	**AA1-WeA1** Atomic Layer Deposited Nano-Coatings to Protect $SrAl_2O_4$ 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-WeA1** Silicon-Based Low k Dielectric Materials with Remote Plasma ALD, ***Hyeongtag Jeon,*** Hanyang University, Republic of Korea
1:45pm	**AA1-WeA2** 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.D. Thouless, N.P. Dasgupta,* University of Michigan	Invited talk continues.
2:00pm	**AA1-WeA3** Atomic Layer Deposition of Pd on ZnO Nanorods for High Performance Photocatalysts, ***Jong Seon Park,*** *B.J. Kim, G.D. Han, K.-H. Park, E.H. Kang, H.-D. Park, J.H. Shim,* Korea University, Republic of Korea	**AA2-WeA3** SiOC Films by PEALD with Excellent Conformality and Wet Etch Resistance, ***Young Chol Byun,*** *E. Shero,* ASM
2:15pm	**AA1-WeA4** 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,*** Arradiance LLC	**AA2-WeA4** 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-WeA5** Tunable Plasmonic Colours Preserved and Modified by Atomic Layer Deposition of Alumina, *J-M. 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-WeA5** Physical and Electronic Properties of Annealed ALD-deposited Ru from $Ru(DMBD)(CO)_3$ and Oxygen, ***Michael H. Hayes,*** Oregon State University; *C.L. Dezelah, J.H. Woodruff,* EMD Performance Materials; *J.F. Conley, Jr.,* Oregon State University
2:45pm	**AA1-WeA6** TFE of OLED Displays by Time-Space-Divided (TSD) PE-ALD and PE-CVD Hybrid System, ***Bongsik Kim,*** JUSUNG Engineering, Republic of Korea	**AA2-WeA6** Fluorine Free Boron-Containing Composite Layers for Shallow Dopant Source Applications, ***Anil Mane,*** *D. Choudhury, K. Pupek, R. Langeslay, M. Delferro, J.W. Elam,* Argonne National Laboratory
3:00pm	**AA1-WeA7** Tailoring the Ferroelectricity of ZrO_2 Thin Films using Ultrathin Interfacial Layers Prepared by Plasma-Enhanced Atomic Layer Deposition, ***Sheng-Han Yi,*** *B.-T. Lin, T.-Y. Hsu, J. Shieh, M.J. Chen,* National Taiwan University, Republic of China	**AA2-WeA7** 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-WeA8** Spin-Hall-Active Platinum Thin Films Grown Via Atomic Layer Deposition, ***Michaela Lammel,*** IFW Dresden, Germany; *R. Schlitz,* Technische Universität Dresden, Germany; *A.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.T.B. Goennenwein,* Technische Universität Dresden, Germany; *A. Thomas,* IFW Dresden, Germany	**AA2-WeA8** ALD Process Monitoring for 3D Device Structures, ***Jiangtao Hu,*** Lam Research Corp.
3:30pm	**Break**	**Break**
3:45pm	**Break**	**Break**
4:00pm		
4:15pm		
4:30pm		
4:45pm		
5:00pm		

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 Knoops, Oxford Instruments Plasma Technology
1:30pm	**EM1-WeA1** Rhenium(III)-based Ternary Oxides: Novel Materials from Straightforward Synthesis *via* ALD Comprising Uncommon Reaction Pathways, ***Max Gebhard**, S. Letourneau, D. Mandia, D. Choudhury, A. Yanguas-Gil, A. Mane, A. Sattelberger, J.W. Elam,* Argonne National Laboratory	**NS-WeA1** Modified ALD Process to Achieve Crystalline MoS_2Thin Films, ***Li Zeng**, C. Maclsaac, J. Shi, N. Ricky, I.-K. Oh, S.F. Bent,* Stanford University
1:45pm	**EM1-WeA2** Growth Bbehavior and Electronic Characterization of $PbZrO_3$ and $PbZr_xTi_{1-x}O_3$ Grown by Atomic Layer Deposition with Several Zr Precursors, ***Nicholas Strnad**,* University of Maryland*; D. Potrepka,* U.S. Army Research Laboratory*; A. Leff,* General Technical Services, LLC*; J. Pulskamp,* U.S. Army Research Laboratory*; R. Phaneuf,* University of Maryland*; R. Polcawich,* U.S. Army Research Laboratory	**NS-WeA2** Nucleation and Growth of ALD MoS_2 Films on Dielectric Surfaces, ***Steven Letourneau**, A. Mane, J.W. Elam,* Argonne National Laboratory
2:00pm	**EM1-WeA3** Understanding Growth Characteristics of ALD $NiAl_yO_x$: The Role of Ozone, ***Jonathan Baker**, J. Schneider, S.F. Bent,* Stanford University	**INVITED: NS-WeA3** 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-WeA4** Atomic Layer Deposition of $B_xMg_{1-x}O$ Films: Progress Towards Shallow Boron Doping, ***David Mandia**, D. Choudhury, M. Gebhard,* Argonne National Laboratory*; J. Liu,* Northwestern University*; A. Yanguas-Gil, A.U. Mane, A. Nassiri, J.W. Elam,* Argonne National Laboratory	Invited talk continues.
2:30pm	**EM1-WeA5** Enhanced Doping Control of Metal Oxide Thin Films Using a Modified ALD Process, *E. Levrau,* IBM TJ Watson Research Center*; **Yohei Ogawa**,* ULVAC, Japan*; M. Frank, M. Hopstaken, E. Cartier,* IBM T.J. Watson Research Center*; K. Schmidt,* IBM Research - Almaden*; M. Hatanaka,* ULVAC, Japan*; J. Rozen,* IBM T.J. Watson Research Center	**NS-WeA5** Atomic Layer Deposition of Emerging 2D Semiconductors HfS_2 and ZrS_2, ***Miika Mattinen**, G. Popov, M. Vehkamäki, P. King, K. Mizohata, P. Jalkanen, J. Räisänen, M. Leskelä, M. Ritala,* University of Helsinki, Finland
2:45pm	**EM1-WeA6** 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*; O. Nilsen, H. Fjellvåg,* University of Oslo, Norway	**NS-WeA6** Low Temperature ALD for Phase-controlled Synthesis of 2D Transition Metal (M=Ti, Nb) *di-* (MX_2) and *Tri-* (MX_3) Sulfides, ***Saravana Balaji Basuvalingam**, M. Verheijen, W.M.M. Kessels, A. Bol,* Eindhoven University of Technology, Netherlands
3:00pm	**EM1-WeA7** Time Dependence of Pyroelectric Response in Ferroelectric $Hf_{0.58}Zr_{0.42}O_2$ Films, ***Sean Smith**, M.D. Henry, M. Rodriguez,* Sandia National Laboratories*; J. Ihlefeld,* University of Virginia	**NS-WeA7** ALD Boron Nitride Coated and Infiltrated Carbon Materials for Environmental Applications, *W. Hao, C. Journet, A. Brioude,* Université Lyon, France*; H. Okuno,* Université Grenoble-Alpes, France*; **Catherine Marichy**,* Université Lyon, France
3:15pm	**EM1-WeA8** Tailoring Nickel Oxide Conductivity by Introducing Transition Metals: From First-principles to Experimental Demonstration, ***Md. Anower Hossain**, T. Zhang, D. Lambert,* University of New South Wales, Australia*; Y. Zakaria,* Hamad Bin Khalifa University, Qatar*; P. Burr,* University of New South Wales, Australia*; S. Rashkeev, A. Abdallah,* Hamad Bin Khalifa University, Qatar*; B. Hoex,* University of New South Wales, Australia	
3:30pm	**Break**	**Break**
3:45pm	**Break**	**Break**
4:00pm		
4:15pm		
4:30pm		
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5:00pm		

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