



UGIM 2016

21st UGIM 2016

University • Government • Industry
Micro/Nanotechnology Symposium

Editable Program Guide

University of Utah
Salt Lake City, Utah

June 12th-15th, 2016

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Keynote Speakers



Dr. Lawrence S. Goldberg

Lawrence S. Goldberg was born in St. Louis, Missouri. He received his B.S. degree in Engineering Physics from Washington University in 1961, and his Ph.D. degree in Solid State Physics from Cornell University in 1966. From 1966-67, he spent a postdoctoral year at the Physikalisches Institut, Universität Frankfurt, Germany. From 1967-1985, he was with the Naval Research Laboratory as research physicist in the Optical Sciences Division where his research interests were in ultrashort pulse lasers and nonlinear optics. During 1976-1977, he was on sabbatical leave at Imperial College, London, England. Dr. Goldberg came to the National Science Foundation in 1985, where he

currently is Senior Engineering Advisor in the Division of Electrical, Communications and Cyber Systems, Directorate for Engineering. He served previously as Division Director, and earlier as Program Director in areas of quantum electronics, optics, plasmas, and electromagnetics. In the summer of 1989, he served as Acting Head of the NSF Office in Tokyo, Japan. In 1995, he was appointed by the President's Science Advisor to the interagency management committee for the U.S.-Japan Joint Optoelectronics Project. He served in 2005 as U.S. Embassy Science Fellow in Chisinau, Moldova, where he worked in close cooperation in an advisory role with the President of the Academy of Sciences of Moldova. He has since participated in U.S. government-level science studies in Ukraine, Kazakhstan, and Romania. At NSF, Dr. Goldberg provided oversight for the National Nanotechnology Infrastructure Network (NNIN). He currently is lead program officer and has guided the competition for the newly established National Nanotechnology Coordinated Infrastructure (NNCI), as successor to the NNIN. He has coordinated joint activities on nanoelectronics with the Semiconductor Research Corporation, conducted under NSF's emphasis area on Nanoscale Science and Engineering. He led federal agency funding for the 2012 National Academies study on Optics and Photonics: Essential Technologies for Our Nation. He serves as NSF member of the interagency Wireless Spectrum Research and Development Senior Steering Group, and represents the Engineering Directorate on the NSF program Enhancing Access to the Radio Spectrum (EARS). He also coordinates the Major Research Instrumentation (MRI) program for the Engineering Directorate. Dr. Goldberg is Fellow of the Optical Society of America, and Fellow of the Institute of Electrical and Electronic Engineers.

Notes:



John Shott

John Shott received three degrees from Stanford University in Electrical Engineering between 1972 and 1978. He then spent the remainder of his career at Stanford in clean room settings in the Integrated Circuits Laboratory, the Center for Integrated Systems, and the Stanford Nanofabrication Facility (SNL).

His focus during much of that time was on the technology, equipment, and facilities required to meet the research needs of a broad community of researchers.

He has recently retired, but is staying active in the university cleanroom community. John is currently the Emeritus Director of Technology at SNL.

Notes:

Russ Meyer

Russ Meyer has spent 20 years working at Micron Technology supporting advanced development and manufacturing programs. His experience spans many technology nodes across DRAM, NAND, and most recently 3D XPoint. He is currently working as Director of Process Integration for the 3D-XPoint development with the responsibility to manage the Micron side of a joint development program with Intel. Prior to his current role he was the Director of the NAND technology development program, spanning several planar nodes and the startup of Micron's Vertical NAND technology. He has also served as integration manager for Micron's 300mm silicon transition as well as several DRAM technology nodes. He graduated with an M.S. in Engineering Physics from North Dakota State University in 1995.

Notes:

UGIM Program Sunday, June 12, 2016

Location: Sorenson Molecular Biotechnology Building (SMBB), 2nd floor atrium and James L. Sorenson Auditorium (Room 2650)

Address: 36 S. Wasatch Dr., Salt Lake City, UT, 84112

Time	Room	SUNDAY, JUNE 12, 2016
8:00am - 11:00am	Auditorium	NNCI Coordination Meeting: Oliver Brand – GA Tech, Coordinator
11:00am - 6:00pm	Atrium	UGIM CHECK-IN & Registration
11:00am - 12:00pm	Auditorium	Introduce new facilities and first-time UGIM attendees: A. William Flounders – UCB
12:00pm - 1:00pm	Atrium	Lunch and Mingle
12:00pm - 1:00pm	Boardroom	UGIM Executive Committee meeting
1:00pm - 2:15pm	Auditorium	Bootie Camp - Cleanroom Management: Julia Aebersold - Louisville, Gary Spinner – GA Tech

2:15pm - 2:30pm	Atrium	Break
2:30pm - 3:45pm	Auditorium	Bootie Camp - Safety & Environmental: John Weaver - Purdue (Chair), Greg Cibuzar - UMinn, Dennis Schweiger - UMich, Mary Tang - Stanford
3:45pm - 4:00pm	Atrium	Break
4:00pm - 5:00pm	Auditorium	Open Source Cleanroom Management: Ryan Taylor – UofU (Host), Danny Pestal - UCB, Tom Lohman - MIT, Vicky Diadiuk - MIT, Dennis Grimard – MIT
5:00pm - 7:30pm	Atrium & adjacent Utah Nanofab	Reception & Utah Nanofab station-based tours Fab equipment swap meet (SMBB 2660)

UGIM Program

Monday, June 13, 2016

Location: Tower at Rice-Eccles Stadium

Address: 451 South 1400 East, Salt Lake City, UT 84112

Time	Room	MONDAY, JUNE 13, 2016
8:00am - 8:15am	Level 6	Opening Remarks
8:15am - 9:15am	Level 6	UGIM survey results: Who are we? Tom Ferraguto - UMass-Lowell Robert Hower - UMich, Susan Anson - KIT
9:15am - 9:45am	Levels 4 & 5	Morning Break
9:45am - 11:15am	Level 6	Keynotes Lawrence Goldberg - National Science Foundation John Shott - SNF Director of Technology Emeritus
11:15am - 12:45pm	Levels 4 & 5	Working Lunch - Topics by table (organized by David Dickensheets and Phil Himmer - MSU)

12:45pm - 1:15pm	Level 6	Debriefing Session David Dickensheets, Phil Himmer - MSU Facilitators discuss topics from tables
1:15pm - 2:15pm	Level 6	Financial Management Panel: Noah Clay - UPenn, Moderator Panelists: Lawrence Goldberg, John Shott, Tom Ferraguto, Robert Hower, Susan Anson, Kevin Walsh - Louisville
2:15pm - 2:45pm	Levels 4 & 5	Afternoon Break
2:45pm - 3:45pm	Level 6	Safety Panel: John Weaver - Purdue, Moderator Greg Cibuzar -UMinn, Dennis Schweiger - UMich, Mary Tang - Stanford
Time	Location	MONDAY EVENING, JUNE 13, 2016
4:00pm - 7:30pm	IM Flash - Lehi, UT	IM Flash Sponsored Dinner Keynote: Russ Meyer - Director of Process Integration Board buses at the front of the stadium by 4:00pm The buses will be at the dinner by 5:30pm
7:30pm - 9:30pm	Heber City, UT	Heber Valley Railroad Ride Board buses at 7:30pm to train at Vivian Park Return to hotel* between 9:30-10:30pm

*Bus will make a circuit to UofU Guest House, Research Park Marriott and Downtown SLC.

UGIM Program Tuesday, June 14, 2016

Location: Tower at Rice-Eccles Stadium

Address: 451 South 1400 East, Salt Lake City, UT 84112

Time	Room	TUESDAY, JUNE 14, 2016
8:00am - 10:00am	Level 6	Tool Selection: Iulian Codreanu – UDel, Session Chair
10:00am - 10:30am	Levels 4 & 5	Morning Break
10:30am - 11:45am	Level 6	Growing and Adapting to Your User Base: Aaron Hawkins - BYU, Session Chair
11:45am - 1:15pm	Levels 4 & 5	Working Lunch - Roles by table (organized by David Dickensheets and Phil Himmer, MSU)
1:15pm - 2:45pm	Level 6	Managing Exotic Materials: John Shott, Session Chair
2:45pm - 3:15pm	Levels 4 & 5	Afternoon Break

3:15pm - 5:00pm	Level 6	Fab Efficiency & Improvement: Dan Christensen – UWisc, Session Chair
Time	Location	TUESDAY, JUNE 14, 2016
5:00pm - 10:30pm	Red Pine Lodge @ The Canyons	Mountain Banquet Dinner Board buses in front of stadium by 5:15pm Arrive at Mountain Gondola by 6:00pm Return to hotel* by 10:30pm

*Bus will make a circuit to UofU Guest House, Research Park Marriott and Downtown SLC.

Tool Selection - Julian Codreanu, Session Chair

8:00am Acquisition of 17 Fumehoods and Wet Benches, Anders M. Jorgensen, Michael W. Allerup, Jan V. Eriksen, Majken Becker, Flemming Jensen and Karen Birkelund, Technical University of Denmark

8:15am Can You Satisfy Every Faculty? Jiangdong Deng, Harvard University Nanofabrication Facility, Center for Nanoscale Systems

8:30am Methodologies for Adding Critically Needed PVD Capability to an Already Extensive PVD Tool Suite, Matthew T. Moneck, Norman Gottron and Mark Weiler, Carnegie Mellon University Nanofabrication Facility

8:45am How Do You Optimize Tool Selection, Simon Doe, University of South Australia

- 9:00am Building an Academic Cleanroom, Peter Duda, University of Chicago
- 9:15am Acquiring Mission Critical Tools at MIT's Microsystems Technology Labs, Vicky Diadiuk, Massachusetts Institute of Technology
- 9:30am Ion Beam Lithography: Faster Writing Strategies for Features Between 150nm and 1um, B. P. Gila, A. Trucco and D. Hays, University of Florida
- 9:45am Bridging the Gap Between UV and E-beam Lithography with a DUV Stepper, Leif S. Johansen, Matthias Keil, Elena Khomtchenko, Anders M. Jørgensen and Jörg Hübner, Technical University of Denmark
- 10:30am **Growing and Adapting to Your User Base - Aaron Hawkins, Chair**
The Berkeley Micro/Nanolab High School Intern Program for Young Women, A. William Flounders, Katalin Voros and Tsu-Jae King Liu, UC Berkeley Marvell Nanofabrication Laboratory
- 10:45am Surviving in Today's Federal Funding Climate, J. Aebersold, K. Walsh, S. McNamara, E. Moiseeva, C. McKenna, X. Wang and M. Watson, University of Louisville
- 11:00am Innovative Outreach and Education Programs of the RTNN, Mark Walters, Duke University

11:15am Educational Programmes at NNfC, Savitha P. Sunanda Babu, Gopal Hegde and Prabhakara Rao, Indian Institute of Science

11:30am The Nordic Nanolab Network - A Best Practice Report, Kay Gastinger, Thomas Swahn, Jörg Hübner and Heini Saloniemi, NTNU NanoLab

Managing Exotic Materials - John Shott, Chair
1:15pm Safe Introduction of New Materials and Processes into Existing Open Access Laboratories, Nadia Cour, UNSW Australia

1:30pm Mixing Bio- and More Conventional Materials, J. Paul, HDR Architecture, Inc.

1:45pm Proper Building Abatement, Exhaust and Waste Handling/Collection Facilities to Accommodate a Broad Range of Materials, Greg Owen, Jacobs

2:00pm New Materials Challenges and Solutions for Operating Nanofabs that are Introducing ALD and MOCVD Processes, A. Gregg, Abbie Gregg Inc.

2:15pm Cleanroom Design for Hazardous Materials Segregation, Joe Morgan, Wilson Architects

2:30pm Panel Session

Fab Efficiency and Improvement - Dan Christensen, Chair

- 3:15pm ISO 9001 Certification for a Research, Development and Prototyping Cleanroom, Craig Hill, Dan Pulver and Marc Brunelle, Massachusetts Institute of Technology Lincoln Laboratory
- 3:30pm Overview of Daily Operation and Management of Multi-User, Gopalkrishna Hedge, Savita P., Y. P. P. Rao, S. A. Shivashankar, P. S. Anilkumar, Rudra Pratap and Navakanta Bhat, Indian Institute of Science
- 3:45pm Leveraging Opportunities for Capital Investment, Karl D. Hirschman and Scott P. Blondell, Rochester Institute of Technology
- 4:00pm Equipment Utilization: Lessons in Equipment Utilization from Queuing Theory, Mary X. Tang, Stanford University
- 4:15pm Merging a Cleanroom and an Analytical Microscopy Facility, Jörg Hübner, Technical University of Denmark
- 4:30pm If You Can't 'See' What You Made, What Good Is It? Tobi Beetz, Stanford University
- 4:45pm Worst Nightmare of a Facility Manager, Burak Birkan and Volkan Öxgüz, Sabanci University

UGIM Program

Wednesday, June 15, 2016

Location: Sorenson Molecular Biotechnology Building (SMBB), 2nd floor atrium and James L. Sorenson Auditorium (Room 2650)

Address: 36 S. Wasatch Dr., Salt Lake City, UT, 84112

TRACK A

Time	Room	WEDNESDAY, JUNE 15, 2016
8:00am	SMBB James L. Sorenson Auditorium RM 2650	Tom Britton - CSI, Requirements for a CGA Code G13-2015 gas cabinets & VMBs
8:50am	Auditorium	Mingle & Vendor Exhibits
9:00am	Auditorium	Dennis Grimard - MIT, Subatmospheric gas handling
9:25am	Auditorium	Gene Ungvarsky - End Users Consulting, Hazardous exhaust abatement strategies
9:50am	Auditorium	Mingle & Vendor Exhibits
10:00am	Auditorium	James Moody - IM Flash, Life safety monitoring systems for HPM's

10:50am	Auditorium	Mingle & Vendor Exhibits
11:00am	Auditorium	<p>Noah Clay – UPenn, Facilitator; Subsidy benchmarking: The search for sister Schools: Exchange metrics and administrative budget justifications.</p> <p>Bring statistics (from ASEE) on COE faculty size and research expenditures, then roughly classify and associate ourselves by small, midsize, large, then individually compare lists of toolsets, then directly comparing notes with peers on expense, revenue, “ROI” justification metrics and budget request approaches</p>
11:50am	Auditorium	Lunch, Mingle & Vendor Exhibits
1:00pm	Auditorium	Craig Noah – CSI, TEOS and precursor liquid delivery systems
1:50pm	Auditorium	Mingle & Vendor Exhibits

2:00pm	Auditorium	<p>Panel: Issues and concerns integrating the design requirements, and executing construction of a new or retrofitted cleanroom within a research laboratory building. The program will address HPM Handling, optimum facility location within the building, ancillary support services, system delineation, and contracting strategies.</p> <p>Tim Loughran - Cleanroom Construction Associates, Moderator, Jack Paul - HDR< Greg Owen - Jacobs, Abbie Gregg - AGI, Joe Morgan - Wilson Architects</p>
2:50pm	Auditorium	Mingle & Vendor Exhibits
3:00pm	Auditorium	<p>Dave Manko - V.P. Global Engineering, Kurt J. Lesker Company, Engineering design considerations (mechanical and software) for thin film deposition tools in the Nanofab</p> <p>Rob Belan - Technical Director PVD Products, Kurt J. Lesker Company, New and upcoming technologies in PVD and thin films; HIPIMS, pulsed DC, low pressure sputtering</p> <p>Duane Bingaman - V.P. Process Equipment Division, Kurt J. Lesker Company, Atomic layer deposition, beyond the basics- design and use considerations for high performance ALD</p> <p>Joe DeMaio - East Coast Sales Manager, Kurt J. Lesker Company, Educational Outreach, Lesker U</p>
Mingle - End of conference		

UGIM Program Wednesday, June 15, 2016

Location: Sorenson Molecular Biotechnology Building (SMBB), 2nd floor atrium and James L. Sorenson Auditorium (Room 2650)

Address: 36 S. Wasatch Dr., Salt Lake City, UT, 84112

TRACK B

Time	Room	WEDNESDAY, JUNE 15, 2016
8:00am	SMBB 2660	Matt Pleil - CNM, Micro/Nano education materials and media
8:25am	SMBB 2660	Jim Smith – UofU, Community college education nano connection to university
8:50am	SMBB 2660	Mingle & Vendor Exhibits
9:00am	SMBB 2660	Brian Van Devenor – UofU, Keeping Afloat: Analytical microscopy facilities co-administrated with cleanrooms
9:15am	SMBB 2660	Open Discussion: Analytical microscopy facility managers
9:50am	SMBB 2660	Mingle & Vendor Exhibits

10:00am	SMBB 2660	Greg Cibuzar – UMin, External revenue - Considerations for academic Nanofabs
10:25am	SMBB 2660	Jorg Scholvin – MIT, User behavior on high-demand tools (discrepancies between reservation availability and actual use)
10:50am	SMBB 2660	Mingle & Vendor Exhibits
11:00am	SMBB 2660	Niels Wijnaendts van Resandt – Heidelberg Instruments, Direct write LPG and grayscale litho on a desktop
11:50am	SMBB 2660	Lunch, Mingle & Vendor Exhibits
1:00pm	SMBB 2660	Rob Pearson - RIT, Incorporating course based formal labs in a research cleanroom
1:50pm	SMBB 2660	Mingle & Vendor Exhibits

2:00pm	SMBB 2660	Tony Olsen – UofU, Shared media for safety training Brian Baker – UofU, Shared media library for tool user training
2:25pm	SMBB 2660	Brian Earl and Bryan Tran – UofU, The cleanroom as the crown jewel of campus STEM outreach: Teaching scaling engineering in campus tours
2:50pm	SMBB 2660	Mingle & Vendor Exhibits
3:00pm	SMBB 2660	William M. Harris – Carl Zeiss Microscopy, Mastering the multi-scale challenge: Challenges in correlative microscopy
Mingle – End of conference		

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