Program Key

Conference Topics

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

Key to Session/Paper Numbers

Sessions sponsored by multiple topics are labeled with all acronyms (e.g. **AC+EM+SS**),
then a number to indicate simultaneous sessions sponsored by the same topic(s) (e.g. SS**1**, SS**2**),
then a dash followed by the first two characters of the day of the week:
Monday, **Tu**esday, **We**dnesday, **Th**ursday, **Fr**iday,
then a single letter for **M**orning, **A**fternoon, **E**vening, **P**oster,
and finally a number indicating the starting time slot for the paper.
Example: SS1-MoM9 (Surface Science, Monday morning, 11:00 am).

Program Overview

Room /Time	Evergreen Ballroom & Foyer	Grand Ballroom A-C	Grand Ballroom A-G	Grand Ballroom E-G	Grand Ballroom H-K	Regency Ballroom A-C
SuP	Poster Sessions					
MoM			PS1-MoM: ALD Plenary Session PS2-MoM: ALE Plenary Session			
MoA		AA1-MoA: ALD for Biological and Space Applications AA2-MoA: ALD for Solar Cells, Fuel Cells, and H_2 Storage		AF2-MoA: ALD Precursors I AF3-MoA: Growth and Characterization I	AF1-MoA: ALD Growth Mechanisms I AF4-MoA: Growth Mechanisms II	ALE1-MoA: Energy-enhanced ALE ALE2-MoA: ALE of Compound Semiconductors
MoP	Poster Sessions					
TuM		AF1-TuM: In-Situ Characterization of ALD Processes AF3-TuM: Growth and Characterization II		AA1-TuM: ALD for Catalysts, Electrocatalysts, and Photocatalysts AA2-TuM: ALD for Batteries I	AF2-TuM: ALD Precursors II AS1-TuM: Area-Selective ALD Techniques	ALE1-TuM: ALE: Gas-phase and/or Thermal ALE ALE2-TuM: Alternative Methods to ALE
TuA		AA3-TuA: ALD for Memory Applications I AF-TuA: Plasma ALD: Growth and Characterization		AA1-TuA: Emerging Applications I AA2-TuA: ALD for Batteries II	AS1-TuA: Area-Selective ALD by Area-Deactivation AS2-TuA: Area-Selective ALD: Combinations with Etching	ALE1-TuA: Modeling & Instrumentation I ALE2-TuA: Modeling & Instrumentation II
TuP	Poster Sessions					
WeM		EM1-WeM: Molecular Layer Deposition EM2-WeM: Organic-Inorganic Hybrid Materials		AM1-WeM: Spatial ALD, Fast ALD, and Large-Area ALD EM3-WeM: Epitaxial Growth and III-V Materials	AA1-WeM: ALD for Memory Applications II AA2-WeM: ALD for ULSI Applications I	ALE1-WeM: Integration & Application of ALE ALE2-WeM: Materials Selective ALE
WeA		AA1-WeA: Emerging Applications II		NS-WeA: 2D Nanomaterials by ALD (including Transition Metal Dichalcogenides)	AA2-WeA: ALD for ULSI Applications II	EM1-WeA: Ternary and Quaternary Oxide Materials

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

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** ALD Innovator Award Winner,	
9:00am	Invited talk continues.	
9:15am	Invited talk continues.	
9:30am	**INVITED: PS1-MoM5** Plenary-ALD Elam, ***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** Plenary-ALE E Joseph, ***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.	

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, ***Octavio Graniel***, *M. 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 LLL; *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	

Monday Afternoon, July 22, 2019

	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, 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, Riikka Puurunen, Aalto University
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.M. 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-MoP5 Synthesis and Thermal Characterization of New Ni(II) and Co(II) Precursors for use in Atomic Layer Deposition of Nickel and Cobalt Metal, ***Ella Kirkland**, 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

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

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 at 400 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**,* 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-MoP9 Thermodynamic and Kinetic Mechanism of Ferroelectric Phase Formation in Atomic Layer Deposited Ferroelectric Hafnia-Zirconia Solid Solution Thin Films, ***Min Hyuk Park***, Pusan National University, Republic of Korea

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***, *M.-S. Kim*, Versum Materials Korea, Republic of Korea

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-MoP7 Effect of Varying Plasma on InN Film Grown by Hollow Cathode Plasma-Assisted Atomic Layer Deposition, ***Mustafa Alevli***, *N. Güngör*, Marmara University, Turkey

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, T.L. Sunderland, A.R. Millward*, Dow Chemicals; *S.M. Hwang*, University of Texas at Dallas; *J.Y. Kim*, Dow Chemicals; *A.M. Lucero, A.L.N. Kondusamy*, University of Texas at Dallas

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-MoP5 Characterization of the Structural Phase Change of ALD Grown NbO_2Thin Films using Temperature-Dependent Raman Spectroscopy, ***Alex Kozen***, *J. Culbertson, S. Mukhopadhyay*, U.S. Naval Research Laboratory; *Z.R. Robinson*, SUNY College at Brockport; *M. Twigg, L.B. Ruppalt, H. Cho*, U.S. Naval Research Laboratory

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 of Low Temperature ALD Si_3N_4, ***Birol Kuyel***, *A. Alphonse, J. Marshall*, Nano Master

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

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-MoP7 Improvements in the Supply Chain of Critical Cobalt Precursors, ***Don Zeng***, Umicore AG & Co. KG; *A. Frey, O. Briel, A. Wilk*, Umicore AG & Co. KG, Germany

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

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. 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; *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,*** 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

Atomic Layer Etching
Room Evergreen Ballroom & Foyer - Session ALE-MoP
Atomic Layer Etching Poster Session
5:45pm

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

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** *In-situ* 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** X-ray Absorption Spectroscopy on ALD Pt Catalysts for Fuel Cells, ***Anup Dadlani***, Norwegian University of Science and Technology, Norway; *Y. Kim, F. Prinz,* Stanford University; *J. Torgersen,* Norwegian University of Science and Technology, Norway	
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,* 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	**ALE2-TuM13** Laser Isotropic Atomistic Removal of Germanium, ***Dongwoo Paeng***, *H. Zhang, Y.S. Kim,* Lam Research Corp.	
11:15am	**ALE2-TuM14** A New Etching / Passivation Process in Cyclic Mode for Spacer Etching in 3D CMOS Integrations, ***Olivier Pollet***, CEA-LETI, France*; N. Posseme,* Univ. Grenoble Alpes, CEA, LETI, France*; V. Ah-Leung,* 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,* National Institute of Advanced Industrial Science and Technology, 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*; 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. 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:** Han-Bo-Ram Lee, Incheon National University, Mikko Ritala, University of Helsinki
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	

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-TuA11** 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-TuA** **Area-Selective ALD: Combinations with Etching** **Moderators:** Silvia Armini, IMEC, Dennis Hausmann, Lam Research Corp.
4:15pm	**AS2-TuA12** Defect Mitigation Solution for Area-Selective Atomic Layer Deposition of Ru on TiN/SiO_2 Nanopatterns, ***Job 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, A. Delabie,* IMEC, Belgium	
4:30pm	**AS2-TuA13** 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	
4:45pm	**AS2-TuA14** 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	

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***, Unaffiliated	
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	

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-TuP4 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

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*; K. Cadien,* University of Alberta, Canada*; K. Harris, J.-Y. Cho,* National Research Council 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***, 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***, 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. 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

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 AlN Interlayer, ***Dilini Hemakumara***, *X. Li, K. Floros, S. Cho,* University of Glasgow, UK*; I. Guinney, C. Humphreys,* University of Cambridge, UK*; I. Thayne,* University of Glasgow, UK*; A. O'Mahony,* Oxford Instruments Plasma Technology*; H. Knoops,* Oxford Instruments Plasma Technology, UK*; D. Moran,* University of Glasgow, UK

AA2-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.*; 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-TuP14 Modifications of the Electrical Properties of MOS Capacitors Based on Bilayer Gate Metallization - WC_xN_y Capped by CVD Molybdenum on SiO_2 and on ALD Al_2O_3, ***Ekaterina Zoubenko***, Technion - Israel Institute of Technology, Israel*; I. Fisher, S. Thombare, P. Van-Cleemput, M. Danek,* Lam Research Corp.*; M. Eizenberg,* Technion - Israel Institute of Technology, Israel

AA2-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 $Pt/Al_2O_3/\beta$-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-TuP2 Improved Catalyst Selectivity and Longevity using Atomic Layer Deposition, *C. Marshall, **Zheng Lu**,* Argonne National Laboratory; *A. Dameron, R. Tracy,* Forge Nano; *C. Nicholas, L. Abrams, P. Barger,* Honeywell UOP; *T. Li,* Argonne National Laboratory

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-TuP4 Atomistic Design of Nanostructured Catalysts with Atomic Layer Deposition, ***Yu Lei**,* University of Alabama, Huntsville

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

AA3-TuP8 Two-dimensional Oxides Supporting Single-Layer Graphene For Enhanced Photocatalytic Activity, ***Alessandro Baraldi**,* University of Trieste, Italy

ALD Applications
Room Evergreen Ballroom & Foyer - Session AA4-TuP
Protectice 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

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

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, 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

Atomic Layer Etching
Room Evergreen Ballroom & Foyer - Session ALE-TuP
Atomic Layer Etching Poster Session
5:30 pm

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

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. 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, ***Ali Haider***, IMEC, Belgium; *S. 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	**AA1-WeM8** Simulation of Biologic Synapse through Ti-based Maleic Acid/TiO_2 Hybrid Bilayer Memristors by Molecular Layer Deposition/Atomic Layer Deposition, ***Chang Liu***, *Y.-Q. Cao, D. Wu, A.-D. Li,* Nanjing University, China	
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	
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 (SKKU)
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:** Iian Buchanan, Versum Materials, UK, 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

	Emerging Materials Room Regency Ballroom A-C - Session EM1-WeA Ternary and Quaternary Oxide Materials **Moderators:** Uwe Schroeder, Namlab, Bert 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. MacIsaac, 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

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Wang, H.: AS1-TuA8, **18**
Wang, J.: AA1-WeA2, 27; AF3-MoP3, **9**
Wang, L.: AA1-TuP14, 20
Wang, M.: AA2-TuP4, 20; AF2-MoP8, **9**; ALE1-TuA6, 19
Wang, S.: ALE2-WeM16, 26
Wang, W.: AA2-TuP13, 20
Wang, X.: AA2-TuP13, 20; AF1-TuM1, **12**; AF2-MoP12, 9; ALE2-MoA15, 8
Wang, Y.: NS-TuP3, 22
Wang, Z.: AA3-TuA11, 16; ALE1-TuM4, 15
Warburton, R.F.: AA2-TuA12, 17
Weber, M.: AA1-MoA3, 5; AA4-TuP1, **21**
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Wege, S.: AM1-WeM6, 24
Wei, H.: EM3-WeM16, 24
Weimer, A.: AA2-MoA14, 5; AF1-MoA6, 7
Weinbub, J.: ALE2-TuA12, 19
Weinfeld, K.: AF3-TuM15, 12
Weinreich, W.: AF3-MoA13, **6**
Werbrouck, A.: AF1-TuM6, **12**
Wheeler, V.: AF2-MoP11, 9; AF-TuA6, 16; AF-TuA7, **16**
Wiemer, C.: AA1-TuA3, 17
Wilk, A.: AM-MoP1, **10**; AM-MoP7, 10
Wilken, M.: AF1-MoP8, 9
Willis, B.: AF3-MoP7, 10; AF3-TuM13, 12; AF3-TuM16, 12; AF4-MoP3, 10; AM1-WeM1, 24; AS-TuP2, 22
Wilt, J.: AA2-TuP15, 20
Winter, C.H.: AA1-TuA3, 17; AF1-MoP2, 9; EM-MoP10, 11; EM-MoP11, 11
Winterkorn, M.M.: AF5-MoP8, **10**
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Woelk, E.: AF2-TuM1, 14; AM-MoP4, **10**
Wojtecki, R.: AS1-TuA6, **18**
Wollmershauser, J.: NS-TuP4, 22
Wolterbeek, B.: AA1-MoA2, 5
Wood, K.: AA2-TuM13, 13
Wooding, J.: AA1-TuA4, **17**
Woodruff, J.H.: AA2-WeA5, 27
Woodward, J.M.: AF1-TuM4, 12; AF-TuA6, 16
Wree, J.-L.: AF1-MoP8, 9; AF2-MoA7, **6**
Wright Jr., R.: AF1-MoP9, 9
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Wu, D.: AA1-WeM8, 25; AA2-TuP4, 20
Wu, J.: AA2-TuP15, 20
Würfl, J.: AA2-TuP16, 20
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Xiang, J.: AA2-TuP13, **20**
Xiang, Q.: AA5-TuP1, 21
Xiao, M.: AF2-MoP8, 9
Xie, Q.: AF2-TuM7, 14
Xu, W.: AS1-TuA3, **18**
Xu, X.: AF3-TuM15, 12
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Yamakawa, S.: ALE1-TuA7, 19
Yamashita, A.: AF1-MoP10, 9; AS1-TuM15, 14
Yamazaki, K.: ALE1-MoA8, 8; ALE-SuP11, 3, 11, 22
Yan, B.: AA5-TuP5, **21**
Yan, C.: ALE1-WeM8, 26
Yan, D.: AA1-TuP14, 20
Yang, B.C.: AM-MoP5, 10
Yang, B.-I.: AF1-MoP11, 9
Yang, M.: ALE1-WeM8, 26
Yang, T.-Y.: AA2-MoA13, 5
Yang, W.: ALE1-MoA1, 8
Yanguas-Gil, A.: AF1-MoA1, **7**; EM1-WeA1, 28; EM1-WeA4, 28
Yatsuda, K.: ALE1-MoA8, 8; ALE-SuP11, 3, 11, 22
Ye, X.: AA1-TuP14, 20; EM2-WeM14, 23
Yee, S.: AA1-TuA8, 17
Yeo, S.M.: AA2-MoA13, 5
Yi, S.-H.: AA1-WeA7, **27**
Yin, Y.-T.: AA3-TuA14, **16**; EM3-WeM15, 24
Ylivaara, O.: AF3-MoA12, **6**
Yoneda, M.: AA2-TuA15, 17
Yoo, S.-W.: ALE1-MoA6, 8
Yoon, H.: AF2-MoP10, 9
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Yoshida, K.: AA4-TuP3, **21**; AA4-TuP5, 21
Yoshikawa, Y.: AA2-TuA15, 17
Yoshino, T.: AS1-TuM15, 14
Yosida, K.: AF4-MoP1, 10
You, C.: ALE2-MoA16, 8
You, S-J.: ALE1-MoA6, 8
Young, E.C.: AF1-TuM4, 12
Young, L.B.: AA2-TuP12, **20**; AA2-WeM16, 25
Yu, S.: AA2-TuM12, 13
Yu, Y.-S.: AF2-MoP6, 9
Yuan, B.: ALE1-TuM4, 15
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Zafeiropoulos, G.: AA1-TuM3, 13
Zanders, D.: AF1-MoP8, 9; AF1-TuM3, **12**; AF2-TuM6, 14
Zazpe, R.: AA1-TuP4, 20; NS-TuP1, **22**
Zeng, D.: AM-MoP1, 10; AM-MoP7, **10**
Zeng, L.: NS-WeA1, **28**
Zeng, T.: AF2-TuM6, 14
Zhang, B.: AF3-MoA17, **6**
Zhang, C.: AA1-WeA4, 27; AS-TuP2, **22**; EM1-WeM2, **23**
Zhang, D.: AA1-MoA1, 5; ALE1-TuA6, **19**
Zhang, D.W.: NS-TuP3, 22
Zhang, F.: EM2-WeM13, 23
Zhang, H.: ALE2-TuM13, 15; ALE2-WeM12, **26**
Zhang, K.: AA2-TuP9, **20**; AA4-TuP10, 21; AM-MoP3, 10
Zhang, Y.: AA4-TuP11, 21
Zhang, Z.: AS1-TuA4, **18**
Zhao, Y.: AA2-TuM14, 13; AF1-MoP14, 9; ALE2-MoA15, 8
Zhao, Y.T.: AA3-TuP6, 21
Zheng, X.: AF4-MoP9, 10; EM3-WeM16, **24**
Zhiyang, Q.: AF4-MoP5, 10; AS-TuP4, 22
Zhou, B.: AA5-TuP1, 21
Zhou, C.: AA1-TuP16, 20
Zhou, L.: AA2-TuP13, 20
Zhou, X.: AF4-MoP10, **10**; AF4-MoP5, 10
Zhu, H.: AA2-TuM16, **13**
Zhu, K.: AA2-MoA11, 5
Zhu, W.: AA1-WeA4, 27
Zoubenko, E.: AA2-TuP14, **20**
Zoubian, F.: AM1-WeM5, 24
Zuo, P.: EM-MoP11, 11
Zywitzki, D.: AF1-MoP8, 9; AF2-MoA6, **6**