Program Key

Conference Topics

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

Program Overview

Room /Time	Plaza ABC	Plaza D	Plaza E	Plaza Exhibit	Plaza F
SaP				Poster Sessions	
SuM	PS1-SuM: Sunday Plenary Session I PS2-SuM: Sunday Plenary Session II				
SuA	NS+EM-SuA: 2D Materials (1:30-3:30 pm)/Laminate, Multicomponent, and Emerging Materials (4:00-5:30 pm)	ALE-SuA: Atomic Layer Etching Session I (1:30-3:30 pm) and II (4:00-5:30 pm)	AF-SuA: ALD Fundamentals: Precursors and Mechanisms (1:30-3:30 pm)/High Aspect Ratios & High Surface Areas (4:00-5:30 pm)		AS-SuA: Area Selective Deposition I: Deactivation (1:30-3:30 pm)/Inherent Selectivity, Activation, Deactivation (4:00-5:30 pm)
SuP				Poster Sessions	
MoM	AA-MoM: Solar Materials I (8:00-10:00 am)/Solar Materials II (10:45 am-12:00 pm)	ALE-MoM: Atomic Layer Etching Session III (8:00-10:00 am) and Session IV (10:45 am-12:00 pm)	AA+NS-MoM: Energy: Catalysis and Fuel Cells I (8:00-10:00 am)/Nanoparticles and Nanostructures (10:45 am-12:00 pm)		AF+AA-MoM: ALD Fundamentals: Plasma ALD (8:00-10:00 am)/Emerging Applications (10:45 am-12:00 pm)
MoA	AA-MoA: Memory and MIM I (1:30-3:30 pm)/Memory and MIM II (4:00-5:30 pm)	ALE+AF-MoA: Atomic Layer Etching Session V (1:30-3:30 pm)/ALD Fundamentals: Process Development (4:00-5:45 pm)	EM+AA-MoA: Organic-Inorganic Hybrid Materials & MLD (1:30-3:30 pm)/Catalysis and Fuel Cells II (4:00-5:30 pm)		AF-MoA: ALD Fundamentals: Characterization (1:30-3:30 pm)/Mechanisms and Surface Science (4:00-5:00 pm)
MoP				Poster Sessions	
TuM	AA-TuM: Batteries I (8:00-10:00 am)/Emerging Apps II (10:45 am-12:00 pm)	AF1-TuM: ALD Fundamentals: Precursors and Process Development (8:00-10:00 am)/Precursors and Mechanism (10:45am-12:00 pm)	AF2-TuM: ALD Fundamentals: Theory & Mechanism (8:00-10: am)/Emerging Materials and Devices (10:45 am-12:00 pm)		AA+AF-TuM: Displays and Flexible Applications (8:00-10:00 am)/ALD Fundamentals: In-Situ Monitoring and Analysis (10:45 am-12:00 pm)
TuA	AA1-TuA: Batteries II (1:30-3:30 pm)/Emerging Apps III (4:00-5:00 pm)		AA2-TuA: ULSI, High-k and III-V I (1:30-3:30 pm)/ULSI, High-k and III-V II (4:00-5:00 pm)		AM+EM-TuA: ALD for Manufacturing (1:30-3:30 pm)/MLD II (4:00-5:00 pm)

Atomic Layer Etching
Room Plaza Exhibit - Session ALE-SaP
Atomic Layer Etching Poster Session
6:00pm

ALE-SaP-1 Quasi-Atomic Layer Etching of Silicon Nitride with Tunable Directionality and Ultra-high Selectivity, ***Sonam Sherpa***, *A Ranjan,* Tokyo Electron

ALE-SaP-2 Atomic Layer Etching with Gas Cluster Ion Beam Irradiation in Reactive Gas Vapor, ***Noriaki Toyoda***, University of Hyogo, Japan; *A Ogawa,* University of Hyogo; *I Yamada,* Univeristy of Hyogo

ALE-SaP-3 Thermal Atomic Layer Etching of TiO_2 using Sequential Exposures of WF_6 and BCl_3, *P Lemaire,* ***Gregory N. Parsons***, North Carolina State University

ALE-SaP-4 Etch Profile Control of ALD-SiO2 Film Assisted by Alternating ALE Process of Fluorocarbon Deposition and O2 Plasma Etching, ***Masaru Zaitsu***, ASM, Japan; *T Tsutsumi,* Nagoya University, Japan; *A Kobayashi,* ASM; *H Kondo, M Hori,* Nagoya University, Japan; *T Nozawa, N Kobayashi,* ASM

ALE-SaP-5 *In Situ* Mass Spectrometer Studies of Volatile Etch Products During Thermal Al_2O_3 Atomic Layer Etching Using HF and Trimethylaluminum, ***Joel Clancey***, *S George,* University of Colorado - Boulder

ALE-SaP-6 Cyclic Plasma Cleaning Process of SiO_2 Layers using Surface Fluorination, ***Kyongbeom Koh***, *H Chae,* Sungkyunkwan University (SKKU), Republic of Korea

ALE-SaP-7 Low Damage Cyclical Etching of GaN and AlGaN, *A Goodyear,* Oxford Instruments Plasma Technology, UK; *P Abrami,* University of Bristol, UK; ***Mike Cooke***, Oxford Instruments Plasma Technology, UK; *M Loveday,* Oxford Instruments Plasma Technology

ALE-SaP-8 Thermal Atomic Layer Etching of ZnO by "Conversion-Etch" Using Hydrogen Fluoride and Trimethylaluminum, ***David Zywotko***, *S George,* University of Colorado - Boulder

ALE-SaP-9 Cryogenic Atomic Layer Etching of SiO_2, *N Holtzer,* ***Thomas Tillocher***, *P Lefaucheux, R Dussart,* GREMI Université d'Orléans/CNRS, France

ALE-SaP-10 SF_4 as a New Fluorine Reagent for Thermal ALE: Application to Al_2O_3 and VO_2 ALE, ***Jonas Gertsch***, *N Johnson, V Bright, S George,* University of Colorado - Boulder

ALE-SaP-11 Demonstrating Manufacturability of Atomic Level Etch (ALE) through Accelerated Neutral Atom Beam (ANAB) Processing, ***Daniel Steinke***, *B Sapp, S PapaRao,* SUNY Polytechnic Institute; *E Barth,* SEMATECH; *V Kaushik, M Rodgers, C Hobbs,* SUNY Polytechnic Institute; *M Walsh, S Kirkpatrick, R Svrluga,* Neutral Physics Corporation

ALE-SaP-12 Etching with Low Te Plasmas, ***Scott Walton***, *D Boris,* U.S. Naval Research Laboratory; *S Hernández,* U.S.Naval Research Laboratory; *H Miyazoe, A Jagtiani, S Engelmann, E Joseph,* IBM TJ Watson Research Center

ALE-SaP-13 Surface Cleaning of Gallium Antimonide Oxides: The Role of Hydrogen Atoms, Argon Ions, and Temperature, ***Thomas Larrabee***, *S Prokes,* Naval Research Laboratory

ALE-SaP-14 Aluminum Native Oxide Surface Cleaning and Passivation in an Atmospheric Plasma System, ***John Mudrick***, *M Pohl, K Knisely,* Sandia National Laboratories

ALE-SaP-15 Atomic Layer Etching in Reactive Ion Etching System for Nanoscale Pattern Transfer, *S Khan,* ***Dmitry Suyatin***, *M Graczyk, A Kvennefors,* Lund University, Sweden; *E Kauppinen,* Aalto University, Finland; *M Huffman, I Maximov,* Lund University, Sweden; *J Sundqvist,* Fraunhofer Institute for Ceramic Technologies and Systems IKTS, Germany

ALE-SaP-16 Selective Fluorocarbon-based Atomic Layer Etching in a Conventional Parallel-Plate, Capacitively Coupled Plasma, ***Stefano Dallorto***, Ilmenau University of Technology; *A Goodyear, M Cooke,* Oxford Instruments Plasma Technology, UK; *S Dhuey, A Schwartzberg, S Sassolini,* Lawrence Berkeley National Laboratory; *C Ward,* Oxford Instruments; *D Olynick,* Lawrence Berkeley National Laboratory; *I Rangelow,* Ilmenau University of Technology; *S Cabrini,* Lawrence Berkeley National Laboratory

ALE-SaP-17 RF Plasma Electrostatics: The Influence on Film Morphology and Carbon Incorporation, ***K. Scott Butcher***, Meaglow Ltd, Canada; *P Terziyska,* Institute of Solid State Physics, Bulgarian Academy of Sciences, Bulgaria; *V Georgiev,* Meaglow Ltd, Canada; *D Georgieva,* Semiconductor Research Lab, Lakehead University, Canada; *R Gergova,* Central Laboratory of Solar Energy and New Energy Sources, Bulgarian Academy of Sciences, Bulgaria; *P Binsted, S Skergetc,* Semiconductor Research Lab, Lakehead University, Canada

ALE-SaP-18 Atomic Layer Etching of Amorphous Silicon with Selectivity Towards MoS_2, ***Markus Heyne***, KU Leuven, Belgium; *A Goodyear,* Oxford Instruments Plasma Technology, UK; *J de Marneffe,* IMEC, Belgium; *M Cooke,* Oxford Instruments Plasma Technology, UK; *I Radu,* IMEC, Belgium; *E Neyts,* University of Antwerp, Belgium; *S De Gendt,* KU Leuven, Belgium

ALE-SaP-19 Simulation of New Material-Systems for Directional Atomic Layer Etching, ***Ivan Berry***, *K Kanarik, T Lill, V Vahedi, R Gottscho,* Lam Research Corp.

Sunday Morning, July 16, 2017

	Room Plaza ABC	
8:00am		**Plenary Session** **Session PS1-SuM** **Sunday Plenary Session I** **Moderators:** John Conley, Oregon State University, Charles Dezelah, EMD Performance Materials
8:15am		
8:30am	**INVITED: PS1-SuM-3** Future Applications and Challenges for ALD in Microelectronics, ***Suvi Haukka,*** ASM, Finland	
8:45am	Invited talk continues.	
9:00am	Invited talk continues.	
9:15am	**INVITED: PS1-SuM-6** Future Trends of Deposition Technologies in Semiconductor Industry, ***Mei Chang,*** Applied Materials	
9:30am	Invited talk continues.	
9:45am		
10:00am	**Coffee Break & Exhibits**	
10:15am	**Coffee Break & Exhibits**	
10:30am	**Coffee Break & Exhibits**	
10:45am	**INVITED: PS2-SuM-12** Atomic Layer Etching – An Overview of Possibilities and Limitations, ***Richard Gottscho,*** Lam Research Corp.	**Plenary Session** **Session PS2-SuM** **Sunday Plenary Session II** **Moderators:** Steven M. George, University of Colorado at Boulder, Keren J. Kanarik, Lam Research Corp.
11:00am	Invited talk continues.	
11:15am	Invited talk continues.	

Sunday Afternoon, July 16, 2017

	ALD Fundamentals **Room Plaza E - Session AF-SuA** **ALD Fundamentals: Precursors and Mechanisms (1:30-3:30 pm)/High Aspect Ratios & High Surface Areas (4:00-5:30 pm)** **Moderators:** Roy Gordon, Harvard University, Charles H. Winter, Wayne State University, Mato Knez, CIC nanoGUNE, Ola Nilsen, University of Oslo	**Atomic Layer Etching** **Room Plaza D - Session ALE-SuA** **Atomic Layer Etching Session I (1:30-3:30 pm) and II (4:00-5:30 pm)** **Moderators:** Geun Young Yeom, Sungkyunkwan University, Korea, Satyarth Suri, Intel Corporation, Ankur Agarwal, KLA-Tencor
1:30pm	**INVITED: AF-SuA-1** Atomic Layer Deposition of Silicon Dielectrics: Precursors, Processes and Plasmas, ***Dennis Hausmann,*** Lam Research	**INVITED: ALE-SuA-1** Atomic Layer Processes to Enable the Atomic Scale Era, ***Robert Clark,*** *K Tapily, J Smith, N Mohanty, S Kal, D Newman, S Consiglio, D O'Meara, K Maekawa, A Mosden, A deVilliers, P Biolsi, T Hurd, C Wajda, G Leusink,* TEL Technology Center, America, LLC
1:45pm	Invited talk continues.	Invited talk continues.
2:00pm	**AF-SuA-3** Atomic Layer Deposition of Carbon Doped Silicon Oxide by Precursor Design and Process Tuning, ***Meiliang Wang,*** *H Chandra, A Mallikarjunan, K Cuthill, M Xiao, X Lei,* Versum Materials, Inc	**ALE-SuA-3** Thermal Atomic Layer Etching of SiO_2 by a "Conversion-Etch" Mechanism, *J DuMont, A Marquardt, A Cano,* ***Steven M. George,*** University of Colorado
2:15pm	**AF-SuA-4** Evaluation of Silicon Precursors for Low Temperature Silicon Nitride Deposition, ***Shuang Meng,*** *B Hendrix, T Baum,* Entegris Inc.*; D Hausmann,* Lam Research	**INVITED: ALE-SuA-4** The Challenges and Opportunities in Plasma Etching of Functionally Enhanced Complex Material Systems, ***Jane Chang,*** UCLA
2:30pm	**AF-SuA-5** Atomic Layer Deposition of SiO_2 Using Tris(dimethylamino)Aminosilane Precursor and Ozone, ***Charith Nanayakkara,*** EMD Performance Materials*; A Dangerfield,* University of Texas at Dallas*; G Liu, C Dezelah,* EMD Performance Materials*; Y Chabal,* University of Texas at Dallas*; R Kanjolia,* EMD Performance Materials	Invited talk continues.
2:45pm	**AF-SuA-6** *In situ* Infrared Absorption Study of Plasma-Enhanced ALD of Silicon Nitride using Di-*sec*-butylaminosilane and Bis(t-butylamino)silane on Silicon and Silicon Nitride Surfaces, ***Fabian Pena,*** *E Mattson, C Nanayakkara, Y Chabal,* University of Texas at Dallas*; A Mallikarjunan, H Chandra, M Xiao, X Lei, R Pearlstein, A Derecskei-Kovacs,* Versum Materials, Inc	**ALE-SuA-6** A Novel Process for Atomic Layer Etching of ZnO using Acetylacetone and Remote O_2 Plasma, ***Alfredo Mameli,*** *M Verheijen, A Mackus, W Kessels, F Roozeboom,* Eindhoven University of Technology, Netherlands
3:00pm	**AF-SuA-7** First-Principles Understanding of Reaction Mechanisms in Plasma Enhanced Atomic Layer Deposition of Silicon Nitride, ***Gregory Hartmann,*** *G Hwang,* The University of Texas at Austin*; P Ventzek,* Tokyo Electron America*; T Iwao, K Ishibashi,* Tokyo Electron Tohoku, Ltd., Japan	**INVITED: ALE-SuA-7** Determining the Benefits and Limitations of Atomic Layer Etching: A Modeling Investigation, *C Huard,* University of Michigan*; Y Zhang, S Sriraman, A Paterson,* Lam Research Corp.*;* ***Mark Kushner,*** University of Michigan
3:15pm	**AF-SuA-8** Atomic Layer Deposition of AlN from $AlCl_3$ using NH_3 and Ar/NH_3 Plasma as Co-reactant, ***Ville Rontu,*** *P Sippola, M Broas,* Aalto University, Finland*; T Sajavaara,* University of Jyväskylä, Finland*; M Paulasto-Kröckel, H Lipsanen, S Franssila,* Aalto University, Finland	Invited talk continues.
3:30pm	**Coffee Break & Exhibit**	**Coffee Break & Exhibit**
3:45pm	**Coffee Break & Exhibit**	**Coffee Break & Exhibit**
4:00pm	**AF-SuA-11** Nanoscale Gettering of Excess O in CuO Nanowires via ALD Al_2O_3, *S Banerjee, Z Gao, Y Myung,* ***Parag Banerjee,*** Washington University, St. Louis	**INVITED: ALE-SuA-11** ALE TBD 2, ***Nitin Ingle,*** Applied Materials
4:15pm	**AF-SuA-12** Temperature Dependent Growth of Alumina on Tungsten Nano-Powder, ***Kedar Manandhar,*** *J Wollmershauser, B Feigelson,* U.S. Naval Research Laboratory	Invited talk continues.
4:30pm	**AF-SuA-13** Critical Aspects in Fluid Bed ALD, ***Markus Bosund,*** *R Peltonen, E Maiorov,* Beneq Oy, Finland*; M Jauhiainen,* Beneq Oy*; E Salmi,* Beneq Oy, Finland*; S Sneck,* Beneq Oy	**ALE-SuA-13** Significant Improvements of CD Uniformity and ARDE in ODL Mask Etching using a Self-limiting Cyclic Etch Approach, ***Barton Lane,*** *P Ventzek,* Tokyo Electron America*; A Ranjan, V Rastogi,* TEL Technology Center, America, LLC
4:45pm	**AF-SuA-14** Super-Conformal Growth by ALD, ***Roy Gordon,*** Harvard University, USA*; J Feng,* Harvard University	**INVITED: ALE-SuA-14** Nanometer-Scale III-V 3D MOSFETs, ***Jesus del Alamo,*** *W Lu, X Zhao, D Choi, A Vardi,* MIT
5:00pm	**AF-SuA-15** Thin Film Conformality Profile Analysis with Microscopic All-Silicon Lateral High Aspect Ratio Structures, ***Riikka Puurunen,*** *O Ylivaara, K Grigoras, M Ylilammi,* VTT Technical Research Centre of Finland, Finland	Invited talk continues.
5:15pm	**INVITED: AF-SuA-16** ALD onto Particles: Batch and Continuous Processes for Industry, ***Joseph Spencer II,*** ALD NanoSolutions, Inc.	**ALE-SuA-16** Atomic Layer Etch Processes Developed in an ICP/RIE Etching System for Etching III-V Compound Semiconductor Materials, ***Xu Li,*** *Y Fu, S Peralagu, S Cho, K Floros, D Hemakumara, M Smith,* University of Glasgow, UK*; I Guiney,* University of Cambridge, UK*; D Moran,* University of Glasgow, UK*; C Humphreys,* University of Cambridge, UK*; I Thayne,* University of Glasgow, UK
5:30pm	Invited talk continues.	**ALE-SuA-17** Enhanced Thermal ALE of Aluminum Oxide Combined with ALD for UV Optical Applications, ***John Hennessy,*** Jet Propulsion Laboratory, California Institute of Technology*; C Moore,* University of Colorado - Boulder*; K Balasubramanian, A Jewell,* Jet Propulsion Laboratory, California Institute of Technology*; K France,* University of Colorado - Boulder*; S Nikzad,* Jet Propulsion Laboratory, California Institute of Technology

Sunday Afternoon, July 16, 2017

	Area Selective ALD **Room Plaza F - Session AS-SuA** **Area Selective Deposition I: Deactivation (1:30-3:30 pm)/Inherent Selectivity, Activation, Deactivation (4:00-5:30 pm)** **Moderators:** Suvi Haukka, ASM Microchemistry Ltd., Finland, David Thompson, Applied Materials, Erwin Kessels, Eindhoven University of Technology, the Netherlands, Adrie Mackus, Eindhoven University, Netherlands	**Nanostructure Synthesis and Fabrication** **Room Plaza ABC - Session NS+EM-SuA** **2D Materials (1:30-3:30 pm)/Laminate, Multicomponent, and Emerging Materials (4:00-5:30 pm)** **Moderators:** Jiyoung Kim, University of Texas at Dallas, Dennis Hausmann, Lam Research, Sumit Agarwal, Colorado School of Mines
1:30pm	**INVITED: AS-SuA-1** Area Selective Deposition Using Spatial ALD and Polymer Patterns, ***Carolyn Ellinger,*** Eastman Kodak Company	**NS+EM-SuA-1** Plasma-enhanced Atomic Layer Deposition of Large-area MoS_2: From 2-D Monolayers to 3-D Vertical Fins, ***Akhil Sharma,*** *S Karwal, V Vandalon, M Verheijen,* Eindhoven University of Technology, Netherlands*; H Knoops,* Oxford Instruments Plasma Technology, UK*; R Sundaram,* Oxford Instruments Plasma Technology*; W Kessels, A Bol,* Eindhoven University of Technology, Netherlands
1:45pm	Invited talk continues.	**NS+EM-SuA-2** Low-Temperature Atomic Layer Deposition of MoS_2 Films, ***Michael Moody,*** *T Jurca, A Henning, J Emery, B Wang, J Tan, T Lohr, T Marks, L Lauhon,* Northwestern University
2:00pm	**AS-SuA-3** Area-selective ALD of Silicon Oxide using Acetylacetone as Inhibitor in a Three-step Cycle, ***Adrie Mackus,*** *A Mameli, M Merkx, B Karasulu, W Kessels,* Eindhoven University of Technology, Netherlands	**NS+EM-SuA-3** Dielectric-MoS_2 Interfaces Grown by Atomic Layer Deposition, ***Steven Letourneau,*** Boise State University*; A Mane, J Elam,* Argonne National Laboratory*; E Graungard,* Boise State University
2:15pm	**AS-SuA-4** Evaluation of Different Nanoimprint Resists for a use in Area-selective Atomic Layer Deposition of Selected Materials, *R Ritasalo,* Picosun Oy, Finland*; M Messerschmidt,* Micro Resist Technology GmbH*; K Grigoras,* VTT, Finland*; S Ek,* Picosun Oy, Finland*; E Østreng,* Picosun Oy*; M Prunnila,* VTT*; **Tero Pilvi,*** Picosun Oy	**NS+EM-SuA-4** Plasma-Enhanced Atomic Layer Deposition of sub-5 nm high- k Dielectrics on 2D Crystals, ***Katherine Price,*** *F McGuire, A Franklin,* Duke University
2:30pm	**AS-SuA-5** Developing a Full Wafer-scale Approach Towards High ALD Selectivity on Copper vs Low-K (and Oxides) using a Single ALD/SAMS Platform, ***Laurent Lecordier,*** Ultratech*; S Armini, S Herregods,* IMEC, Belgium	**NS+EM-SuA-5** Novel *in-situ* Electrical Characterization of the Atomic Layer Deposition Process on 2D Transition Metal Dichalcogenides Transistors, ***Antonio Lucero,*** *J Lee, L Cheng, H Kim, J Lee, S Kim, J Kim,* University of Texas at Dallas
2:45pm	**AS-SuA-6** Fabrication of Large-area Nanolines by Area-selective Atomic Layer Deposition, *J Ekerdt,* ***Zizhuo Zhang,*** University of Texas at Austin	**NS+EM-SuA-6** Deposition of MoS_2 and WS_2 from bis(tert-butylimido)-bis(dialkylamido) Compounds and 1-Propanethiol, ***Berc Kalanyan,*** *J Maslar, W Kimes, B Sperling,* National Institute of Standards and Technology*; R Kanjolia,* EMD Performance Materials
3:00pm	**AS-SuA-7** Nanoscale Selective Deposition of TiO_2 using e-beam Patterned Polymeric Inhibition Layers and TDMAT Precursor, *A Haider, M Yilmaz, P Deminskyi,* Bilkent University, Turkey*; **Hamit Eren,*** Delft University of Technology, Netherlands*; N Biyikli,* Utah State University	**NS+EM-SuA-7** Direct Growth of Layered Boron Nitride Films on MoS_2 using Atomic Layer Deposition for 2D Based Nano-electronics, ***Jaebeom Lee,*** *L Cheng, H Zhu, A Ravichandran, A Lucero, M Catalano, M Kim, R Wallace, L Colombo, J Kim,* University of Texas at Dallas*; Z Che,* The University of Texas at Dallas
3:15pm	**AS-SuA-8** Area-selective Atomic Layer Deposition using Inductively Coupled Plasma Polymerized Fluorocarbon Layer: A Case Study for Metal-Oxides and Metals, ***Ali Haider,*** *P Deminskyi, T Khan,* Bilkent University, Turkey*; H Eren,* Delft University of Technology, Netherlands*; N Biyikli,* Utah State University	**INVITED: NS+EM-SuA-8** Fabrication of Functional Complex Nanostructures Based on Novel Atomic Layer Deposition Approach of Boron Nitride, ***Wenjun Hao,*** *C Marichy, C Journet, A Brioude,* Univ Lyon, France
3:30pm	**Coffee Break & Exhibit**	Invited talk continues.
3:45pm	**Coffee Break & Exhibit**	**Coffee Break & Exhibit**
4:00pm	**INVITED: AS-SuA-11** Adventures and Advances in Selective Deposition, ***David Thompson,*** Applied Materials	**INVITED: NS+EM-SuA-11** When There is no Bulk: Growth and Structure of Dielectric and Semiconductor Oxide Nanolaminates, ***Angel Yanguas-Gil,*** Argonne National Laboratory
4:15pm	Invited talk continues.	Invited talk continues.
4:30pm	**AS-SuA-13** Direct-write ALD of Transparent Conductive Oxides: Micro- and Nanoscale Patterned In_2O_3:H and ZnO, ***Alfredo Mameli,*** *B Karasulu, B Barcones Campo, M Verheijen, A Mackus, W Kessels, F Roozeboom,* Eindhoven University of Technology, Netherlands	**NS+EM-SuA-13** Perfecting Single-Crystal Ternary Perovskite $YAlO_3$ Epitaxial Growth on GaAs(111)A Utilizing Atomic Layer Deposited Sub-Nano-Laminated Y_2O_3/Al_2O_3, ***Lawrence Boyu Young,*** *C Cheng, K Lin, Y Lin, H Wan,* National Taiwan University, Republic of China*; M Li,* National Nano Device Laboratories, Republic of China*; R Cai, S Lo,* Industrial Technology Research Institute, Republic of China*; C Hsu,* 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
4:45pm	**AS-SuA-14** Inherent Substrate-Selective Growth of Cobalt and Nickel Metal Films by Atomic Layer Deposition, ***Marissa M. Kerrigan,*** *C Winter,* Wayne State University	**NS+EM-SuA-14** Thermal Coefficient of Resistance (TCR) Measurements for Atomic Layer Deposited Metal-Metal Oxide Nanocomposites, ***Anil Mane,*** *J Avila, Y Zhang, J Elam,* Argonne National Laboratory
5:00pm	**AS-SuA-15** Delayed Nucleation of HfO_2 and TiO_2 ALD on Carbon via Cyclic Plasma Treatments for Application in Selective-Area Deposition, ***Eric Stevens,*** North Carolina State University, USA*; Y Tomczak, B Chan, E Altamirano-Sanchez,* IMEC, Belgium*; G Parsons,* North Carolina State University, USA*; A Delabie,* IMEC, Belgium	**NS+EM-SuA-15** Phase Control of Ga_2O_3 Films Deposited by Atomic Layer Epitaxy, ***Virginia Wheeler,*** *N Nepal, D Meyer, C Eddy, Jr.,* U.S. Naval Research Laboratory
5:15pm	**INVITED: AS-SuA-16** Selective Deposition Process Combining PEALD and ALE, ***Christophe Vallée,*** Univ. Grenoble Alpes, CNRS, France*; R Gassilloud,* CEA-Leti, France*; R Vallat,* Univ. Grenoble Alpes, CNRS, France*; C Mannequin,* University of Tsukuba*; A Uedono,* University of Tsukuba, Japan*; V Pesce,* Univ. Grenoble Alpes, CNRS, France*; N Posseme,* CEA-Leti, France*; P Gonon, A Bsiesy,* Univ. Grenoble Alpes, CNRS, France	**NS+EM-SuA-16** High Quality SiN and SiO_2 Films Produced by PEALD with Microwave ECR Plasma Below 200 ºC, ***Jesse Kalliomaki,*** *V Kilpi,* Picosun Oy, Finland*; T Maline,* Picosun Oy*; H Enami, N Mise,* Hitachi High-Technologies Corp., Japan*; H Hamamura, T Usui,* Hitachi R&D Group

5:30pm	Invited talk continues.	**NS+EM-SuA-17** Tertiary Butyl Hydrazine as a Reducing Agent for Low-Temperature Atomic Layer Deposition of Low-Resistivity Copper Thin Films, ***Katja Väyrynen***, *K Mizohata, J Räisänen,* University of Helsinki, Finland; *D Peeters, A Devi,* Ruhr-University Bochum, Germany; *M Ritala, M Leskelä,* University of Helsinki, Finland

ALD Applications
Room Plaza Exhibit - Session AA-SuP
ALD Applications Poster Session
5:30pm

AA-SuP-1 Atomic Layer Deposition Surface Functionalized Adsorbents for Adsorption of Metal Ions and Organic Pollutants, ***Xiaofeng Wang***, *X Liang,* Missouri University of Science and Technology

AA-SuP-2 Supported Ni Nanoparticle Catalysts Synthesized by Atomic Layer Deposition for Dry Reforming of Methane, ***Zeyu Shang***, *X Liang,* Missouri University of Science and Technology

AA-SuP-3 Wear Behavior of Annealed Atomic Layer Deposited Alumina Thin Films, ***Zakaria Hsain***, *G Zeng, B Krick, N Strandwitz,* Lehigh University

AA-SuP-4 Surface Enhanced Raman Scattering Effect on Various Pt Nanostructures by using Self-aligned Block Co-Polymer Template, Pt Atomic Layer Deposition, ***Won-Kyun Yeom***, *J Shin, D Sung, J Oh, J Oh, G Yeom,* Sung Kyun Kwan University, Republic of Korea

AA-SuP-5 Effect of Post-annealing on the Performance of Ultraviolet Photodetectors with Atomic-Layer-Deposited ZnO Semiconductor, ***Jian Gao***, *W Liu, S Ding,* Fudan University, China

AA-SuP-6 Density and Origin of Pinhole-Defects in ALD Barrier Coatings on Steel Substrates, ***Tim Poljansek***, *S Klein,* Robert Bosch GmbH, Germany; *J Bartha,* TU Dresden, Germany

AA-SuP-7 Room-Temperature Atomic Layer Deposition of Al_2O_3 for Anticorrosion Coatings, ***Kensaku Kanomata***, *M Ishikawa, M Miura, B Ahmmad, S Kubota, F Hirose,* Yamagata University, Japan

AA-SuP-8 Structural and Optical Properties of SnS and SnSe Thin Films Grown by Atomic Layer Deposition for Photovoltaic Applications, ***Ji Hye Kim***, *Y Tak, H Park,* ISAC Research Inc., Republic of Korea

AA-SuP-9 Characterization of the Alumina-Alucone Multilayer Thin Film for a Flexible Transparent Electrode by Atomic Layer and Molecular Layer Depositions, ***Sung Tae Hwang***, *S Song, G Lee, B Choi,* Korea University, Republic of Korea

AA-SuP-10 Investigation of Pure Antimony Films Grown by PALD, ***Bodo Kalkofen***, *M Silinskas, R Balasubramanian, B Garke,* Otto von Guericke University, Germany; *H Gargouri,* Sentech Instruments, Germany; *E Burte,* Otto von Guericke University, Germany

AA-SuP-11 Fabrication of Hollow Structures Using Plasma Enhanced Atomic Layer Deposition, ***Masayuki Nakamura***, *T Kobayashi, T Sagawa, T Tatsuta, S Motoyama,* Samco Inc., Japan; *P Wood,* Samco Inc.; *O Tsuji,* Samco Inc., Japan

AA-SuP-12 PALD of Germanium Antimony Tellurium Compounds, ***Mindaugas Silinskas***, *B Kalkofen, R Balasubramanian, N Harmgarth,* Otto von Guericke University, Germany; *H Gargouri,* Sentech Instruments, Germany; *E Burte,* Otto von Guericke University, Germany

AA-SuP-13 Flexible Alucone/Al_2O_3/Alucone Hybrid Dielectric Layers using *in-situ* ALD/MLD Techniques, ***Dong-Won Choi***, *S Lee,* Hanyang University, Korea; *J Lee,* Hanyang University, Korea, Republic of Korea; *J Park,* Hanyang University, Republic of Korea

AA-SuP-14 Characteristics of Low-k Film at Low Temperature Using SDP System, ***Minho Cheon***, *D Lee,* JUSUNG Engineering, Republic of Korea

AA-SuP-15 High Quality ALD of Silicon Nitride Films via Microwave Plasma, ***Kihyun Kim***, Samsung Electronics, Republic of Korea; *J Provine, P Schindler, F Prinz,* Stanford University

AA-SuP-16 Improved Corrosion Resistance and Mechanical Properties of CrN Hard Coatings with an Atomic Layer Deposited Al_2O_3 Interlayer, ***Zhixin Wan***, *S Park, S Kwon,* Pusan National University, Republic of Korea

AA-SuP-17 ALD Thin-Films for Micro-Channel Plate based Detectors, ***Nitin Deepak***, University of Liverpool, UK; *S Harada, T Conneely,* Photek Ltd., UK; *R Potter,* University of Liverpool, UK; *J Milnes,* Photek Ltd., UK

AA-SuP-18 The Effect of SiOx/SiNx Multilayer Structure using Low Temperature Plasma Enhanced Atomic Layer Deposition for Gas Diffusion Barrier, ***Ju-Hwan Han***, Hanyang University, Republic of Korea; *C Kim, K Lim, S Lee, H Choi,* LG Display, Republic of Korea; *J Park,* Hanyang University, Republic of Korea

AA-SuP-19 Reduced Thermal Conductivity of ALD Synthesized PbTe/PbSe Nanolaminates Grown on Nanopatterned Substrates, ***Xin Chen***, Old Dominion University; *M DeCoster,* University of Virginia; *P Lin, K Zhang,* Old Dominion University; *P Hopkins,* University of Virginia; *H Baumgart,* Old Dominion University

AA-SuP-20 The Effect of Titanium Tetrachloride-based Plasma Enhanced ALD TiN on the Threshold Voltage of Gate Last-Like Processed FD-SOI MOSFET with ALD HfO_2 Gate Dielectric, *Y Kim, M Chae,* ***Changhwan Choi***, Hanyang University, Korea

AA-SuP-21 Atomic Layer Deposition of Transition Metal Dichalcogenide MoS_2 Thin Films, *M Zeng,* George Mason University; ***Kai Zhang***, *X Chen, P Lin,* Old Dominion University; *Q Li,* George Mason University; *C McCleese, C Kolodziej, C Burda,* Case Western Reserve University; *H Baumgart,* Old Dominion University

AA-SuP-22 The Impact on GaN MOS Capacitor Performance of *in-situ* Processing in a Clustered ALD/ICP/RIE Tool, ***Dilini Hemakumara***, *X Li, S Cho, K Floros,* University of Glasgow, UK; *I Guiney,* University of Cambridge, UK; *D Moran,* University of Glasgow, UK; *C Humphreys,* University of Cambridge, UK; *A O'Mahony, H Knoops,* Oxford Instruments Plasma Technology, UK; *I Thayne,* University of Glasgow, UK

AA-SuP-23 Plasma-Enhanced ALD of Dielectrics on Aluminum and *in-situ* FUV Spectroscopy, ***Brianna Eller***, *R Nemanich, P Scowen,* Arizona State University

AA-SuP-24 ALD on Textiles for Wearable Electronics, ***Wade Ingram***, *J Jur,* North Carolina State University

AA-SuP-25 Enhancement of ZnO Nanorod Gas Sensors with AZO Nanolaminate Coating by Atomic Layer Deposition, ***Pengtao Lin***, *X Chen, K Zhang, H Baumgart,* Old Dominion University

AA-SuP-26 A Comparison Study of Atomic Layer Deposition (ALD) of Ceria (CeO_2) Films using $Ce(^iPrCp)_2$ (^iPr-amd) and $Ce(^iPrCp)_3$ Precursors, ***Maryam Golalikhani***, *P Van Buskirk, J Roeder,* Sonata LLC

AA-SuP-27 Theoretical Study of Si-N Film Atomic Layer Deposition Mechanism with Hydrazine and Diclorosilane Precursors and their Derivatives, ***Alexander Goldberg***, *M Halls, H Kwak, T Seidel,* Schrodinger, Inc.

AA-SuP-28 Nucleation and Growth Characterization of Metallic Ruthenium Films Grown by PEALD on Surface Treated Si (100) at Low Substrate Temperatures, ***Nicholas Strnad***, University of Maryland; *G Rayner,* The Kurt J. Lesker Company; *D Potrepka,* U.S. Army Research Laboratory; *B Liu,* The Pennsylvania State University; *J Pattison,* University of Maryland; *M Rivas,* University of Connecticut; *R Polcawich,* U.S. Army Research Laboratory

AA-SuP-29 Challenge the Productivity of ALD for High Volume Manufacturing of High Efficiency Solar Cells, ***Wei-Min Li***, *X Li,* Jiangsu Leadmicro Nano-Equipment Technology Ltd., P.R. China

AA-SuP-30 Role of Cu in ALD Grown Cu:ZnS *p*-type Transparent Conductor, ***Shaibal Sarkar***, *N Mahuli,* Indian Institute of Technology Bombay, India

AA-SuP-31 *In-situ* investigation of Electrical Properties in Cu Incorporated ZnS Thin Films Grown by Atomic Layer Deposition, ***Debabrata Saha***, *S Sarkar,* Indian Institute of Technology Bombay, India

AA-SuP-32 All ALD Hybrid Photoelectrochemical Systems Based on Self-Organized TiO_2 Nanotubes Coated with Chalcogenides, ***Jan Macák***, University of Pardubice, Czech Republic

AA-SuP-33 Electrical, Optical and Mechanical Properties of ALD-Ti doped ZnO Thin Films prepared on Corning® Willow® Glass for the Application of Flexible Transparent Oxide Substrate, ***Woo-Jae Lee***, *C Kim, Y Kim, S Kwon,* Pusan National University, Republic of Korea

AA-SuP-34 Surface Passivation of Nanoparticle via Rotation Fluidization Coupled Atomic Layer Deposition Reactor, *K Qu, C Duan, K Cao,* Huazhong University of Science and Technology, China; ***Rong Chen***, Huazhong University of Science and Technology, P.R. China

AA-SuP-35 Atomic Layer Deposition of Doped Zinc Oxide as an Alternative to Fluorine Doped Tin Oxide for Transparent Contacts in Perovskite Solar Cells, ***Louise Ryan***, Tyndall National Institute, Ireland; *A Walsh, M McCarthy,* Tyndall National Institute, University College Cork, Ireland; *S Monaghan, M Mondreanu,* Tyndall National Institute, Ireland; *S O'Brien, M Pemble, I Povey,* Tyndall National Institute, University College Cork, Ireland

AA-SuP-36 Oxides Nanomembranes Deposited by Atomic Layer Deposition for Lithium Ion Batteries, ***Gaoshan Huang***, *Y Zhao, Y Mei,* Fudan University, China

AA-SuP-37 Enhanced Photoelectrochemical Efficiency of Self-Organized TiO Nanotubes Films due to Secondary Materials, ***Jan Macák***, University of Pardubice, Czech Republic

AA-SuP-38 Atomic Layer Deposition of Ru and RuO_2 on Powder, ***Jaehong Yoon***, Yonsei University, Korea; *Y Lee,* Incheon National University; *H Kim,* Yonsei University, Republic of Korea; *H Lee,* Incheon National University, Republic of Korea

AA-SuP-39 Plasma-free Atomic Layer Deposition of Nickel and Nickel-based Alloy Thin Films for Nickel Silicide, ***Shunichi Nabeya***, *S Jung, S Kim,* Yeungnam University, Republic of Korea

AA-SuP-40 Room Temperature Atomic Layer Depostion of $Al_xSi_{1-x}O$ and its Application for Dye Sensitized Solar Cells, *T Imai, K Kanomata, M Miura, B Ahmmad, S Kubota,* ***Fumihiko Hirose***, Yamagata University, Japan

AA-SuP-41 Tungsten Thin Films Nucleation, Adhesion and Conductivity Improvement using Nanocomposite Barrier Layer Grown by Atomic Layer Deposition, ***Anil Mane***, *J Elam,* Argonne National Laboratory

AA-SuP-42 Textile-based Heater Fabricated by Atomic Layer Deposition for Artificial Muscles, ***Jong Seo Park***, *I Oh,* Yonsei University, Republic of Korea; *T Han,* Incheon National University, Republic of Korea; *H Kim,* Yonsei University, Republic of Korea; *H Lee,* Incheon National University, Republic of Korea

AA-SuP-43 Bio-Templated *Morpho* Butterfly Wings by ALD for Photocatalysis, ***Robin Rodriguez***, *S Agarwal, D Das,* University of Michigan; *W Shang,* Shanghai Jiao Tong University, China; *R Goubert, R Skye, E Kazyak,* University of Michigan; *T Deng,* Shanghai Jiao Tong University, China; *N Dasgupta,* University of Michigan

AA-SuP-44 Atomic Layer Deposition of $ZrSiO_4$ and $HfSiO_4$ Thin Films using a Newly Designed DNS-Zr and DNS-Hf Bimetallic Precursors for High-Performance Logic Devices, ***Da-Young Kim***, *S Kwon,* Pusan National University, Republic of Korea; *S Jeon, H Lim, S Jo, J Park, W Chae, S Yim, J Park,* DNF.Co.Ltd, Republic of Korea; *S Lee, M Kim,* DNF Co. Ltd, Republic of Korea

AA-SuP-45 Enhanced Thermal Stability and Catalytic Activity of Metal Oxide Coated Platinum Catalyst via Atomic Layer Deposition, *J Cai,* Huazhong University of Science and Technology; *K Cao, B Shan,* Huazhong University of Science and Technology, China; ***Rong Chen***, Huazhong University of Science and Technology, P.R. China

AA-SuP-46 Selective Atomic Layer Deposition of Bimetallic Core Shell Nanoparticles Towards PROX Reactions Modulated with Pt Shell Thickness, *Y Lang, J Yang, K Cao, J Zhang, B Shan,* Huazhong University of Science and Technology, China; ***Rong Chen***, Huazhong University of Science and Technology, China, P.R. China

AA-SuP-47 Deposition of Tungsten Carbide and Tungsten Nitride Films from Halogen-Free Tungsten Precursors, ***Moo-Sung Kim***, Versum Materials Korea, Republic of Korea; *S Yabut, S Ivanov,* Versum Materials

AA-SuP-48 Improvement of Corrosion and Mechanical Properties of NiTi Implants by using Atomic Layer Deposited TiO_2 Protective Coating, ***Chi-Chung Kei***, *Y Yu,* National Applied Research Laboratories, Republic of China; *D Vokoun, J Racek, L Kadeřávek,* Institute of Physics of the ASC Prague

AA-SuP-49 UV Reflectance Measurement Results of ALD-ALE Modified Al Mirrors for Future Astronomical Missions., ***Christopher Moore***, University of Colorado - Boulder; *J Hennessy,* Jet Propulsion Laboratory, California Institute of Technology; *C Carter,* University of Colorado - Boulder; *A Jewell, S Nickzad,* Jet Propulsion Laboratory, California Institute of Technology; *K France,* University of Colorado - Boulder

AA-SuP-50 Modification of Borohydride Materials for Hydrogen Storage by ALD, ***Katherine Hurst***, *S Christensen, P Parilla, T Gennett,* National Renewable Energy Laboratory

AA-SuP-51 Color Modification of Metal Surfaces by Transparent ALD Film Stacks, ***Ritwik Bhatia***, *A Bertuch,* Ultratech

AA-SuP-52 Fabrication of New Type Electrode Based TiO_2-coated Metal Foam using ALD Process for Decomposition of Methane Gas for Fuel Cell Application, ***Sung Pil Woo***, Yonsei University, Republic of Korea; *K Lee, Y Lee, I Kim, J Ko, S Shin, Y Yoon,* Gachon University, Republic of Korea

AA-SuP-53 Plasma-assisted ALD of Ru Nanoparticles on Electrospun Polymeric Nanofibers for Catalysis, *K Ranjith, A Haider,* Bilkent University, Turkey; ***Necmi Biyikli***, Utah State University; *T Uyar,* Bilkent University, Turkey

AA-SuP-54 The Adhesion of Thermal ALD to Metal Surfaces at Low Temperatures, *J Kelliher,* ***William Sweet***, *N Crain, C Roske,* Northrop Grumman

AA-SuP-55 ALD-Frequency Multiplied Fresnel Zone Plates for Hard X-rays Focusing, ***Nicolaie Moldovan***, *H Zeng,* Advanced Diamond Technologies; *R Divan, L Ocola, V De Andrade,* Argonne National Laboratory

AA-SuP-56 Synthesis of Highly Dispersed and Highly Stable Supported Au-Pt Bimetallic Catalysts by a Two-step Method, ***Xiaofeng Wang***, *X Liang,* Missouri University of Science and Technology

AA-SuP-57 Atomic Layer Deposited Cobalt Oxide Thin Films as Photoanodes for Photoelectrochemical Water Splitting, ***Soonyoung Jung***, *B Jang,* Yeungnam University, Republic of Korea; *S Oh, Y Lee, J Oh,* KAIST, Republic of Korea; *S Kim,* Yeungnam University, Republic of Korea

AA-SuP-58 ALD of Nanolaminate Doped Electron Transport Layers for Perovskite Solar Cells, ***Melissa McCarthy***, *A Walsh, L Ryan,* Tyndall National Institute, University College Cork, Ireland; *A Walter, B Kamino,* Centre Suisse d'Electronique et de Microtechnique; *J Werner,* Ecole Polytechnique Fédérale de Lausanne; *S Moon, S Nicolay,* Centre Suisse d'Electronique et de Microtechnique; *C Ballif,* Ecole Polytechnique Fédérale de Lausanne; *F Laffir,* University of Limerick; *S O'Brien, M Pemble, I Povey,* Tyndall National Institute, University College Cork, Ireland

AA-SuP-59 ALD TiO2 Coating on Nanostructured Silicon with Enhanced Photoelectrochemical Efficiency and Stability, ***Xudong Wang***, *Y Yu,* University of Wisconsin-Madison

AA-SuP-60 Fabrication of Lithium Titanate inside TiO_2-Coated SUS Foam as a Binder-free Anode Material for All-Solid-State Battery, ***Sung Pil Woo***, Yonsei University, Republic of Korea; *K Lee, Y Lee, I Kim, J Ko, S Shin,* Gachon University, Republic of Korea; *J Kim,* Hallym University, Republic of Korea; *J Shim,* Korea University, Republic of Korea; *W Lee,* Yonsei University, Republic of Korea; *Y Yoon,* Gachon University, Republic of Korea

AA-SuP-61 ALD-Y_2O_3/GaAs(001) Having Extremley High Thermal Stability at 900 °C and Very Low Interfacial Trap Densities - Comparative Studies with ALD-Al_2O_3 and HfO_2 Gate Dielectrics, ***Yen-Hsun Lin***, *H Wan, L Young, C Cheng, K Lin,* National Taiwan University, Republic of China; *Y Cheng,* National Chia-Yi University, Republic of China; *W Chen,* National Synchrotron Radiation Research Center, Republic of China; *C Cheng,* National Chia-Yi University, Republic of China; *T 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

AA-SuP-62 PEALD of Nickel Thin Film using bis(1,4-di-iso-propyl-1,4-diazabutadiene) Nickel, ***Jae-Min Park***, *S Kim,* Sejong University, Republic of Korea; *J Hwang, J Kim,* Sejong University; *J Lee, W Han, W Koh,* UP Chemical Co., Ltd., Republic of Korea; *W Lee,* Sejong University, Republic of Korea

AA-SuP-63 Lifetime and Gain Improvement in MCP-based Detectors with ALD Thin-films for High-energy Particle Detection Applications, ***Nitin Deepak***, University of Liverpool, UK; *S Harada, T Conneely,* Photek Ltd., UK; *R Potter,* University of Liverpool, UK; *J Milnes,* Photek Ltd., UK

AA-SuP-64 Durability of Silver Mirrors Protected with Combinations of Evaporated and ALD Barrier Overlayers, ***David Fryauf***, *J Diaz Leon,* University of California Santa Cruz; *A Phillips,* University of California Observatories; *N Kobayashi,* University of California Santa Cruz

AA-SuP-65 Atomic Layer Deposition onto Carbon Fiber Fabrics, *C Militzer, P Dill,* ***Werner Goedel***, Chemnitz University of Technology, Germany

AA-SuP-66 Increasing Li-ion Battery Performance by Spatial ALD Coating of Separator Membranes with Al_2O_3, *E Balder, L Haverkate,* TNO/Holst Center, Netherlands; *Y Creyghton,* TNO, Netherlands; *P Poodt,* TNO/Holst Center, Netherlands; ***Fred Roozeboom***, TNO/Holst Center, The Netherlands, Netherlands; *S Unnikrishnan,* TNO/Holst Center, Netherlands

AA-SuP-67 Total-Dose Radiation Response of Atomic Layer Deposition Al_2O_3 Films, *C Nixon, B Triggs,* Semicoa; *N Sullivan,* ***Huazhi Li***, Arradiance

AA-SuP-68 Tuning the Switching Properties of ZnO Thin Film Memristors by Al Doping via ALD, ***Cecilia Giovinazzo***, *S Porro, C Ricciardi,* Polytechnic of Turin, Italy

AA-SuP-69 Atomic Layer Deposition of Bulk Layered Heterojunctions for Efficient Electrocatalyst, ***Changdeuck Bae***, *T Ho, H Shin,* Sungkyunkwan University

AA-SuP-70 Atomic Layer Deposited Ultra-thin Ta-Ni-N Films for Cu Diffusion Barriers, ***Yong-Ping Wang***, *Z Ding, W Liu, S Ding,* Fudan University, China

AA-SuP-71 Improved Electrical Properties of ZrO_2/$ZrSiO_4$/ZrO_2 (ZSZ) based MIM Capacitors using DNS-Zr Bimetallic Precursor, ***Sang Yong Jeon***, DNF.co.Ltd, Republic of Korea; *H Lim,* DNF Co. Ltd, Republic of Korea; *S Jo,* DNF.co.Ltd, Republic of Korea; *J Park,* DNF Co. Ltd, Republic of Korea; *W Chae, S Yim,* DNF.co.Ltd, Republic of Korea; *J Park,* DNF Co. Ltd, Republic of Korea; *S Lee,* DNF.Co.Ltd, Republic of Korea; *M Kim,* DNF Co. Ltd, Republic of Korea; *D Kim, S Kwon,* Pusan National University, Republic of Korea

AA-SuP-72 ALD Metal Oxides for Passivation of Si/SiO_2 Interface in BSI CMOS Image Sensors, ***Evan Oudot***, *M Gros-Jean, K Courouble,* STMicroelectronics, France; *C Vallée,* Univ. Grenoble Alpes, CNRS, France; *F Bertin,* LETI, France

AA-SuP-73 Graphene-based Flexible Electrode Preparation with Aid of ALD Layer and its Electrochemical Applications, ***Yekyung Kim***, *D Lee, J Seo, S Lee, K Hong, S Chang, S Cho, H Kim,* Korea Electronics Technology Institute, Republic of Korea

AA-SuP-74 Teaching Perovskites to Swim: ALD Oxide Overcoating for Liquid Water- and Heat-Resistant Photovoltaics, *I Kim,* ***Alex Martinson,*** Argonne National Laboratory

AA-SuP-75 Highly Stable High Mobility Oxide Thin-film Transistor with N_2O Plasma Treatment and Gate Insulator by Means of Atomic Layer Deposition, ***Jong Beom Ko,*** *K Park, Y Nam, S Lee, S Park,* Korea Advanced Institute of Science and Technology, Republic of Korea

AA-SuP-76 Zinc Oxide Infiltration of Two-Photon Polymerized Structures, ***Jacek Lechowicz,*** University of Illinois at Chicago; *L Ocola, R Divan,* Argonne National Laboratory; *I Paprotny,* University of Illinois at Chicago

AA-SuP-77 Investigating Li-ions Transport Through ALD Al_2O_3 Coatings on NMC Cathode in a Li-ion Battery, *M Laskar,* ***David Jackson,*** *S Xu, Y Guan,* University of Wisconsin-Madison; *M Dreibelbis,* Dow Chemicals; *R Hamers,* University of Wisconsin-Madison; *M Mahanthappa,* University of Minnesota; *D Morgan, T Kuech,* University of Wisconsin-Madison

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Nanostructure Synthesis and Fabrication
Room Plaza Exhibit - Session NS-SuP
Nanostructures Synthesis and Fabrication Poster Session
5:30pm

NS-SuP-1 Refractive Index and Bandgap Variation in Al_2O_3-ZnO Ultrathin Multilayers Prepared by Atomic Layer Deposition, ***Javier López Medina,*** CONACYT - Centro de Nanociencias y Nanotecnologia - UNAM, Mexico; *E Solorio, H Borbón, F Castillon, R Machorro,* Centro de Nanociencias y Nanotecnologia - Universidad Nacional Autónoma de Mexico, Mexico; *N Nedev,* Universidad Autónoma de Baja California, Mexico; *M Farias, H Tiznado,* Centro de Nanociencias y Nanotecnologia - Universidad Nacional Autónoma de Mexico, Mexico

NS-SuP-2 Controlled and Selective Etches for Gate All-Around Device Fabrication, ***Subhadeep Kal,*** *J Smith, N Mohanty, Y Su, C Pereira, A Mosden, P Biolsi, T Hurd,* Tokyo Electron

NS-SuP-3 Wafer-Scale Synthesis of High-Quality and Few-Layer WS_2 Films on Si/SiO_2 Substrates, ***Yung-Ching Chu,*** National Chiao Tung University, Republic of China; *C Jong,* NARLabs, Republic of China; *Y Ho,* National Chiao Tung University, Republic of China; *P Lu,* UCLA; *C Zhong,* National Chiao Tung University, Republic of China; *H Hsu,* ITRI, Republic of China; *Y Tu,* National Chiao Tung University, Republic of China; *J Woo,* UCLA; *E Chang,* National Chiao Tung University, Republic of China

NS-SuP-4 Towards Producing Bulk Monolithic Core/Shell Nanocomposites, ***Boris Feigelson,*** *J Wollmershauser, K Manandhar,* U.S. Naval Research Laboratory

NS-SuP-5 Nanolaminate Copper Barriers of Ru/TaN_x Thin Films by Inductively Coupled Plasma Enhanced Atomic Layer Deposition, ***Bo-Heng Liu,*** *W Cho, C Kei,* National Applied Research Laboratories, Republic of China

NS-SuP-6 On the Possibility of the Development of Vicinal Superlattices in Quantum Wires on Semiconductor Low - Index Surfaces, ***Victor Petrov,*** Russian Academy of Science, Russian Federation

NS-SuP-7 Rational Design of Hyperbranched Nanowire Systems for Tunable Superomniphobic Surfaces Enabled by Atomic Layer Deposition, ***Ashley Bielinski,*** *M Boban,* University of Michigan, USA; *Y He,* University of Pittsburgh; *E Kazyak, D Lee,* University of Michigan, USA; *C Wang,* Pacific Northwestern National Laboratory; *A Tuteja, N Dasgupta,* University of Michigan, USA

NS-SuP-8 Designing Low Density Foams by ALD Templating, ***Monika Biener,*** Lawrence Livermore National Laboratory

NS-SuP-9 Fully CMOS-Compatible Synthesis and Photodetector-Integration of Ultrathin, Parallel-Aligned ZnO Nanowire Arrays by Infiltration Synthesis, ***Chang-Yong Nam,*** *A Stein,* Brookhaven National Laboratory

NS-SuP-10 Monodispersed, Highly Interactive Facet Oriented Pd Nanograins Grown by ALD onto Electrospun Polymeric Nanofibers, ***Kugalur Ranjith,*** *A Celebioglu,* Bilkent University, Turkey; *H Eren,* Delft University of Technology, Netherlands; *N Biyikli,* Utah State University; *T Uyar,* Bilkent University, Turkey

Monday Morning, July 17, 2017

	ALD Applications **Room Plaza E - Session AA+NS-MoM** **Energy: Catalysis and Fuel Cells I (8:00-10:00 am)/Nanoparticles and Nanostructures (10:45 am-12:00 pm)** **Moderators:** Riikka Puurunen, Aalto University, Finland, Necmi Biyikli, Utah State University, Joseph Spencer II, ALD NanoSolutions, Inc.	**ALD Applications** **Room Plaza ABC - Session AA-MoM** **Solar Materials I (8:00-10:00 am)/Solar Materials II (10:45 am-12:00 pm)** **Moderators:** Christian Dussarrat, Air Liquide, Mariadriana Creatore, Eindhoven University of Technology, The Netherlands, Jeffrey Elam, Argonne National Laboratory, Neil Dasgupta, University of Michigan
8:00am	**AA+NS-MoM-1** Performance of Promoted Rh Catalysts for C_{2+} Oxygenate Production, ***Arun Asundi***, *N Yang, C MacIsaac, S Bent,* Stanford University	**INVITED: AA-MoM-1** Atomic Layer Deposition Processing for Perovskite Solar Cells: Research Status, Opportunities and Challenges, ***Mariadriana Creatore***, Eindhoven University of Technology, Netherlands
8:15am	**AA+NS-MoM-2** Facile Synthesis of Three-Dimensional Pt-TiO2 Nano-networks: A Highly Active Catalyst for the Hydrolytic Dehydrogenation of Ammonia–Borane, ***Hamit Eren***, Delft University of Technology, Netherlands; *N Biyikli,* Utah State University; *M Guler,* Northwestern University	Invited talk continues.
8:30am	**AA+NS-MoM-3** Cobalt/Alumina Interactions in ALD Synthesized Catalysts for Fischer-Tropsch Synthesis, ***Jacob Clary***, *S Van Norman, H Funke, J Falconer, C Musgrave, A Weimer,* University of Colorado - Boulder	**AA-MoM-3** Atomic Layer Deposition of NbC-Al2O3 Nanocomposite Films for Efficient Solar Selective Coatings, ***Jason Avila***, Argonne National Laboratory; *A Peters,* Northwestern University; *A Mane, J Libera, A Yanguas-Gil,* Argonne National Laboratory; *O Farha, J Hupp,* Northwestern University; *J Elam,* Argonne National Laboratory, USA
8:45am	**AA+NS-MoM-4** ALD of Platinum on Metal Organic Framework Nodes: Toward Single Site Synthesis and Sinter-Resistant Catalysts, *I Kim,* Argonne National Laboratory, USA; ***Alex Martinson***, Argonne National Laboratory	**AA-MoM-4** Refractory Solar Selective Nanocomposite Coatings for Concentrated Solar Power Receivers, ***Jeffrey Elam***, *A Mane, J Avila, A Yanguas-Gil, J Libera,* Argonne National Laboratory; *J Hupp, J Liu,* Northwestern University; *U Sampathkumaran, K Yu,* InnoSense LLC; *R Buck, F Sutter,* German Aerospace Center - DLR
9:00am	**AA+NS-MoM-5** Particle Atomic Layer Deposition for Stabilization of Pt/C Fuel Cell Catalysts, ***William McNeary***, *A Lubers, M Maguire,* University of Colorado - Boulder; *S van Rooij,* Ecole Polytechnique Fédérale de Lausanne, Switzerland; *S Bull, A Weimer,* University of Colorado - Boulder	**AA-MoM-5** *P*-type Bismuth Sulfide (Bi_2S_3) Grown by Atomic Layer Deposition, ***Neha Mahuli***, *D Saha, S Sarkar,* Indian Institute of Technology Bombay, India
9:15am	**AA+NS-MoM-6** ALD CeO_2 to Improve Catalytic Activity and Thermal Stability of Low Temperature SOFC Electrodes, *J Yu, S Oh,* Seoul National University of Science and Technology, Republic of Korea; *W Noh,* Air Liquide Laboratories Korea; ***Jihwan An***, Seoul National University of Science and Technology, Republic of Korea	**AA-MoM-6** Role of Fixed Charge in the Modification of Schottky Barrier Height of Metal Insulator Semiconductor Tunnel Structures, ***Roderick Marstell***, *N Strandwitz,* Lehigh University
9:30am	**AA+NS-MoM-7** Atomic Layer Deposition of Metal Oxide Thin Films and Metal Nanoparticles for Improving the Electrode Performance in Photoelectrochemical Applications, ***Valerio Di Palma***, *M Verheijen,* Eindhoven University of Technology, Netherlands; *R Sinha, G Zafeiropoulos, A Bieberle, M Tsampas,* DIFFER, Dutch Institute for Fundamental Energy Research; *W Kessels, M Creatore,* Eindhoven University of Technology, Netherlands	**AA-MoM-7** Determination of Energy Barrier Heights between Amorphous Metals and ALD Dielectrics using Internal Photoemission Spectroscopy, ***Melanie Jenkins***, *T Klarr, D Austin, J McGlone,* Oregon State University; *L Wei, N Nguyen,* National Institute of Standards and Technology; *J Wager, J Conley,* Oregon State University
9:45am	**AA+NS-MoM-8** Carbon-templated Nb:TiO_2 Nanostructures as Oxygen Evolution Catalyst Supports for PEM Electrolyzers, ***Alexander Hufnagel***, *D Böhm, S Häringer, D Fattakhova-Rohlfing, T Bein,* University of Munich (LMU), Germany	**AA-MoM-8** ALD Window and Buffer Layers in Thin Film Solar Cells, *A Palmstrom, K Bush, M McGehee, A Hultqvist, T Sone,* ***Stacey F. Bent***, Stanford University
10:00am	**Coffee Break & Exhibits**	Talk continues.
10:15am	**Coffee Break & Exhibits**	**Coffee Break & Exhibits**
10:30am	**Coffee Break & Exhibits**	**Coffee Break & Exhibits**
10:45am	**AA+NS-MoM-12** Atomic Layer Deposition Route to Tailor Nanoalloys of Noble and Non-Noble Metals, ***Ranjith Karuparambil Ramachandran***, *J Dendooven, M Filez, V Galvita, H Poelman, E Solano, M Minjauw, K Devloo-Casier,* Ghent University, Belgium; *E Fonda,* Synchrotron SOLEIL, SAMBA Beamline, France; *D Hermida-Merino,* Netherlands Organisation for Scientific Research, DUBBLE@ESRF, France; *W Bras,* Netherlands Organisation for Scientific Research, DUBBLE@ESRF; *G Marin, C Detavernier,* Ghent University, Belgium	**AA-MoM-12** Atomic Layer Deposition of Bismuth Vanadate Photoanodes, ***Ashley Bielinski***, *J Brancho, B Bartlett, N Dasgupta,* University of Michigan, USA
11:00am	**AA+NS-MoM-13** Aggregative Growth of Noble-Metal Nanoparticles in Atomic Layer Deposition: Effect of Temperature, Partial Pressure, Exposure Time, Coreactant, and Substrate, ***Fabio Grillo***, *H Van Bui, J Moulijn, M Kreutzer, J van Ommen,* Delft University of Technology, Netherlands	**AA-MoM-13** High-Efficiency Perovskite Solar Cells with Humidity-Stability beyond 60 Days Achieved via Atomic Layer Deposition, ***Dibyashree Koushik***, *Y Kuang,* Eindhoven University of Technology, Netherlands; *V Zardetto,* TNO-Solliance, High Tech Campus, Netherlands; *W Verhees, S Veenstra,* ECN-Solliance, High Tech Campus, Netherlands; *M Verheijen, W Kessels, M Creatore, R Schropp,* Eindhoven University of Technology, Netherlands
11:15am	**AA+NS-MoM-14** *In situ* Grazing Incidence Small Angle X-ray Scattering Study of the ALD Growth and Thermal Stability of Pt Nanoparticles, ***Jolien Dendooven***, *E Solano, R Ramachandran, M Minjauw,* Ghent University, Belgium; *A Coati,* Synchrotron SOLEIL, France; *D Hermida-Merino,* ESRF, France; *C Detavernier,* Ghent University, Belgium	**AA-MoM-14** Efficient Surface Passivation of Black Silicon Using Spatial ALD, *I Heikkinen,* Beneq Oy, Finland; *P Repo, V Vähänissi, T Pasanen,* Aalto University, Finland; *V Malinen,* ***Emma Salmi***, Beneq Oy, Finland; *H Savin,* Aalto University, Finland
11:30am	**AA+NS-MoM-15** High-Precision Growth of Metal Oxide Nanoparticles on Carbon Composites for Energy Related Applications, *F Yang,* ***Mato Knez***, CIC nanoGUNE, Spain	**AA-MoM-15** Enhancing Water Oxidation Activity of α-hematite Through Atomic Layer Deposition, *C Du, J Wang,* Huazhong University of Science and Technology, China; *R Chen,* Huazhong University of Science and Technology, China, P.R. China; *Y Wen,* ***Bin Shan***, Huazhong University of Science and Technology, China

11:45am	**AA+NS-MoM-16** Tuning the Isoelectric Point of Conical Nanochannel Surfaces by Atomic Layer Deposition of Al_2O_3, TiO_2, and SiO_2 to Tailor Selective Ion Transport, ***Nils Ulrich***, *A Spende,* GSI Helmholtz Center, Germany; *N Sobel,* TU Darmstadt, Germany; *M Toimil-Molares, C Trautmann,* GSI Helmholtz Center, Germany	**AA-MoM-16** ALD Stabilization Layers for Quantum Dot Solar Energy Conversion, ***Theodore Kraus***, *B Parkinson,* University of Wyoming

Monday Morning, July 17, 2017

	ALD Fundamentals **Room Plaza F - Session AF+AA-MoM** **ALD Fundamentals: Plasma ALD (8:00-10:00 am)/Emerging Applications (10:45 am-12:00 pm)** **Moderators:** Charles Dezelah, EMD Performance Materials, Yves Chabal, University of Texas, Dallas, Virginia Wheeler, U.S. Naval Research Laboratory, Angel Yanguas-Gil, Argonne National Lab	**Atomic Layer Etching** **Room Plaza D - Session ALE-MoM** **Atomic Layer Etching Session III (8:00-10:00 am) and Session IV (10:45 am-12:00 pm)** **Moderators:** Fred Roozeboom, TNO-Holst Centre & Eindhoven University of Technology, The Netherlands, Sumit Agarwal, Colorado School of Mines
8:00am	**INVITED: AF+AA-MoM-1** ALD - From Ideal to Real, ***Ola Nilsen,*** University of Oslo, Norway	**INVITED: ALE-MoM-1** Selectivity in Thermal Atomic Layer Etching, ***Younghee Lee,*** *S George,* University of Colorado
8:15am	Invited talk continues.	Invited talk continues.
8:30am	**AF+AA-MoM-3** Atomistic View of the ALD of Zinc Oxide, ***Timo Weckman,*** Aalto University, Finland; *M Shirazi,* Eindhoven University of Technology, Netherlands; *S Elliott,* Tyndall National Institute, University College Cork, Ireland; *K Laasonen,* Aalto University, Finland	**ALE-MoM-3** Modeling the Chemical Mechanism of Thermal ALE of Alumina by HF and Tin Acetylacetonate, ***Simon Elliott,*** Tyndall National Institute, University College Cork, Ireland
8:45am	**AF+AA-MoM-4** Selective Deposition of Single Site Vanadium Oxide at Specific Functional Groups of Carbon Supports for Catalytic Applications, ***Pascal Düngen,*** *N Pfänder,* Max Planck Institute for Chemical Energy Conversion; *X Huang,* Fritz Haber Institute of the Max Planck Society; *K Böhm,* Max Planck Institute for Chemical Energy Conversion; *S Buller,* Max Planck Institute for Chemical Energy Conversion, Germany; *R Schlögl,* Max Planck Institute for Chemical Energy Conversion	**INVITED: ALE-MoM-4** Integrating Atomic Layer Deposition and Etching to Achieve Selective Growth, ***Stacey F. Bent,*** Stanford University
9:00am	**AF+AA-MoM-5** Surface Modification of V-VI Semiconductors using Exchange Reactions within Atomic Layer Deposition Half-cycle., ***Christoph Wiegand,*** Leibniz Institute for Solid State and Materials Research Dresden (IFW Dresden), Germany; *R Zierold, R Faust,* Universität Hamburg, Germany; *D Pohl, A Thomas, B Rellinghaus, K Nielsch,* Leibniz Institute for Solid State and Materials Research Dresden (IFW Dresden), Germany	Invited talk continues.
9:15am	**AF+AA-MoM-6** Interface Dipole of High k -Y_2O_3 on GaAs(001) Attained using Cycle-by-Cycle ALD and Synchrotron Radiation Photoelectron Spectroscopy, ***Wan-Sin Chen,*** National Synchrotron Radiation Research Center, Republic of China; *K Lin, L Young,* National Taiwan University, Republic of China; *Y Cheng,* National Chia-Yi University, Republic of China; *Y Lin, H Wan,* National Taiwan University, Republic of China; *C Yang,* National Tsing Hua University, Republic of China; *C Cheng,* National Chia-Yi University, Republic of China; *T Pi,* National Synchrotron Radiation Research Center, Republic of China; *R Kwo,* National Tsing Hua University, Republic of China; *M Hong,* National Taiwan University, Republic of China	**INVITED: ALE-MoM-6** ALE and ALC: Computational Assessment of Opportunities and Challenges in Nanoelectronic Applications, ***Sumeet C. Pandey,*** Micron
9:30am	**AF+AA-MoM-7** Surface Reactions during Three-step ALD of SiC_xN_y using Si_2Cl_6, CH_3NH_2, and N_2 Plasma, ***Rafaiel Ovanesyan,*** *N Leick,* Colorado School of Mines; *K Kelchner,* Lam Research Corporation; *D Hausmann,* Lam Research; *S Agarwal,* Colorado School of Mines	Invited talk continues.
9:45am	**AF+AA-MoM-8** A Comparative Study on PEALD Grown Nanolaminates on polypropylene: Influence of precursor and plasma variation, ***Maximilian Gebhard,*** *F Mitschker, P Awakowicz, A Devi,* Ruhr-University Bochum, Germany	**ALE-MoM-8** Reactor Scale Uniformity Enabled by Atomic Layer Etching, ***Chad Huard,*** *S Lanham, M Kushner,* University of Michigan
10:00am	**Coffee Break & Exhibits**	**Coffee Break & Exhibits**
10:15am	**Coffee Break & Exhibits**	**Coffee Break & Exhibits**
10:30am	**Coffee Break & Exhibits**	**Coffee Break & Exhibits**
10:45am	**AF+AA-MoM-12** A Dual Action Optical Sensor Using Metal and Dielectric ALD Layers, ***Sean Barry,*** Carleton University, Canada	**INVITED: ALE-MoM-12** Thermal Atomic Layer Etching of Cobalt Metal Films, ***Charles H. Winter,*** *W Waduge,* Wayne State University
11:00am	**AF+AA-MoM-13** Disentangling Photochromism and Electrochromism by Blocking Hole Transfer at the Electrolyte Interface, ***Omid Zandi,*** *Y Wang, J Kim,* University of Texas at Austin; *Z Gao,* Washington University, St. Louis; *S Heo,* University of Texas at Austin; *P Banerjee,* Washington University, St. Louis; *D Milliron,* University of Texas at Austin	Invited talk continues.
11:15am	**AF+AA-MoM-14** Atomic Layer Deposition of Electro-optically Active Ferroelectric Barium Titanate Films, ***Edward Lin,*** *E Ortmann,* The University of Texas at Austin; *S Abel,* IBM Research-Zurich; *A Posadas,* The University of Texas at Austin; *J Fompeyrine,* IBM Research-Zurich; *A Demkov, J Ekerdt,* The University of Texas at Austin	**ALE-MoM-14** WO_3 and W Thermal Atomic Layer Etching Using "Conversion-Fluorination" and "Oxidation-Conversion-Fluorination" Etching Mechanisms, ***Nicholas Johnson,*** *S George,* University of Colorado
11:30am	**AF+AA-MoM-15** Laser Spike Annealing of ALD VO_2, ***Alexander Kozen,*** U.S. Naval Research Laboratory; *R Bell,* Cornell University; *B Downey,* U.S. Naval Research Laboratory, usa; *M Currie,* U.S. Naval Research Laboratory; *M Thompson,* Cornell University; *V Wheeler, C Eddy, Jr.,* U.S. Naval Research Laboratory	**INVITED: ALE-MoM-15** Plasma-Enhanced Atomic Layer Etching of TiN and TaN with Organic Masks, ***Nathan Marchack,*** *J Papalia, R Bruce, S Engelmann, E Joseph,* IBM TJ Watson Research Center
11:45am	**AF+AA-MoM-16** Improving Processability of Poorly Flowing Pharmaceutical Powders by Atomic Layer Deposition, ***Tommi Kääriäinen,*** University of Helsinki, Finland; *J Nyman,* Åbo Akademi University, Finland; *M Kääriäinen, P Hoppu,* NovaldMedical Ltd Oy, Finland; *N Sandler,* Åbo Akademi University, Finland; *S George,* University of Colorado; *M Ritala, M Leskelä,* University of Helsinki, Finland	Invited talk continues.

Monday Afternoon, July 17, 2017

	ALD Applications **Room Plaza ABC - Session AA-MoA** **Memory and MIM I (1:30-3:30 pm)/Memory and MIM II (4:00-5:30 pm)** **Moderators:** John Smythe, Micron Technology, John Conley, Oregon State University, Robert Clark, TEL Technology Center, America, LLC	**ALD Fundamentals** **Room Plaza F - Session AF-MoA** **ALD Fundamentals: Characterization (1:30-3:30 pm)/Mechanisms and Surface Science (4:00-5:00 pm)** **Moderators:** Mikko Ritala, University of Helsinki, David Emslie, McMaster University, Simon Elliott, Tyndall National Institute, University College Cork
1:30pm	**AA-MoA-1** Atomic Layer Deposited Ta-doped ZrO_2 for DRAM Capacitors, ***Bo-Eun Park**, I Oh, J Park, S Seo, H Kim,* Yonsei University, Republic of Korea	**AF-MoA-1** FTIR and NMR Analysis of ALD Al_2O_3 on poly-L-lactone Acid Powder and Electrospun Fibres, ***Laura Svärd**, T Virtanen, M Putkonen, E Kenttä, H Rautkoski, P Heikkilä, P Simell,* VTT Technical Research Centre of Finland, Finland
1:45pm	**AA-MoA-2** High Capacitance 3D MIM Structures Achieved by ALD Deposited TiO_2 for Advanced DRAM Applications, ***Ahmad Chaker**, P Szkutnik, P Gonon, C Vallée, A Bsiesy,* Univ. Grenoble Alpes, CNRS, France	**AF-MoA-2** Bulge Testing of Freestanding ALD Thin Film Membranes, ***Oili Ylivaara**,* VTT Technical Research Centre of Finland, Finland*; P Törmä,* HS Foils, Finland*; I Stuns, J Saarilahti, R Puurunen,* VTT Technical Research Centre of Finland, Finland
2:00pm	**AA-MoA-3** Seed-layer Effects on the Crystallization and Electrical Characteristics of ALD-grown Ta_2O_5 Thin Films, ***Jae Hyoung Choi**,* Samsung Electronics, Korea, Republic of Korea*; S Kang, S Chung, C Cho, S Oh, Y Kim, K Yoon, H Lim, K Hwang, H Kang,* Samsung Electronics, Republic of Korea	**AF-MoA-3** Infiltrated Zinc Oxide in Polymethylmethacrylate: An Atomic Cycle Growth Study, ***Leonidas Ocola**,* Argonne National Laboratory*; A Connolly,* Vassar College*; D Gosztola,* Argonne National Laboratory*; R Schaller,* Argonne National Laboratory, Northwestern University*; A Yanguas-Gil,* Argonne National Laboratory
2:15pm	**AA-MoA-4** Electrode Induced Variation in Voltage Nonlinearity of ALD Al_2O_3 and HfO_2 Metal-Insulator-Metal Capacitors (MIMCAPs), ***Dustin Austin**, K Holden, J Hinz, C Remple, J Conley,* Oregon State University	**AF-MoA-4** Study on Atomic-Layer-Deposited Al_2O_3 Dielectric Films with a New Small Angle X-Ray Scattering Method, ***Chao Li**, F Shahriarian, M Goorsky,* University of California Los Angeles
2:30pm	**AA-MoA-5** High-Voltage Nanolaminate Metal-Insulator-Insulator-Metal (MIIM) Tunnel Diodes using ALD Al_2O_3 and Ta_2O_5, *D Austin, M Jenkins,* ***Konner Holden**, J Conley,* Oregon State University	**AF-MoA-5** Evaluating Mechanical Properties of Free-standing ALD Al_2O_3, ***Junmo Koo**,* Korea University, Republic of Korea*; S Lee, T Kim,* Korea Advanced Institute of Science and Technology, Republic of Korea*; J Shim,* Korea University, Republic of Korea
2:45pm	**AA-MoA-6** Capacitance Maximization of Ultra-thin Si-capacitors by Atomic Layer Deposition of Anti-ferroelectric HfO_2 in High Aspect Ratio Structures, ***Stefan Riedel**, W Weinreich, C Mart, J Müller,* Fraunhofer IPMS, Germany	**AF-MoA-6** Secondary Electron Yield of Nano-oxide Thin Films Measured by Spherical Collector with Pulsed Electron Irradiation, ***Baojun Yan**, S Liu, K Wen,* Institute of High Energy Physics of Chinese Academy of Sciences, China
3:00pm	**AA-MoA-7** Ferroelectricity in Ternary HfO_2-ZrO_2-La_2O_3 Mixed Oxide Grown by ALD, ***Anna Chernikova**, M Kozodaev, A Markeev,* Moscow Institute of Physics and Technology, Russian Federation	**AF-MoA-7** Electrical Characterization of Platinum Thin Films Deposited by Plasma-Enhanced ALD and Magnetron Sputtering, ***Martin Winterkorn**, H Kim, K Kaplan, J Provine, T Kenny, F Prinz,* Stanford University
3:15pm	**AA-MoA-8** A Study on the Oxygen Source and Annealing Temperature Effects of Atomic Layer Deposited Ferroelectric $Hf_{0.5}Zr_{0.5}O_2$ Thin Films, ***Si Joon Kim**, D Narayan, J Lee, J Mohan,* University of Texas at Dallas*; S Summerfelt,* Texas Instruments*; J Kim,* University of Texas at Dallas	**AF-MoA-8** A Facile Control of Major Carriers on Atomic Layer Deposited SnO_x Thin Film by using Various Oxygen Reactants, ***Jung-Hoon Lee**,* Hanyang University, Republic of Korea*; J Park, J Park,* Hansol Chemical, Republic of Korea*; J Park,* Hanyang University, Republic of Korea
3:30pm	**Coffe Break & Exhibits**	**Coffe Break & Exhibits**
3:45pm	**Coffe Break & Exhibits**	**Coffe Break & Exhibits**
4:00pm	**AA-MoA-11** Thickness Dependence of Polarization Response in $(Hf,Zr)O_2$, ***Sean Smith**, M Rodriguez, D Henry, M Brumbach, J Ihlefeld,* Sandia National Laboratories	**AF-MoA-11** Activation of Metal Amidinate ALD Precursors on Surfaces and Implications for Film Growth, *B Chen,* University of California, Riverside*; Y Duan,* University of Delaware*; Y Yao,* University of California, Riverside*; J Coyle, S Barry,* Carleton University, Canada*; A Teplyakov,* University of Delaware*; **Francisco Zaera**,* University of California, Riverside
4:15pm	**INVITED: AA-MoA-12** ALD as a Primary Contributor Towards Enabling Key Materials in the Memory Roadmap, ***John Smythe**,* Micron Technology	**AF-MoA-12** Surface Chemistry during Atomic-Layer Deposition of Pt Studied with Vibrational Sum-frequency Generation, ***Vincent Vandalon**, A Mackus, W Kessels,* Eindhoven University of Technology, Netherlands
4:30pm	Invited talk continues.	**AF-MoA-13** Mechanistic Study of the Atomic Layer Deposition of Titanium Dioxide Films from Ethylcyclopentadienyltris(dimethylamido)titanium and Ozone or Water, ***Joseph Klesko**, R Rahman, A Dangerfield, C Nanayakkara, T L'Esperance,* University of Texas at Dallas*; C Dezelah, R Kanjolia,* EMD Performance Materials*; Y Chabal,* University of Texas at Dallas
4:45pm	**AA-MoA-14** Plasma-Enhanced Atomic Layer Deposition of Oxygen Deficient TaOx Thin Films for Resistive Switching Memory Applications, ***Konstantin Egorov**, D Kuzmichev, Y Lebedinskii,* Moscow Institute of Physics and Technology, Russian Federation*; C Hwang,* Seoul National University, Korea*; A Markeev,* Moscow Institute of Physics and Technology, Russian Federation	**AF-MoA-14** The Role of Surface Chemical Functionality in the Initial Stages of Deposition for Copper and Silver Precursors, ***Andrew Teplyakov**,* University of Delaware
5:00pm	**AA-MoA-15** Monitoring Resistive Switching Properties of ALD Grown Al_2O_3/HfO_2 Nanolaminate ReRAM Structures by *iin-situ* Reducing Plasma Treatments, ***Marceline Bonvalot**, B Eychenne, P Gonon,* LETI-LTM, France	**AF-MoA-15** Reaction Mechanism of ALD Zirconium Oxide using Alkylamido-Cyclopetadienyl Zirconium Precursors, ***Jae-Min Park**, T Mayangsari, S Kim, Y Kim,* Sejong University, Republic of Korea*; W Han, B Yoo, W Koh,* UP Chemical Co., Ltd., Republic of Korea*; W Lee,* Sejong University, Republic of Korea
5:15pm	**AA-MoA-16** Properties of ALD Ferroelectric Si-doped HfO_2 Characterized with Noncontact Corona-Kelvin Metrology, ***Dmitriy Marinskiy**,* Semilab SDI*; P Polakowski,* Fraunhofer IPMS, Germany*; A Findlay, P Edelman, M Wilson, J Lagowski,* Semilab SDI*; J Metzger, R Binder,* GLOBALFOUNDRIES, Germany*; J Müller,* Fraunhofer IPMS, Germany	**AF-MoA-16** Elucidation of Distinct Electric Characteristics of ALD Oxides on Highly Ordered GaAs(001) and $In_{0.53}Ga_{0.47}As$(001) Surfaces using Synchrotron Radiation Photoelectron Spectroscopy, ***Yi-Ting Cheng**,* National Chia-Yi University, Republic of China*; W Chen,* National Synchrotron Radiation Research Center, Republic of China*; K Lin, L Young, Y Lin, H Wan,* National Taiwan University, Republic of China*; T Pi,* National Synchrotron Radiation Research Center, Republic of China*; M Hong,* National Taiwan University, Republic of China*; C Cheng,* National Chia-Yi University, Republic of China*; J Kwo,* National Tsing Hua University, Republic of China

Monday Afternoon, July 17, 2017

	Atomic Layer Etching **Room Plaza D - Session ALE+AF-MoA** **Atomic Layer Etching Session V (1:30-3:30 pm)/ALD Fundamentals: Process Development (4:00-5:45 pm)** **Moderator:** Mike Cooke, Oxford Instruments Plasma Technology	**Emerging Materials** **Room Plaza E - Session EM+AA-MoA** **Organic-Inorganic Hybrid Materials & MLD (1:30-3:30 pm)/Catalysis and Fuel Cells II (4:00-5:30 pm)** **Moderators:** Sang In Lee, Synos Foundation, Yongfeng Mei, Fudan University, China, Ville Miikkulainen, University of Helsinki
1:30pm	**INVITED: ALE+AF-MoA-1** *In situ* Spectroscopic Methods for Atomic Layer Etching and Atomic Layer Deposition, ***Yves Chabal***, *J Klesko, A Dangerfield, J Veyan,* University of Texas at Dallas	**INVITED: EM+AA-MoA-1** Unique Inorganic-Organic Hybrid Materials by ALD/MLD as Enablers of Next-generation Applications?, ***Maarit Karppinen***, Aalto University, Finland
1:45pm	Invited talk continues.	Invited talk continues.
2:00pm	**ALE+AF-MoA-3** An *in situ* Optical Diagnostic Study of the Process Conditions that Affect the Etch per Cycle in ALE of SiO_2, *S Agarwal,* ***Ryan Gasvoda***, *N Leick,* Colorado School of Mines; *A van de Steeg,* Eindhoven University of Technology, Netherlands; *R Ovanesyan, J Klein,* Colorado School of Mines; *R Bhowmick, E Hudson,* Lam Research Corp.	**EM+AA-MoA-3** Atomic/molecular Layer Deposition of Luminescent Inorganic-Organic Hybrid Erbium Pyridine Dicarboxylate Thin Films, ***Lukas Mai***, Ruhr-University Bochum, Germany; *Z Giedraityte,* Aalto University, Finland; *M Schmidt, D Rogalla, S Scholz, A Wieck,* Ruhr-University Bochum, Germany; *M Karppinen,* Aalto University, Finland; *A Devi,* Ruhr-University Bochum, Germany
2:15pm	**INVITED: ALE+AF-MoA-4** New Innovative Etching Approaches for Future Generation by Controlling the Surface Reaction at Atomic-Level, ***Masanobu Honda***, *T Katsunuma,* Tokyo Electron Miyagi Ltd., Japan	**EM+AA-MoA-4** Molecular Layer Deposition of Manganese-Ethylene Glycol Hybrid Films, ***David Bergsman***, *J Baker, N Yang, C MacIsaac, A Strickler, M Lillethorup, S Bent,* Stanford University
2:30pm	Invited talk continues.	**EM+AA-MoA-5** Synthesis, Characterization, and Electrochemistry of Molybdenum-1,2-Ethanedithiol Hybrid ALD Films, ***Callisto MacIsaac***, *R Closser, J Schneider, T Hellstern, D Bergsman, S Bent,* Stanford University
2:45pm	**ALE+AF-MoA-6** Controlled Layer-by-Layer Etching of ALD Grown Ta_2O_5 Thin Films, ***Anil Mane***, *J Elam,* Argonne National Laboratory	**EM+AA-MoA-6** Ultrahigh Elastic Strain Energy Storage in Metal-Oxide-Infiltrated Polymer Nanopillars Generated by Infiltration Synthesis, ***Chang-Yong Nam***, Brookhaven National Laboratory; *K Dusoe,* University of Connecticut; *A Stein, X Ye, K Kisslinger,* Brookhaven National Laboratory; *S Lee,* University of Connecticut
3:00pm	**ALE+AF-MoA-7** Atomic Layer Etching Mechanism of 2D MoS_2 Layers, ***Ki Seok Kim***, *K Kim, Y Ji, G Yeom,* Sung Kyun Kwan University, Republic of Korea	**EM+AA-MoA-7** Kinetics of Vapor Phase Infiltration: Fitting Theory to Experimental Measurements, *C Leng,* ***Mark Losego***, Georgia Institute of Technology
3:15pm	**ALE+AF-MoA-8** ALD & Quasi-ALE Patterning Application in EUV Contact Etch, ***Hongyun Cottle***, *D O'Meara, A Metz,* Tokyo Electron Limited; *P Biolsi,* TEL Technology Center, America, LLC; *S Nakamura, T Yang,* Tokyo Electron Limited; *M Honda,* Tokyo Electron Miyagi Ltd., Japan; *S Morikita,* Tokyo Electron Limited	**EM+AA-MoA-8** Vapor Phase Infiltration for Doping Conducting Polymers, *W Wang, F Yang,* CIC nanoGUNE, Spain; *C Chen, Y Qin,* Chinese Academy of Sciences, China; ***Mato Knez***, CIC nanoGUNE, Spain
3:30pm	**Coffe Break & Exhibits**	**Coffe Break & Exhibits**
3:45pm	**Coffe Break & Exhibits**	**Coffe Break & Exhibits**
4:00pm	**ALE+AF-MoA-11** Boron Nitride Growth at Room Temperature Using Electron Enhanced Atomic Layer Deposition (EE-ALD), ***Jaclyn Sprenger***, *H Sun, A Cavanagh, S George,* University of Colorado - Boulder	**EM+AA-MoA-11** Catalysts Modified by ALD for Harsh Biomass Conversion Processes, ***Steven Christensen***, *K Hurst, M Griffin, D Vardon,* National Renewable Energy Laboratory
4:15pm	**ALE+AF-MoA-12** Catalyzed Atomic Layer Deposition of Silicon Oxide at Ultra-low Temperature using Alkylamines, ***Tirta Rona Mayangsari***, *J Park, L Yusup, J Gu,* Sejong University, Republic of Korea; *J Yoo, H Kim,* JUSUNG Engineering, Republic of Korea; *W Lee,* Sejong University, Republic of Korea	**EM+AA-MoA-12** Effects of Alumina Incorporation by Particle Atomic Layer Deposition on Sintering and Microstructure of Yttria-Stabilized Zirconia (8YSZ), ***Christopher Bartel***, *R O'Toole, M Kodas, A Drake, A Horrell,* University of Colorado - Boulder; *R Hall,* ALDNanoSolutions, Inc.; *C Musgrave, A Weimer,* University of Colorado - Boulder
4:30pm	**ALE+AF-MoA-13** Low Resistance ALD TiN from Low Temperature Thermal N_2H_4 + $TiCl_4$, ***Steven Wolf***, *M Kavrik, J Park,* University of California San Diego; *R Holmes, D Alvarez, J Spiegelman,* RASIRC; *A Kummel,* University of California San Diego	**EM+AA-MoA-13** Low-Temperature ALD Cobalt Sulfide for High-Efficient Hydrogen Evolution Textiles, ***Donghyun Kim***, *J Park, H Kim,* Yonsei University, Republic of Korea
4:45pm	**ALE+AF-MoA-14** Study of the Isotropic Behavior of AZO Conductivity Deposited by Atomic Layer Deposition - Effect of Film Thickness, ***Benoit Dugrenil***, Microoled - CEA Leti, France; *S Guillamet, M Thomschke,* Microoled Company; *M Tournaire, B Aventurier, L Mollard, T Maindron,* CEA-Leti, France	**EM+AA-MoA-14** Atomic Layer Deposition of Platinum: An Avenue to the Scalable Synthesis of Ultra-low-loading Fuel Cell Catalysts?, *A Goulas,* Delft IMP B.V., Netherlands; *F Grillo, A Dokania,* Delft University of Technology, Netherlands; *D Valdesueiro,* Delft IMP B.V., Netherlands; *H Van Bui,* Delft University of Technology, Netherlands; ***Bart van Limpt***, Delft IMP B.V., Netherlands; *J Moulijn, J van Ommen,* Delft University of Technology, Netherlands
5:00pm	**ALE+AF-MoA-15** Growth Behaviour and Stability of Atomic Layer Deposited MoO_3 by $Mo(CO)_6$ and H_2O/O_3 Precursors, ***Perttu Sippola***, Aalto University, Finland; *Z Zhu,* Beneq Oy; *T Sajavaara,* University of Jyväskylä, Finland; *H Lipsanen,* Aalto University, Finland	**EM+AA-MoA-15** Pd-Ag Bimetallic Nanograin-Decorated Nylon Nanofibers: Efficient Catalytic Reduction of 4-Nitrophenol, *K Ranjith, A Celebioglu,* Bilkent University, Turkey; *H Eren,* Delft University of Technology, Netherlands; *N Biyikli,* Utah State University; ***Tamer Uyar***, Bilkent University, Turkey
5:15pm	**ALE+AF-MoA-16** Characterization of Al_2O_3 and HfO_2 Grown on Metal Surfaces with Thermal and Plasma Enhanced Atomic Layer Deposition, ***Haiping Zhou***, *Y Fu, M Mirza,* University of Glasgow, UK	**EM+AA-MoA-16** Size-Selective Catalysts with an Ultra-Thin Porous Shell Prepared by Molecular Layer Deposition, ***Zeyu Shang***, *X Liang,* Missouri University of Science and Technology

ALD Fundamentals
Room Plaza Exhibit - Session AF-MoP
ALD Fundamentals Poster Session
5:30pm

AF-MoP-1 Template-Free Vapor-Phase Growth of Patrónite (VS_4) by Atomic Layer Deposition, ***Matthew Weimer,*** *R McCarthy,* Argonne National Laboratory*; J Emery, M Bedzyk,* Northwestern University*; F Sen, A Kinaci, M Chan, A Hock, A Martinson,* Argonne National Laboratory

AF-MoP-2 Novel Approach to Deposit Carbon Doped Silicon Oxide Film with High Carbon Content via Thermal ALD, ***Haripin Chandra,*** *K Cuthill,* Versum Materials, Inc*; M MacDonald, G Sanchez,* Versum Materials, Inc.*; A Mallikarjunan,* Versum Materials, Inc

AF-MoP-3 A New Reducing Co-Reagent and Challenges in Thermal Atomic Layer Deposition of Electropositive Metal Films, ***Kyle Blakeney,*** *C Winter,* Wayne State University

AF-MoP-4 Volatile Rare Earth Metal Alkoxides for ALD precursors, ***Atsushi Sakurai,*** ADEKA Corporation, Japan*; N Sugiura,* ADEKA Corporation*; M Hatase, A Nishida, A Yamashita,* ADEKA Corporation, Japan

AF-MoP-5 Enabling Smooth and Conformal Film Growth via Separate Surface Treatment during Atomic Layer Deposition of Cobalt, ***Jeong-Seok Na,*** Lam Research Corp.

AF-MoP-6 Comparative Study of ALD SiO_2 Films, ***Andy Zauner,*** Air Liquide R&D, France*; J Girard,* Air Liqude Advanced Materials, France

AF-MoP-7 B_2O_3 ALD for Advanced Doping Applications: The Roles of Free Radical Precursors and Surface Composition, *A Pilli, J Jones,* ***Jeffry Kelber,*** University of North Texas*; F Pasquale, A LaVoie,* Lam Research Corp.

AF-MoP-8 High-aspect Ratio Anodic TiO_2 Nanotube Layers: Unprecedented Ability of ALD to add a Functionality, ***Raul Zazpe,*** *J Přikryl, H Sopha, L Hromadko, J Macák,* University of Pardubice, Czech Republic

AF-MoP-9 PEALD Ga_2O_3 as Dielectric Interlayer on GaN, ***Mei Hao,*** *R Nemanich, S Chowdhury,* Arizona State University

AF-MoP-10 Effect of Deposition Temperature and Plasma Condition on Film Quality of TiO_2 Deposited by Plasma-Enhanced Atomic Layer Deposition, ***Munehito Kagaya,*** Tokyo Electron Limited, Japan*; S Iwashita,* Tokyo Electron Yamanashi Limited, Japan*; Y Suzuki, Y Sakamoto,* Tokyo Electron Limited, Japan*; A Uedono,* University of Tsukuba, Japan*; T Mitsunari,* Tokyo Electron Limited, Japan*; N Shindo, M Yamasaka, N Noro, T Hasegawa,* Tokyo Electron Yamanashi Limited, Japan*; T Moriya,* Tokyo Electron Limited, Japan

AF-MoP-11 Atom Probe Tomography of Platinum and Ruthenium Atomic Layer Deposition Films, ***Daniel Potrepka,*** *B Hornbuckle,* U.S. Army Research Laboratory*; N Strnad,* University of Maryland

AF-MoP-12 Nitrogen Doped Al_2O_3 Films with High Doping Uniformity and Low Film Roughness Grown by Plasma Enhanced Atomic Layer Deposition, ***Hong-Yan Chen,*** *H Lu,* Fudan University, China

AF-MoP-13 Study on the Gate Sidewall Spacer Silicon-Nitride ALD Process at Low Temperature by High Density Multiple ICP Sources, ***Ho-Hyun Song,*** *H Chang, Y Seol,* KAIST, Republic of Korea

AF-MoP-14 Effect of Revolution and Rotating Substrate for ALD SiO_2 Film at Low Temperature Using SDP System, ***Jin-Hyuk Yoo,*** *B Cho,* JUSUNG Engineering, Republic of Korea

AF-MoP-15 Breakthrough Trace Element Analysis for Challenging ALD Film Precursors, ***Lisa Mey-Ami,*** *J Wang, H Gotts, F Li,* Air Liquide - Balazs NanoAnalysis

AF-MoP-16 New Technology Advances of Electromechanical Valve Technology for Precision-Controlled Millisecond Pulsed Delivery in ALD/ALE Applications, ***Patrick Lowery,*** HORIBA*; H Nishizato,* Horiba Stec, Japan*; J Dick, T Hoke,* HORIBA

AF-MoP-17 Band Alignment at the Interface of Atomic Layer Deposition Al_2O_3 and Ga-Polar GaN under Ultraviolet/Ozone Treatment, *K Kim, J Ryu, J Kim, S Cho, D Liu, J Park, I Lee,* University of Wisconsin-Madison*; B Moody,* HexaTech. Inc.*; W Zhou,* University of Texas at Arlington*; J Albrecht,* Michigan State University*;* ***Zhenqiang Ma,*** University of Wisconsin-Madison

AF-MoP-18 Raman Spectrum Characterization of Ti-based ALD Thin Films Treated with Ultra-high Vacuum Annealing, ***Chengchun Tang,*** *X Jia, C Gu, J Li,* Institute of Physics, Chinese Academy of Sciences, China

AF-MoP-20 Complete Analytical Characterization of Surface, Interfacial and Bulk Layers of ALD Films: The Path to Improved and Reliable Deposition Processes, ***Yagnaseni Ghosh,*** *C Langland, W Rivello, F Li,* Air Liquide - Balazs NanoAnalysis

AF-MoP-21 Sequential Exposures of N_2H_4 + BCl_3 on Copper, HOPG and $Si_{0.7}Ge_{0.3}$ Surfaces, ***Steven Wolf,*** *M Breeden, M Edmonds, K Sardashti, M Clemons,* University of California San Diego*; E Yieh, H Ren, S Nemani,* Applied Materials*; D Alvarez,* RASIRC*; A Kummel,* University of California San Diego

AF-MoP-22 Plasma Enhanced ALD of BN, B-doped SiN and B-doped TiN, ***Moo-Sung Kim,*** Versum Materials Korea, Republic of Korea*; X Lei,* Versum Materials, Inc*; S Yang,* Versum Materials Korea, Republic of Korea

AF-MoP-23 Scale-Up of Atomic Layer Deposition on Powders in Fixed Bed Reactors, ***Kristian Knemeyer,*** *V Strempel, P Ingale, R Naumann d'Alnoncourt,* BasCat, UniCat BASF JointLab, Technische Universität Berlin, Germany*; A Thomas, M Driess,* Institut für Chemie, Technische Universität Berlin, Germany*; F Rosowski,* BASF SE, Germany

AF-MoP-24 Measurement and Control of Stress of ALD Films and Nano-laminates Measured by Interferometry, ***Ritwik Bhatia,*** Ultratech

AF-MoP-25 Temperature Dependent Kinetics of ALD Reaction: SiN PEALD Study, ***Triratna Muneshwar,*** *K Cadien,* University of Alberta, Canada

AF-MoP-26 Process Development and Characterization of the Atomic Layer Deposited MoS2, ***Tian-Bao Zhang,*** *J Xu, Y Wang, L Chen, Q Sun, H Zhu, S Ding, D Zhang,* Fudan University, China

AF-MoP-27 Low Energy Ion Scattering (LEIS) Analysis of ALD Deposited GaSb Films on SiO_2, ***Philipp Brüner,*** ION-TOF GmbH, Germany*; T Grehl,* ION-TOF GmbH*; R ter Veen,* Tascon GmbH, Germany*; M Fartmann,* Tascon GmbH*; T Blomberg, M Tuominen,* ASM, Finland

AF-MoP-28 Alternative Plasma Gas Chemistries for Plasma Enhanced Atomic Layer Deposition and the 2016 PEALD Publication Review, ***Plasma-ALD Guy,*** www.plasma-ald.com

AF-MoP-29 Characterization of Ultra-thin ALD Coating in Mesoporous Silicon Layers, ***Andras Kovacs,*** *U Mescheder,* Furtwangen University, Germany

AF-MoP-30 Hydrogen Impurities in Al_2O_3 Thin Films using TMA and Heavy Water as Precursors, ***Sami Kinnunen,*** *K Arstila, M Lahtinen, T Sajavaara,* University of Jyväskylä, Finland

AF-MoP-31 Density Functional Theory Calculation on the Reaction Between Different Nitriding Agents and Chlorine-terminated Silicon Nitride Surface, ***Luchana Yusup,*** *T Mayangsari, J Park,* Sejong University, Republic of Korea*; Y Kwon,* Kyung Hee University, Republic of Korea*; W Lee,* Sejong University, Republic of Korea

AF-MoP-32 Edge-On MoS_2 Thin Films by Direct Atomic Layer Deposition for Hydrogen Evolution Reaction, ***Changdeuck Bae,*** *T Ho, H Shin,* Sungkyunkwan University

AF-MoP-33 Role of Initial Precursor Chemisorption on Incubation Delay for Molybdenum Oxide Atomic Layer Deposition, ***Charith Nanayakkara,*** EMD Performance Materials*; A Vega,* University of Texas at Dallas*; G Liu, C Dezelah, R Kanjolia,* EMD Performance Materials*; Y Chabal,* University of Texas at Dallas

AF-MoP-34 Precursor Screening for Low Temperature Atomic Layer Deposition of SiO_2 using Ozone, ***Dingkai Guo,*** *B Hendrix, T Baum,* Entegris Inc.

AF-MoP-35 Surface Treatments on Vertically Aligned Carbon Nanotube Forests for Atomic Layer Deposition, ***David Kane,*** *R Vanfleet, R Davis,* Brigham Young University

AF-MoP-36 Quantum Chemical Design for Kinetically Enhanced ALD Precursors, ***Thomas Mustard,*** Schrodinger, Inc.*; C Winter,* Wayne State University, USA*; M Halls,* Schrodinger, Inc.

AF-MoP-37 QDB: A Database of Plasma Process Data, ***Christian Hill,*** *S Rahimi, D Brown, A Dzarasova,* Quantemol Ltd, UK*; J Hamilton, K Wren-Little,* University College London, UK*; S Mohr,* Quantemol Ltd, UK*; J Tennyson,* University College London, UK

AF-MoP-38 Surface Functionalization of Few-layer MoS_2 for Atomic Layer Deposition using Gold Chloride Salts, ***Jaron Kropp,*** *T Gougousi,* University of Maryland, Baltimore County

AF-MoP-39 Atomic layer deposition of ZrO_2 thin film using a novel linked cyclopentadienyl-amido Zr precursor, ***Mira Park,*** *J Kwon, Y Lee, J Park, S Kim, H Ahn, S Yun, J Park,* Hansol Chemical, Republic of Korea

AF-MoP-40 Surface Oxidation of Titanium Oxynitride Films Prepared by PEALD, *J Łobaza, M Kot,* Brandenburg University of Technology Cottbus-Senftenberg, Germany*; F Naumann,* ***Hassan Gargouri,*** Sentech Instruments, Germany*; K Henkel, D Schmeißer,* Brandenburg University of Technology Cottbus-Senftenberg, Germany

AF-MoP-41 Characterization of SiN_x Plasma Enhanced Atomic Layer Deposition Process, ***Sun Jung Kim****, S Yong, H Chae,* Sungkyunkwan University (SKKU), Republic of Korea

AF-MoP-42 Transient Response of ALD-QCM with Synchronized Back Pressure Control of Sensor Head, *S Tanaka,* Tohoku University, Japan*; K Hikichi,* Techofine Co., Japan*;* ***Masafumi Kumano,*** Tohoku University, Japan

AF-MoP-43 Precise Thickness Controllable Al_2O_3 Thin Film Using Non-Pyrophoric Al Precursors and Atomic Layer Deposition, ***Donghak Jang****, S Yeo,* Hansol Chemical*; K Mun, J Park,* Hansol Chemical, Republic of Korea

AF-MoP-44 Diagnostic ALD Reactor with Multiple Modes of FT-IR Spectroscopy*, B Sperling,* ***James Maslar****, B Kalanyan,* National Institute of Standards and Technology

AF-MoP-45 Leveraging Atomistic Modeling for Insights into Nucleation of Cobalt Precursors on Various Substrates, ***Andrew Adamczyk****, A Cooper,* Versum Materials*; M Kim,* Versum Materials Korea, Republic of Korea*; S Ivanov,* Versum Materials

AF-MoP-46 Crystalline AlN Films on Si(100) with Sharp Interface and Good Uniformity at Low Temperature by Plasma Enhanced ALD, ***Xinhe Zheng****, S Liu, Y He, M Li, J Wang, C Hou,* University of Science and Technology Beijing, China

AF-MoP-47 Comparison between PEALD-TiN Films using $TiCl_4$ or TDMAT as Ti-precursor, ***Hans-Dieter Schnabel,*** Westsächsische Hochschule Zwickau, Germany*; T Junghans, U Reinhold, C Reinhold,* Westsächsische Hochschule Zwickau

AF-MoP-48 High-speed Spectroscopic Ellipsometry for ALD Applications, ***Gai Chin,*** ULVAC Inc., Japan

AF-MoP-49 UHV FT-IR Spectroscopy for Atomic Layer Deposition: An Instrumental Contribution*, X Stammer,* Bruker Optics, Ettlingen, Germany*;* ***Richard Merk****, S Shilov,* Bruker Optics

AF-MoP-50 New Tungsten Precursors at Scale - Properties and ALD Application, ***Andreas Wilk****, A Rivas Nass, R Ramon-Müller, O Briel,* Umicore AG & Co. KG, Germany

AF-MoP-51 The Effect of Precursor Ligands and Substitution Chemistry on the Nucleation and Structure of Layered Chalcogenides*, H Zhang,* ***Adam Hock,*** Illinois Institute of Technology

ALD for Manufacturing
Room Plaza Exhibit - Session AM-MoP
ALD for Manufacturing Poster Session
5:30pm

AM-MoP-1 Anhydrous Hydrogen Peroxide Gas Delivery for Semiconductor Manufacturing: Optimal Delivery Conditions for ALD Processes*, D Alvarez, J Spiegelman,* ***Keisuke Andachi****, R Holmes, Z Shamsi,* RASIRC

AM-MoP-2 OpenALD - A Framework for an Open Source ALD Reactor, ***Vivek Dwivedi,*** NASA

AM-MoP-3 Multilayer ALD Metal Oxide Films Deposited by Spatially Resolved ALD Processes for Moisture Barrier Films, ***Sang Heon Yong****, S Kim, H Chae,* Sungkyunkwan University (SKKU), Republic of Korea

AM-MoP-4 A Green Precleaning Process in Wettability Improvement for Thinner and Uniform ALD Al_2O_3 Film Deposition on Layered MoS_2 Film, ***Cheng-Ying Wang,*** National Taiwan Normal University, Taiwan*; Y Ho, Y Chu,* National Chiao Tung University, Republic of China*; H Hsu,* ITRI, Republic of China*; B Chen, P Chen,* Minghsin University of Science & Technology, Taiwan*; M Lee,* National Taiwan Normal University, Taiwan*; C Jong,* NARLabs, Republic of China

AM-MoP-5 Highly Sensitive Ion Trap Mass Spectrometer for Inline Process Control, ***Ruediger Reuter****, V Derpmann, G Fedosenko, A Laue, T Graber, M Aliman, H Chung,* Carl Zeiss SMT GmbH, Germany

AM-MoP-6 STD-PEALD Equipment Design and Evaluation of Nano Thin-Film Characteristics*, M Jeong,* Korea Electronics Technology Institute, Republic of Korea*; T Ryu,* Sung Kyun Kwan University*; K Hong,* Korea Electronics Technology Institute, Republic of Korea*; J Choi,* Sung Kyun Kwan University*; C Song, M Koo,* LEED Corp.*;* ***Yekyung Kim****, S Chang,* Korea Electronics Technology Institute, Republic of Korea*; I Jeong,* LEED Corp.*; H Kim,* Korea Electronics Technology Institute, Republic of Korea

AM-MoP-7 Demonstration of a Correlation between Barrier Property and Defect Visualization of ALD(Al_2O_3)/Graphene Film*, K Hong, M Jeong, D Lee, J Seo, S Lee,* Korea Electronics Technology Institute, Republic of Korea*; J Choi,* Sung Kyun Kwan University*; I Jeong,* LEED Corp.*; S Chang,* ***Yekyung Kim****, H Kim,* Korea Electronics Technology Institute, Republic of Korea

AM-MoP-8 Transport and Kinetics of a Remote DBD Plasma for ALD Processing of Metal Oxides*, T Beekman,* ***Yves Creyghton****, J Emmelkamp,* Solliance/TNO, Netherlands*; A Sobota,* Eindhoven University of Technology, Netherlands

AM-MoP-9 Effects of Sealing Components on ALD Film Quality, ***Fred Pourmirzaie,*** Flodynamix

Area Selective ALD
Room Plaza Exhibit - Session AS-MoP
Area Selective ALD Poster Session
5:30pm

AS-MoP-1 Area-selective ALD using Vapor and Solution-Phase Synthesized Perfluorodecyltrichlorosilane (FDTS) SAMs as Growth Inhibition Layers, ***Ali Haider,*** Bilkent University, Turkey*; S Altuntas,* TOBB University of Economics & Technology, Turkey*; P Deminskyi, T Khan,* Bilkent University, Turkey*; F Buyukserin,* TOBB University of Economics & Technology, Turkey*; N Biyikli,* Utah State University

AS-MoP-2 Nanoscale Patterning of C_4F_8 Plasma Polymer Blocking Layers via Femtosecond Pulsed Laser Processing for Selective Deposition of Noble Metals, ***Petro Deminskyi,*** *I Pavlov, S Ilday, O Tokel,* Bilkent University, Turkey*; H Eren,* Delft University of Technology, Netherlands*; A Haider, F Ilday,* Bilkent University, Turkey*; N Biyikli,* Utah State University

AS-MoP-3 Feasibility Study of Single and Multi-layered Graphene as Plasma-compatible Deactivation Layers for Selective Deposition of III-Nitride Materials, ***Petro Deminskyi,*** *E Kovalska, A Haider, C Kocabas,* Bilkent University, Turkey*; N Biyikli,* Utah State University

AS-MoP-4 Electroless Noble Metal Deposition - A New Approach for Highly Selective Surface Controlled Deposition Process, ***Stanko Brankovic,*** Universtiy of Houston*; D Solanki, D Wu,* University of Houston*; Y Dordi, A Joi,* Lam Research

AS-MoP-5 Inherently Selective Plasma-assisted ALD: A Feasibility Study for III-Nitride Materials, ***Necmi Biyikli,*** Utah State University*; A Haider, P Deminskyi,* Bilkent University, Turkey

Emerging Materials
Room Plaza Exhibit - Session EM-MoP
Emerging Materials Poster Session
5:30pm

EM-MoP-1 ALD of Copper(I) Halide Direct Bandgap Semiconductors*, T Homola, R Krumpolec,* ***David Cameron,*** Masaryk University, Czech Republic*; R Zazpe, J Přikryl, J Macák,* University of Pardubice, Czech Republic*; P Maydannik,* Lappeenranta University of Technology, Finland*; G Natarajan,* Indira Gandhi Centre for Atomic Research, India

EM-MoP-2 Atomic Layer Deposition of Topological Insulator Selenides and Tellurides, ***Tommi Tynell****, C Wiegand, A Thomas, K Nielsch,* Leibniz Institute for Solid State and Materials Research Dresden (IFW Dresden), Germany

EM-MoP-3 New precursor for low temperature deposition of SiO_2 layer using thermal and plasma enhanced ALD techniques*, A Korolev,* ***Hima Lingam****, V Chitturi, P Cobb,* Nova-Kem*; M Boleslawski, D Suh, C Choi, H Jeong,* Wonik Materials

EM-MoP-4 Modeling of the Reactions of Hexachlorodisilane on NH and NH_2 Functionalized Silicon Nitride Surface*, X Wang,* The Dow Chemcal Company*;* ***Xiaobing Zhou****, B Hwang,* The Dow Chemical Company*; B Ketola, B Rekken, T Sunderland, A Millward, M Telgenhoff, V Shamamian, C Lee, Y Ahn, W Chung,* The Dow Chemcal Company

EM-MoP-5 New Silicon precursor for Low Temperature SiN_x ALD Applications*, A Korolev, H Lingam,* ***Venkateswara Chitturi,*** Nova-Kem*; M Boleslawski, C Choi, H Jeong, D Suh,* Wonik Materials

EM-MoP-6 Structure and Growth Behavior of MLD Films Using Cyclic Azasilanes, Maleic Anhydride, Trimethylaluminum and Water*,* ***Ling Ju****, N Strandwitz,* Lehigh University

EM-MoP-7 Divalent Group IV Precursors for Atomic Layer Deposition Features*, M Nim,* ***Hyunkee Kim****, K Mun, J Park, J Park,* Hansol Chemical, Republic of Korea

EM-MoP-8 Plasma Enhanced Atomic Layer Deposition of Aluminium Sulphide, ***Jakob Kuhs***, *Z Hens, C Detavernier,* Ghent University, Belgium

EM-MoP-9 The Film Property of Super-cycled Al_2O_3/SnO_x Atomic Layer Deposition and the Associated Thin Film Transistor Performance, ***Seung-Hwan Lee***, *S Choi,* Hanyang University, Korea; *J Park,* Hanyang University, Republic of Korea

EM-MoP-10 Optical Properties and XPS Analyses of $Ti_xSi_{(1-x)}O_2$ Films Prepared by ALD and Comparison to ab-initio Predictions, ***Marek Elias***, CEITEC, Brno University of Technology, Czech Republic; *P Ondracka,* Masaryk University, Czech Republic; *D Necas,* CEITEC, Masaryk University, Czech Republic; *J Vida,* Masaryk University, Czech Republic; *E Kedronova, L Zajickova,* CEITEC, Masaryk University, Czech Republic

EM-MoP-11 Atomic Layer Deposition of MoO_x:N films: Electrical and Electrochemical Properties, ***Arpan Dhara***, *D Saha, S Sarkar,* Indian Institute of Technology Bombay, India

EM-MoP-12 *In Situ* Characterization of Thin Film Molybdenum Carbide using Spectroscopic Ellipsometry, ***Adam Bertuch***, Ultratech; *J Hoglund,* SemiLab; *L Makai,* Semilab; *J Byrnes,* SemiLab; *J McBee, G Sundaram,* Ultratech

EM-MoP-13 Molecular Layer Deposition of Boron Carbide from Carboranes, ***Michelle Paquette***, *L Dorsett, S Malik, A Caruso,* University of Missouri-Kansas City; *J Bielefeld, S King,* Intel Corporation

EM-MoP-14 Sub-10 nm Scalable Hybrid Dielectric Engineering on MoS_2 for 2D Materials Based Devices, ***Lanxia Cheng***, *J Lee, H Zhu, A Ravichandran, Q Wang, A Lucero, M Kim, R Wallace,* University of Texas at Dallas; *L Colombo,* Texas Instruments, USA; *J Kim,* University of Texas at Dallas

EM-MoP-15 Critical Layer Thickness Determination for GaN Thin Films Grown on Sapphire Substrate via Hollow-Cathode Plasma-assisted Atomic Layer Deposition, ***Mustafa Alevli***, *N Gungor,* Marmara University; *N Biyikli,* Utah State University

EM-MoP-16 Digital Doping of ALD VO_2 for Thermochromic Applications, ***Alexander Kozen***, *M Currie,* U.S. Naval Research Laboratory; *K Jungjohann,* Sandia National Laboratory; *B Downey,* U.S. Naval Research Laboratory, usa; *C Eddy, Jr., V Wheeler,* U.S. Naval Research Laboratory

EM-MoP-17 Characterization and Comparison of ALD Laminate Structures with HfO_2 + SiO_2 as MIM Capacitor Dielectric for GaAs HBT Device, ***Yao-Ting Shao***, *C Hua,* WIN Semiconductors Corp., Republic of China

EM-MoP-18 Atomic Layer Deposition of Mo-doped VO_2 Thin Films by Nanolamination of VO_2/MoO_3 Alternating Layers, ***Xinrui Lv***, *Y Yu, Y Cao,* Chinese Academy of Sciences, China

EM-MoP-19 Trace Metal Analysis on SiC Wafers using ICP-MS, ***Jaya Chowdhury***, ChemTrace

EM-MoP-23 Atomic Layer Deposited Single Crystal High-k Y-doped Cubic HfO_2 on GaAs(001) Utilizing HfO_2/Y_2O_3 Super-cycles, ***Lawrence Boyu Young***, *C Cheng, Y Lin, K Lin,* National Taiwan University, Republic of China; *C Hsu,* 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

Tuesday Morning, July 18, 2017

	ALD Applications **Room Plaza F - Session AA+AF-TuM** **Displays and Flexible Applications (8:00-10:00 am)/ALD Fundamentals: In-Situ Monitoring and Analysis (10:45 am-12:00 pm)** **Moderators:** Hyungjun Kim, Yonsei University, Korea, Jin-Seong Park, Hanyang University, Han-Jin Lim, Samsung Electronics, Tom Knisley, Applied Materials	**ALD Applications** **Room Plaza ABC - Session AA-TuM** **Batteries I (8:00-10:00 am)/Emerging Apps II (10:45 am-12:00 pm)** **Moderators:** Christophe Detavernier, Ghent University, Belgium, Christophe Vallee, LETI-LTM, France, Gary Rubloff, University of Maryland, Tero Pilvi, Picosun Oy
8:00am	**INVITED: AA+AF-TuM-1** Functional Materials using Atomic Layer Deposition for Emerging Display Applications, ***Jin-Seong Park,*** Hanyang University, Republic of Korea	**INVITED: AA-TuM-1** Designing of Surface and Interface of Electrodes for Highly-stable Li Ion Batteries, Li-S Batteries and Metal-Air Batteries, ***Xueliang Sun,*** University of Western Ontario, Canada
8:15am	Invited talk continues.	Invited talk continues.
8:30am	**AA+AF-TuM-3** Flexible Platinum Nanoparticle-based Piezoresistive Transducers Elaborated by Atomic Layer Deposition, ***Etienne Puyoo,*** *C Malhaire, D Thomas, R Rafaël,* Institut des Nanotechnologies de Lyon, France*; M R'Mili, A Malchère, L Roiban, S Koneti, M Bugnet,* MATEIS, France*; A Sabac, M Le Berre,* Institut des Nanotechnologies de Lyon, France	**AA-TuM-3** ALD Vanadium Oxides for 3D Thin-film Lithium Ion Batteries, ***Felix Mattelaer,*** Ghent University, Belgium*; K Geryl,* Ghent University*; T Dobbelaere,* Ghent University, Belgium*; G Rampelberg,* Ghent University*; J Dendooven, C Detavernier,* Ghent University, Belgium
8:45am	**AA+AF-TuM-4** Color Coating of Electronic Textiles via Control of Refractive Index by Atomic Layer Deposition, ***Hyun Gu Kim,*** *W Kwon, H Lee,* Incheon National University, Republic of Korea	**AA-TuM-4** PE-ALD of Transition Metal Phosphates as Lithium-Ion Battery Electrode Materials, *T Dobbelaere, F Mattelaer, J Dendooven,* Ghent University, Belgium*; P Vereecken,* Imec, Belgium*;* ***Christophe Detavernier,*** Ghent University, Belgium
9:00am	**AA+AF-TuM-5** Comprehensive Studies of Atomic Layer Deposited InGaO Thin Films using InCA-1, TMGa and H_2O_2 for Oxide Semiconductor Thin Film Transistor Applications, ***Jiazhen Sheng,*** Hanyang University, Republic of Korea*; B Shong,* Chungnam National University, Republic of Korea*; J Park,* Hanyang University, Republic of Korea	**AA-TuM-5** Comparing Temporal and Spatial Atomic Layer Deposition for Enhanced Performance of Li Ion Battery Electrodes, ***Alexander Yersak,*** *A Dameron,* University of Colorado - Boulder*; X Li, Y Yang,* Colorado School of Mines*; K Hurst, R Tenet,* National Renewable Energy Laboratory*; S George,* University of Colorado - Boulder
9:15am		**AA-TuM-6** All-Solid-State Thin-Film Battery with a Novel Organic Cathode Material by Atomic/Molecular Layer Deposition, ***Mikko Nisula,*** *M Karppinen,* Aalto University, Finland
9:30am	**AA+AF-TuM-7** Highly Sensitive VOCs Sensor Based on Atomic Layer Deposition of TiO_2 on Carbon Nanotubes, ***Michela Sainato,*** University of Illinois at Chicago*; R Divan, L Stan, Y Liu,* Argonne National Laboratory*; I Paprotny,* University of Illinois at Chicago	**AA-TuM-7** Atomic Layer Deposition of Hierarchical CNTs@$FePO_4$ Architecture as a 3D Electrode for Lithium-Ion and Sodium-Ion Batteries, ***Jian Liu,*** The University of British Columbia, Canada*; B Wang, Q Sun, R Li, T Sham, X Sun,* University of Western Ontario, Canada
9:45am		**AA-TuM-8** Unravelling The Role of ALD Al_2O_3 and TiO_2 Protective Coatings on Lithium-Ion Battery Electrodes., ***Felix Mattelaer,*** Ghent University, Belgium*; M Kurttepeli,* University of Antwerp*; S Deng,* Ghent University, Belgium*; D Cott, P Vereeceken,* IMEC, Belgium*; J Dendooven,* Ghent University, Belgium*; S Bals,* University of Antwerp*; C Detavernier,* Ghent University, Belgium
10:00am	**Coffee Break & Exhibits**	**Coffee Break & Exhibits**
10:15am	**Coffee Break & Exhibits**	**Coffee Break & Exhibits**
10:30am	**Coffee Break & Exhibits**	**Coffee Break & Exhibits**
10:45am	**AA+AF-TuM-12** *In-situ* Real-time and *in-vacuo* Study of the Temperature Impact on the Al_2O_3 ALD Nucleation upon Pristine Monolayer Graphene, ***Marcel Junige,*** Technische Universität Dresden, Germany*; J Kitzmann, C Chavarin,* IHP GmbH, Leibniz-Institut für Innovative Mikroelektronik*; M Geidel, J Reif, M Albert,* Technische Universität Dresden, Germany*; G Lupina, C Wenger,* IHP GmbH, Leibniz-Institut für Innovative Mikroelektronik, Germany*; J Bartha,* Technische Universität Dresden, Germany	**AA-TuM-12** ALD Layer Opportunties for Reversible Bonding of Ultrathin Glass Substrates, ***Messaoud Bedjaoui,*** *S Poulet,* LETI, France
11:00am	**AA+AF-TuM-13** Investigation of the Influence of Plasma Parameters During Aluminum Nitride Atomic Layer Epitaxy using Grazing Incidence Small Angle X-ray Scattering, ***Virginia Anderson,*** *N Nepal, S Johnson, D Boris, S Walton,* U.S. Naval Research Laboratory*; Z Robinson,* SUNY College at Brockport*; A Kozen,* U.S. Naval Research Laboratory*; A Nath,* George Mason University*; S Rosenberg,* U.S. Naval Research Laboratory*; C Wagenbach,* Boston University*; J Hite,* U.S. Naval Research Laboratory*; K Ludwig,* Boston University*; C Eddy, Jr.,* U.S. Naval Research Laboratory	**AA-TuM-13** Atomic Layer Deposition and Precursor Development for Chemoresistive Gas Sensing Materials, ***Rachel Wilson,*** *C Blackman, C Carmalt,* University College London, UK
11:15am	**AA+AF-TuM-14** Studies of Surface Structure and Surface Chemistry During Plasma-Assisted Atomic Layer Epitaxial Growth of InN Semiconductor Thin Films on GaN Substrates, ***Samantha Rosenberg,*** U.S. Naval Research Laboratory*; D Pennachio,* UCSB*; V Anderson, N Nepal,* U.S. Naval Research Laboratory*; C Wagenbach,* Boston University, USA*; A Kozen,* U.S. Naval Research Laboratory*; Z Robinson,* SUNY College at Brockport*; J Logan, S Choi,* UCSB*; J Hite,* U.S. Naval Research Laboratory*; K Ludwig,* Boston University*; C Palmstrøm,* UCSB*; C Eddy, Jr.,* U.S. Naval Research Laboratory	**AA-TuM-14** Physics with and Physics of Atomic Layer Deposited Nanofilms, ***Neal Sullivan,*** Arradiance*; A Lehmann,* Universitat Erlangen-Numberg*; A Brandt,* University of Texas at Arlington
11:30am	**AA+AF-TuM-15** Plasma Gas Chemistry Influence on Growth of InN Films by Atomic Layer Epitaxy, ***Neeraj Nepal,*** *V Anderson, S Johnson, S Rosenberg, A Kozen,* U.S. Naval Research Laboratory, USA*; C Hoskin,* Boston University*; D Meyer, B Downey, J Hite, V Wheeler,* U.S. Naval Research Laboratory, USA*; R Zachary,* SUNY College at Brockport*; D Boris, S Walton,* U.S. Naval Research Laboratory, USA*; K Ludwig,* Boston University, USA*; C Eddy, Jr.,* U.S. Naval Research Laboratory, USA	**AA-TuM-15** Highly Resistive ALD Coatings for Microchannel Plates Operating at Cryogenic Temperatures, ***Till Cremer,*** *B Adams, M Aviles, J Bond, C Craven, M Foley, A Lyashenko, M Minot, M Popecki, M Stochaj, W Worstell,* Incom Inc.*; J Elam, A Mane,* Argonne National Laboratory*; O Siegmund, C Ertley,* University of California, Berkeley

11:45am	**AA+AF-TuM-16** Spectroscopic Ellipsometry of WO_3 Thin Films from ALD: *In-situ* Layer-by-Layer Growth Monitoring and *ex-situ* Optical Characterization, ***Ufuk Kilic**, D Sekora, A Mock, M Schubert,* University of Nebraska Lincoln	**AA-TuM-16** Reactions on ALD TiO_2, ZnO, and Al_2O_3 Metal Oxides during Nucleation of UiO-66-NH_2 MOF Thin Films as Hydrolysis Catalysts for Chemical Warfare Agent Simulants., ***Dennis Lee**, J Zhao, C Oldham,* North Carolina State University*; G Peterson,* Edgewood Chemical Biological Center*; G Parsons,* North Carolina State University

Tuesday Morning, July 18, 2017

	ALD Fundamentals **Room Plaza D - Session AF1-TuM** **ALD Fundamentals: Precursors and Process Development (8:00-10:00 am)/Precursors and Mechanism (10:45am-12:00 pm)** **Moderators:** Sean Barry, Carleton University, Canada, Simon Rushworth, EpiValence, UK, Markku Leskela, University of Helsinki, Finland, Ravindra Kanjolia, EMD Performance Materials	**ALD Fundamentals** **Room Plaza E - Session AF2-TuM** **ALD Fundamentals: Theory & Mechanism (8:00-10: am)/Emerging Materials and Devices (10:45 am-12:00 pm)** **Moderators:** HyeongTag Jeon, Hanyang University, Korea, Harm Knoops, Oxford Instruments Plasma Technology, Iian Buchanan, Versum Materials, UK, Dustin Austin, Oregon State University
8:00am	**INVITED: AF1-TuM-1** Photo-assisted ALD of Oxides and Metals, ***Ville Miikkulainen***, *K Väyrynen,* University of Helsinki, Finland; *V Kilpi,* Picosun Oy, Finland; *K Mizohata, J Räisänen, M Ritala,* University of Helsinki, Finland	**AF2-TuM-1** Tuning Material Properties by Ion Energy Control during Remote Plasma-ALD on Planar and 3D Substrates, ***Tahsin Faraz,*** Eindhoven University of Technology, Netherlands; *H Knoops,* Oxford Instruments Plasma Technology, UK; *M Verheijen, C van Helvoirt, S Karwal, A Sharma,* Eindhoven University of Technology, Netherlands; *D Hausmann, J Henri,* Lam Research; *A Bol, M Creatore, W Kessels,* Eindhoven University of Technology, Netherlands
8:15am	Invited talk continues.	**AF2-TuM-2** Stress Control of Plasma ALD Films Deposited at Low Temperature by Application of Substrate Biasing, ***Thomas Miller,*** Oxford Instruments Plasma Technology, UK; *A Kurek, A O'Mahony,* Oxford Instruments Plasma Technology; *H Knoops,* Oxford Instruments Plasma Technology, UK; *O Thomas, R Gunn,* Oxford Instruments Plasma Technology
8:30am	**AF1-TuM-3** Oxidation State Discrimination in the Atomic Layer Deposition of Vanadium Oxides, ***Matthew Weimer,*** *I Kim, P Guo,* Argonne National Laboratory; *R Schaller,* Argonne National Laboratory, Northwestern University; *A Martinson, A Hock,* Argonne National Laboratory	**AF2-TuM-3** Benefits of an O_2 Plasma in a Bi_2O_3 ALD Process, ***Matthias Müller,*** *K Komander, C Höhn, R van de Krol,* Helmholtz Zentrum Berlin, Germany; *A Bronneberg,* Dutch Institute for Fundamental Energy Research, Netherlands
8:45am	**AF1-TuM-4** Controlled B Doping in ZnO Atomic Layer Deposition using Boric Acid in Methanol as the B Source, ***Yan Zhang,*** *A Mane,* Argonne National Laboratory; *J Liu, O Farha,* Northwestern University; *K Kovi,* Argonne National Laboratory; *J Hupp,* Northwestern University; *J Elam,* Argonne National Laboratory	**AF2-TuM-4** High Quality Thin Films Produced by Innovative PEALD Equipment with Microwave ECR Plasma, ***Hiromichi Enami,*** *N Mise,* Hitachi High-Technologies Corp., Japan; *H Hamamura, T Usui,* Hitachi R&D Group; *J Kalliomaki, V Kilpi,* Picosun Oy, Finland; *T Malinen,* Picosun Oy
9:00am	**AF1-TuM-5** Atomic Layer Deposition of Cobalt(II) Oxide/Hydroxide Thin Films, ***Tomi Iivonen,*** *E Tirkkonen, K Mizohata, K Meinander, M Leskelä,* University of Helsinki, Finland	**AF2-TuM-5** ALD of Aluminum Fluoride using $Al(CH_3)_3$ and SF_6 Plasma, ***Martijn Vos,*** Eindhoven University of Technology, Netherlands; *H Knoops,* Oxford Instruments Plasma Technology, UK; *W Kessels, A Mackus,* Eindhoven University of Technology, Netherlands
9:15am	**AF1-TuM-6** High Purity Indium Oxide Films Prepared by Modified ALD using Liquid Ethylcyclopentadienyl Indium, ***Fumikazu Mizutani,*** *S Higashi,* Kojundo Chemical Laboratory Co.,Ltd., Japan; *T Nabatame,* National Institute for Materials Science	**AF2-TuM-6** Ferroelectricity in Undoped ZrO_2 Thin Films on Pt Electrode without Post-Annealing Treatment, *M Chen,* ***Po-Hsien Cheng,*** National Taiwan University, Taiwan
9:30am	**AF1-TuM-7** A New Scandium Precursor for the ALD of Scandium Oxide, ***Jean-Sébastien Lehn,*** *C Dezelah, D Moser, R Kanjolia,* EMD Performance Materials	**AF2-TuM-7** Improving the Conductivity ($<10^{-3}$ Ω cm) of HfN_x by Ion Energy Control during Plasma-assisted ALD, ***Saurabh Karwal,*** *B Karasulu, M Verheijen, J Niemelä, T Faraz, W Kessels, M Creatore,* Eindhoven University of Technology, Netherlands
9:45am	**AF1-TuM-8** ALD Y_2O_3 Film Using Liquid Yttrium Precursor and Water, ***Akihiro Nishida,*** *A Yamashita, M Hatase, T Yoshino, M Enzu,* ADEKA Corporation, Japan	**AF2-TuM-8** Plasma Technology for Spatial ALD of Conductive Layers, ***Yves Creyghton,*** *A Illiberi, F Roozeboom,* Solliance/TNO, Netherlands
10:00am	**Coffee Break & Exhibits**	**Coffee Break & Exhibits**
10:15am	**Coffee Break & Exhibits**	**Coffee Break & Exhibits**
10:30am	**Coffee Break & Exhibits**	**Coffee Break & Exhibits**
10:45am	**AF1-TuM-12** Thermal ALD of Gold Thin Films, *M Mäkelä, T Hatanpää, K Mizohata, J Räisänen, M Leskelä,* ***Mikko Ritala,*** University of Helsinki, Finland	**AF2-TuM-12** Atomic Layer Deposition of Lithium Titanate on Planar and 3D-Structured 200 mm Silicon Substrates, ***Sascha Bönhardt,*** *S Zybell, W Weinreich,* Fraunhofer IPMS, Germany; *C Hoßbach, V Neumann,* Technische Universität Dresden, Germany
11:00am	**AF1-TuM-13** Nucleation Behavior of Ru on SiO_2 by Atomic Layer Deposition Using Cyclopentadienylethyl(dicarbonyl)Ruthenium and Oxygen, ***Guo Liu,*** EMD Performance Materials; *C Dezelah,* EMD Performance Materials, USA; *D Moser, R Kanjolia,* EMD Performance Materials	**AF2-TuM-13** Nano-ceramic Composite Separator Modified by ALD for Lithium Ion Batteries of Improved Safety and Reliability, ***Erik Østreng,*** Picosun Oy; *R Ritasalo, S Ek,* Picosun Oy, Finland; *R Dominko,* National Institute of Chemistry
11:15am	**AF1-TuM-14** Mechanistic Aspects of Ru ALD Based on $Ru(DMBD)(CO)_3$ using Downstream Quadrupole Mass Spectrometry, ***Zhengning Gao,*** Washington University, St. Louis; *R Kanjolia,* EMD Performance Materials; *P Banerjee,* Washington University, St. Louis	**AF2-TuM-14** Physical and Electrical Characteristics of ALD Tin Disulfide Multilayer, ***Juhyun Lee,*** *G Ham, S Shin, H Kim, S Lee, H Choi, H Jeon,* Hanyang University, Republic of Korea
11:30am	**AF1-TuM-15** Atomic Layer Deposition for Rhenium Based Materials, ***Jani Hämäläinen,*** *M Mattinen, M Vehkamäki, K Mizohata, K Meinander, J Räisänen, M Ritala, M Leskelä,* University of Helsinki, Finland	**AF2-TuM-15** PEALD Platinum Nano-island SET Fabrication and Electrical Characterization, ***Daniel Thomas,*** *E Puyoo, M Le Berre,* Institut des Nanotechnologies de Lyon, France; *L Militaru, S Koneti, A Malchère, L Roiban,* INSA de Lyon, France; *A Sabac,* Institut des Nanotechnologies de Lyon, France; *K Ayadi, C Chevalier, J Grégoire, F Calmon, B Gautier,* INSA de Lyon, France
11:45am	**AF1-TuM-16** Plasma-enhanced Atomic Layer Deposition of Silver using the $Ag(fod)(PEt_3)$-precursor and NH_3-plasma, ***Matthias Minjauw,*** *E Solano,* Ghent University, Belgium; *S Sree,* KU Leuven, Belgium; *R Asapu,* University of Antwerp, Belgium; *M Van Daele, R Ramachandran,* Ghent University, Belgium; *S Verbruggen, S Lenaerts,* University of Antwerp, Belgium; *J Martens,* KU Leuven, Belgium; *C Detavernier, J Dendooven,* Ghent University, Belgium	**AF2-TuM-16** Thermal Annealing Effects on Electron Emission Properties of ALD MgO, ***Violeta Prodanovic,*** *H Chan,* Delft University of Technology, Netherlands; *A Mane, J Elam,* Argonne National Laboratory, USA; *L Sarro, H v.d. Graaf,* Delft University of Technology, Netherlands

Tuesday Afternoon, July 18, 2017

	ALD Applications **Room Plaza ABC - Session AA1-TuA** **Batteries II (1:30-3:30 pm)/Emerging Apps III (4:00-5:00 pm)** **Moderators:** Ganesh Sundaram, Ultratech, Andy Sun, University of Western Ontario, Canada, Erik Østreng, Picosun Oy, Nicholas Strandwitz, Lehigh University	**ALD Applications** **Room Plaza E - Session AA2-TuA** **ULSI, High-k and III-V I (1:30-3:30 pm)/ULSI, High-k and III-V II (4:00-5:00 pm)** **Moderators:** Scott Clendenning, Intel Corporation, Elton Graungard, Boise State University, Sven Van Elshocht, IMEC
1:30pm	**AA1-TuA-1** Highly Improved Performance of High Voltage ALD Coated Cathodes Showing Minimal Capacity/Voltage Fade at 4.8V, ***Lamuel David,*** *D Mohanty,* Oak Ridge National Laboratory*; K Dahlberg,* Xalt Energy LLC*; D King,* Forge Nano (a PneumatiCoat Company)*; D Wood III,* Oak Ridge National Laboratory	**INVITED: AA2-TuA-1** ALD as an Enabler of Self-aligned Multiple Patterning Schemes, ***Sven Van Elshocht****, Z Tao, J Everaert, S Demuynck, E Altamirano-Sanchez,* IMEC, Belgium
1:45pm	**AA1-TuA-2** Physical and Electrochemical Effects of Post-deposition Annealing on Atomic Layer Deposited Al_2O_3 Coatings on $LiNi_{0.5}Mn_{0.3}Co_{0.2}O_2$, ***David Jackson****, T Kuech,* University of Wisconsin-Madison	Invited talk continues.
2:00pm	**AA1-TuA-3** Novel Mechanism of Atomic Layer Deposition Al_2O_3 on $LiMn_2O_4$ for High Capacity Lithium-ion Batteries, ***Lin Chen,*** Illinois Institute of Technology; Argonne National Laboratory*; R Warburton,* Purdue University*; K Chen,* Northwestern University*; J Libera,* Argonne National Laboratory*; M Hersam,* Northwestern University*; J Greeley,* Purdue University*; J Elam,* Argonne National Laboratory, USA	**AA2-TuA-3** Thin Film Dopant Sources Grown by PALD for Shallow Semiconductor Doping, ***Bodo Kalkofen****, M Silinskas,* Otto von Guericke University, Germany*; M Lisker,* IHP GmbH, Leibniz-Institut für Innovative Mikroelektronik*; Y Kim,* Lam Research Corporation
2:15pm	**AA1-TuA-4** Atomic Layer Deposition of Superionic Solid-State Electrolytes for Lithium Batteries, ***Xiangbo Meng,*** University of Arkansas*; J Connell, P Lopes, J Libera,* Argonne National Laboratory, USA*; K Zavadil,* Sandia National Laboratory*; J Zhang,* Pacific Northwestern National Laboratory*; J Elam,* Argonne National Laboratory, USA	**AA2-TuA-4** Effective Work-Function of PEALD Metal Nitrides and its Tuning by Co-deposition, ***Ekaterina Zoubenko****, I Krylov, B Pokroy, M Eizenberg,* Technion - Israel Institute of Technology, Israel
2:30pm	**AA1-TuA-5** Cubic Garnet $Li_7La_3Zr_2O_{12}$ Solid Lithium Electrolyte by ALD, ***Eric Kazyak****, K Wood, K Chen, A Bielinski, A Davis, T Thompson, J Sakamoto, N Dasgupta,* University of Michigan	**AA2-TuA-5** Surface Morphology, Crystallinity and Electrical Properties of Some Rare-earth Oxide ALD Films, ***Satu Ek****, R Ritasalo,* Picosun Oy, Finland*; T Sarnet,* Picosun Oy*; J Kalliomaki,* Picosun Oy, Finland*; E Østreng,* Picosun Oy*; S Vangelista, A Lamperti, S Spiga,* CNR-IMM - MDM Laboratory*; R Piagge, G Ghidini,* STMicroelectronics
2:45pm	**AA1-TuA-6** Improving Interfacial Stability of Sulfide-Based Lithium-Ion-Conducting Solid Electrolytes with ALD, ***Jasmine Wallas****, A Heist, S Lee, S George,* University of Colorado - Boulder	**AA2-TuA-6** Atomic Layer Deposition of High-k Oxide Films from $La(NO_{33}{\cdot}6H_2O$ Solution Oxidant, ***In-Sung Park****, S Kim, T Lee, S Seong, Y Jung, J Ahn,* Hanyang University, Republic of Korea*; J An, J Yun,* Korea Research Institute of Standard and Science (KRISS), Korea
3:00pm	**AA1-TuA-7** Atomic Layer Deposition of Solid-State Electrolytes for All-Solid-State Lithium Ion Batteries, ***Biqiong Wang****, J Liu, Y Zhao, A Lushington, R Li, T Sham, X Sun,* University of Western Ontario, Canada	**AA2-TuA-7** Great Enhancement of Dielectric Constant via High Temperature Annealing ALD Bi-layered Oxides, ***Keng-Yung Lin****, L Young, C Cheng, Y Lin, H Wan,* National Taiwan University, Republic of China*; R Cai, S Lo,* Industrial Technology Research Institute, Republic of China*; M Hong,* National Taiwan University, Republic of China*; J Kwo,* National Tsing Hua University, Republic of China
3:15pm	**AA1-TuA-8** Highly Stable WS_2 Thin Film Anode Grown by Plasma-enhanced Atomic Layer Deposition (PEA LD) for Na-ion Battery, ***Dip Nandi,*** Yeungnam University, Republic of Korea*; S Yeo,* Yonsei University, Republic of Korea*; M Ansari,* Yeungnam University, Republic of Korea*; H Kim,* Yonsei University, Republic of Korea*; T Song, S Kim,* Yeungnam University, Republic of Korea	**AA2-TuA-8** Atomic Layer Deposition of Novel Interface Layers on III-V Channel Devices, *F Tang,* ***Xiaoqiang Jiang,*** ASM*; Q Xie,* ASM, Belgium*; M Givens,* ASM*; J Maes,* ASM, Belgium*; S Sioncke, I Tsvetan, L Nyns, D Lin, N Collaert,* IMEC, Belgium
3:30pm	**Coffee Break**	**Coffee Break**
3:45pm	**Coffee Break**	**Coffee Break**
4:00pm	**AA1-TuA-11** ALD-Tin Oxide as Impermeable Electron Extraction Layers for Temperature Stable Roll-to-Roll-Compatible Perovskite Solar Cells, ***Lukas Hoffmann,*** University of Wuppertal, Germany*; K Brinkmann,* University of Wuppertal*; J Zhao, T Hu,* Nanchang University, China*; D Schlamm, J Malerczyk, T Becker, D Theirich,* University of Wuppertal*; S Olthof, K Meerholz,* University of Cologne*; H Gargouri,* Sentech Instruments, Germany*; B Cheng, Y Chen,* Nanchang University, China*; T Riedl,* University of Wuppertal	**AA2-TuA-11** ZrO_2 as a High-k Gate Dielectric for Enhancement-mode AlGaN/GaN MOS HEMTs, ***Charles R. Eddy, Jr.****, V Wheeler,* U.S. Naval Research Laboratory*; D Shahin,* University of Maryland*; T Anderson, M Tadjer, A Koehler, K Hobart,* U.S. Naval Research Laboratory*; A Christou,* University of Maryland*; F Kub,* U.S. Naval Research Laboratory
4:15pm	**AA1-TuA-12** Nano-Structured Ceramic ALD Coatings to Stabilize SiC Against Reaction in High Temperature Steam, ***Amanda Hoskins****, A Coffey, C Musgrave, A Weimer,* University of Colorado - Boulder	**AA2-TuA-12** Investigation of High-quality Silicon Nitride (SiN_x) Thin Film Grown by Low-temperature Hollow Cathode Plasma-Enhanced ALD as a Gate Dielectric for AlGaN/GaN MIS-HEMTs, ***Xin Meng****, Y Byun, J Lee, H Kim, J Lee, A Lucero, L Cheng, J Kim,* University of Texas at Dallas
4:30pm	**AA1-TuA-13** Mechanical, Physical, and Electrical Properties of Plasma-Enhanced Atomic Layer Deposition of TiVN, ***Mark Sowa,*** Ultratech*; N Strandwitz, L Ju,* Lehigh University*; A Kozen,* U.S. Naval Research Laboratory*; B Krick,* Lehigh University	**AA2-TuA-13** Atomic Layer Annealing for Atomic Layer Epitaxy of AlN Ultrathin Films at a Low Growth Temperature, *M Chen,* ***Wei-Hao Lee****, H Shih, W Kao, Y Chuang,* National Taiwan University, Taiwan*; R Lin,* Chang Gung University, Taiwan*; H Lin,* National Taiwan University, Taiwan*; M Shiojiri,* Kyoto Institute of Technology, Japan

ALD for Manufacturing
Room Plaza F - Session AM+EM-TuA
ALD for Manufacturing (1:30-3:30 pm)/MLD II (4:00-5:00 pm)
Moderators: Maarit Karppinen, Aalto University, Paul Ma, Applied Materials, Inc., Mike McSwiney, Intel, USA, Sean Smith, Sandia National Laboratories

1:30pm	**AM+EM-TuA-1** Large Area Spatial Atmospheric ALD, ***Corné Frijters****, F van den Bruele, F Grob, A Illiberi, P Poodt,* TNO/Holst Center, Netherlands	
1:45pm	**AM+EM-TuA-2** Low Resistivity Titanium Nitride ALD: Low Temperature Enabled by the Use of Ultra-High Purity Hydrazine, ***Daniel Alvarez****, J Spiegelman, K Andachi, R Holmes,* RASIRC*; A Kummel, S Wolf, M Kavrik,* UCSD*; M Raynor, H Shimizu,* Matheson Tri-Gas	
2:00pm	**AM+EM-TuA-3** Modeling Ampoule Performance for Low Vapor Pressure Precursor Delivery, ***James Maslar****, W Kimes, B Sperling,* National Institute of Standards and Technology*; W Kimmerle, K Kimmerle,* NSI	
2:15pm	**AM+EM-TuA-4** An innovative chamber designed for ALD, PECVD and FAST® SiO_2 processes: towards high throughput and conformal deposition at low temperature, ***Laetitia Bonnet****, F Piallat, J Vitiello,* KOBUS, France	
2:30pm	**AM+EM-TuA-5** Growth Rates During Silicon Spatial Electron-Enhanced Atomic Layer Deposition: Role of Dangling Bond Lifetime, ***Andrew Cavanagh****, S George,* University of Colorado	
2:45pm	**AM+EM-TuA-6** Spatial Atomic Layer Deposition of Gate Encapsulation Silicon Nitride for Self-Aligned Contact Enablement, ***Jiehui Shu****, S Mehta, J Chang, X Qiu, J Liu,* GLOBALFOUNDRIES U.S. Inc.	
3:00pm	**AM+EM-TuA-7** Fast Atomic Layer Deposition Process for Thin-Film Encapsulation of Organic Light-Emitting Diodes, ***Tony Maindron****, C Lopez, S Meunier Della-Gatta, M Tournaire, B Caulfield, M Gontier,* CEA-Leti, France*; J Kools, L Baril,* Encapsulix, France	
3:15pm	**AM+EM-TuA-8** Flexible Functional Devices at Mass Production Level with the FLEx R2R sALD Platform, ***Diederick Spee****, W Boonen, E Clerkx, D Borsa,* Meyer Burger B.V., Netherlands	
3:30pm	**Coffee Break**	
3:45pm	**Coffee Break**	
4:00pm	**AM+EM-TuA-11** All-Organic Spatial MLD: Troubleshooting Deposition onto Porous Substrates, ***Daniel Higgs****,* ALD NanoSolutions, Inc.*; Y Wang,* GE*; E Chan,* National Institute of Standards and Technology*; H Wang,* GE*; C Stafford,* National Institute of Standards and Technology*; S George,* University of Colorado - Boulder	
4:15pm	**AM+EM-TuA-12** Graphene Oxide Functionalization by Molecular Layer Deposition, ***Mercedes Vila Juarez****,* Coating Technologies S.L., Spain*; A Jaggernauth, M Neto,* CICECO, University of Aveiro*; M Hortiguela, G Gonçalves, M Singh,* TEMA-NRD, University of Aveiro, Portugal*; F Oliveira, R Silva,* CICECO, University of Aveiro	
4:30pm	**AM+EM-TuA-13** Contrast Enhancement of Biological Nanoporous Materials with Zinc Oxide Infiltration for Electron and X-ray Nanoscale Microscopy, ***Leonidas Ocola****,* Argonne National Laboratory*; V Sampathkumar,* University of Chicago*; N Kasthuri, R Winarski,* Argonne National Laboratory	

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