

# IAB2024:

MTL Industrial Advisory Board  
Annual Meeting 2024

**MTL** ● MICROSYSTEMS  
● TECHNOLOGY  
● LABORATORIES

January 25, 2024  
Cambridge, MA

MICROSYSTEMS TECHNOLOGY LABORATORIES • MASSACHUSETTS INSTITUTE OF TECHNOLOGY



## AGENDA

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7:45am	<b>Breakfast</b>
8:30am	<b>MTL Director's update</b> , <i>Tomás Palacios</i>
9:30am	<b>Discussion with MIT/MTL Leadership</b> <i>Tomás Palacios and Marc Baldo</i>
10:00am	Photo
10:10am	<b>Break</b>
10:30am	<b>MIT.nano update</b> , <i>Vladimir Bulović</i>
10:45am	<b>Research Update 1: From Materials to Systems</b> <i>Suraj Cheema, Luqiao Liu, Song Han</i>
11:45am	<b>Report from the joint Committee on the future of computing and communications at MTL and RLE</b> , <i>Duane Boning</i>
12:00pm	<b>Sustainability Initiative</b> , <i>Elsa Olivetti</i>
12:15pm	<b>Lunch</b>
1:15pm	<b>Sustainability in Microelectronics</b> , <i>Lionel Kimerling</i>
1:30pm	<b>Research Update 2: System-Level Prototypes</b> <i>Tim Abate, Sam Coday, Kevin Chen</i>
2:30pm	<b>Elevator Pitch Presentations</b>
3:10pm	<b>Break</b>
3:30pm	<b>Discussion with faculty</b>
4:00pm	<b>IAB discussion and feedback to MTL leadership</b>
4:45pm	<b>Adjourn</b>



# MIG MEMBER BIOGRAPHIES



## **Susan Feindt**

Fellow & Advanced Process Development Director  
Analog Devices

Susan is an ADI fellow and Director of Analog's Advanced Process Development Group in Wilmington, MA. She has been with Analog Devices for over 30 years. Susan has led process development efforts for integrated circuits used in various applications and markets including automotive, communications, industrial and healthcare. She focuses on silicon based Bipolar and BiCMOS processes, Gallium Nitride and Heterogeneous Integration. Before joining Analog Device, Susan worked for Harris Semiconductor in Melbourne, Florida. Susan received her BS in Chemical Engineering from the Massachusetts Institute of Technology.



## **Mike DeLaus**

Fellow, Global Operations & Technology  
Analog Devices

Mike DeLaus is a Fellow in the Global Operations & Technology group at Analog Devices. He currently manages the Wafer-Level Packaging Team. He is responsible for ADI's wafer bumping, flip-chip, and fanout packaging strategies. He also manages development programs involving Through-Silicon Vias (TSVs), 3D integration, chiplets and other advanced packaging technologies. He has been at ADI for over 30 years and previously had roles managing bipolar transistor development and radiation hardening of process technologies. He began his career at Harris Semiconductor where he managed a yield and device engineering group. He currently serves on the Technical Program Committee for the Symposium on VLSI Technology and Circuits. He is a member of the IEEE Heterogeneous Integration Roadmap Committee. Mike received his B.S. degree in Materials Science and Engineering from the Massachusetts Institute of Technology.



**Michael Haverty**

Director and Distinguished Member of Technical Staff  
Applied Materials

Michael Haverty is a Director and Distinguished Member of Technical Staff at Applied Materials with degrees in Materials and Computer Science from Johns Hopkins and Stanford. He began his career as an intern as Intel's first Materials modeler during the first internet boom in 2001 and now leads one of the largest atomic-scale modeling teams in the semiconductor industry. He's worked with some of the earliest developing software companies in the field, in the startup world as a VP of Science, his own modeling consulting firm, and advising new start-ups in the area. He has a wide range of 30+ granted and in-process patents, funded and collaborated with academics through SRC and direct funding research projects, and obtained and worked on multiple US and European government funded grant projects. Now leading the Materials Design team at Applied he focuses the team on discovering, screening,



**David Carter**

Laboratory Fellow  
Draper

Dr. David Carter is Laboratory Fellow at Draper Laboratory. He has been at Draper for 22 years, where he has managed multiple technical groups, most recently Materials Science and Chemistry. He has led efforts to apply nanofabrication and nanotechnology in a variety of areas including RF MEMS, integrated optics, plasmonic devices, carbon nanotube MEMS/NEMS integration, and self-assembly, and has led multidisciplinary programs in micro/nanofabrication, microfluidics, biotechnology, mechanical and electrical engineering, and technology transition. His work in molded nanoscale polymers led to the first-ever demonstration of human climbing using biomimetic synthetic gecko adhesion. He has advised several graduate Draper scholars and has initiated multiple collaborations with university researchers (including several with MIT).

Prior to Draper, he held a research staff position at MIT, where he led the development of zone-plate-array lithography (ZPAL). Before MIT, he held a staff position at Harvard University, where he managed the cleanroom facility. Dr. Carter received his Ph.D. in Electrical Engineering from MIT and his A.B. and M.S. degrees in Engineering Sciences from Dartmouth College. He has co-authored 35 journal and conference papers and has 21 patents in micro/nanofabrication, nanotechnology, and materials.



**George Courville**

Business Development Manager, Technology Partnerships  
Edwards

George has over 25 years of experience as a marketing and business development professional. His career has included senior management positions with both large, multi-national corporations as well as small, nanotechnology start-ups. He has led global business development teams offering high performance materials and equipment for many uses in semiconductor, display, solar and other high technology markets. He was responsible for managing a marketing and applications team that introduced and supported the first dry vacuum pumps for the semiconductor market.

George received his Bachelor of Science degree in Chemical Engineering from Tufts University, and an MBA from Boston University.



**Anthony Taylor**

Applications Technologist  
Edwards

Anthony has over 30 years' experience working in the semiconductor industry and conducting research in thin film technology and microsystems. He has been with Edwards, Sanborn, New York, as an Applications Engineer and Applications Technologist for the past 28 years and a visiting scientist at MIT since 2014. His work at MIT has focused on novel fabrication methods of micro and nano-systems, specifically graphene-based gas sensors for vacuum and exhaust management applications, and 3D-printed miniature vacuum and liquid pumps. He received a Bachelor of Science degree in Physics (cum laude) from Saint Lawrence University, a Master of Science degree in Physics from the University of Arizona, and the Doctor of Philosophy in Physics from Rensselaer Polytechnic Institute (RPI).



### **Fredrik Dahlgren**

Head of Device Platform Research  
Ericsson Research

Fredrik Dahlgren is Head of Device Platform Research at Ericsson Research. He is also an Adjunct Professor at Chalmers University of Technology. Before this, he was Director of WARA, the Research Arenas of the Wallenberg Autonomous Systems and AI research program, during 2016-2017, and in that role he was also a Guest Professor at Linköping University. Fredrik Dahlgren has a PhD in Computer Architecture from Lund University in 1994. He was a visiting scientist at MIT 1995/1996 after which he became an associate professor at Chalmers. From 1999, he has been with Ericsson Group in various leading positions, including Head of Research at Ericsson Mobile Platforms, Head of Technology Management in the CTO Office (ST-Ericsson), and system architecture program manager for highly integrated multi-core and multimedia-centric smartphone platforms at ST-Ericsson.



### **Joel Schlee**

Head of Microwave Hardware and Antennas  
Ericsson Research

Joel Schlee is currently Head of Microwave Hardware and Antennas at Ericsson Research. He has previously worked as manager in the product development of point-to-point microwave links at Ericsson and he has a background in the semiconductor device community as founder and part owner of Low Noise Factory. He did his PhD in the Microwave Electronics domain focusing on cryogenic low noise InP HEMT transistors for quantum computers and radio astronomy.





**Ted Letavic**

Corporate Fellow  
Senior Vice President of Technology Innovation  
GlobalFoundries

Ted Letavic is a Corporate Fellow and Senior Vice President of Technology Innovation at GlobalFoundries. He is a group leader with technical roadmap responsibility for solution architecture and semiconductor innovation in market segments that include compute and datacenter, wired and wireless infrastructure, mobility, industrial/IoT/ATV, and high speed communications. His recent research interests include silicon photonics, sub tera-Hertz semiconductor devices, analog compute-in-memory, and quantum systems. He has over 60 US patents granted, has authored over 70 reviewed scientific papers, and serves on numerous academic and industrial advisory boards. He received a PhD in Electrical Engineering from Rensselaer Polytechnic Institute.



**Hiroshi Suzuki**

General Manager, Technology Strategy Division  
Hitachi High-Tech

Dr. Hiroshi Suzuki is the General Manager of the Technology Strategy Division of Hitachi High-Tech (HHT) and is responsible for the technology strategy of the HHT group.

He joined Central Research laboratory (CRL), Hitachi Ltd. in 1989, and researched electron-beam instruments for improving yields of semi-conductor and magnetic devices. He developed several methods and apparatuses to characterize the electrical properties of LSIs and to analyze the magnetic properties of several magnetic devices used in HDDs. He received academic awards including the Technology Development Award (JIM, 1999) and the Technology Award (JSPE, 2003). As a part of his carrier in Hitachi, he worked in research planning at CRL for several years, and he was temporary transferred to the corporate venture capital (CVC) of Hitachi's R&D division from 2004 to 2005.

He moved to Hitachi High-Technologies Corporation in 2011, where he was in charge of R&D planning and strategy, and he was temporary transferred to the HHT's subsidiary company to develop new technologies for inspection of social infrastructure from 2016 to 2018. He led technological innovation for HHT group from 2020 to 2022.

He graduated with his Bachelor's and Master's degrees in precision engineering from Tohoku University in 1987 and 1989. He obtained a Ph.D. in engineering from Tohoku University in 2007 when he worked for CRL, Hitachi Ltd..



**HITACHI**  
Inspire the Next

### **Junichi Tanaka**

Senior Chief Engineer  
Chief Technology Officer of Nano-technology Solution  
Business Group  
Hitachi High-Tech

Junichi Tanaka is the Senior Chief Engineer and Chief Technology Officer of Nano-technology Solution Business Group at Hitachi Hightech. He is dedicated to the careful monitoring and control of semiconductor device fabrication processes. Dr. Tanaka's first research was designing plasma process simulators and crafting monitoring tools specifically for plasma etchers. From 1998 to 1999, he was a Visiting Scholar at the University of California, Berkeley. During this tenure, he spearheaded the development of a pioneering force-potential model, which facilitated molecular dynamics simulations of SiO<sub>2</sub> reactive ion etching, providing predictions of etched pattern shapes.

He innovated various techniques to enhance etched profiles by harnessing the power of plasma spectra and integrating a customized FTIR wall monitor. These advancements paved the way for his involvement in a comprehensive Advanced Process Control (APC) project.

In 2008, he was awarded the Semicon-Japan Technology Symposium Award. A significant component of this achievement hinged on the consistent repeatability of CDSEM measurements. His current work is focused on exploring state-of-the-art technologies within the realms of metrology and inspection. Dr. Tanaka especially interested in various time-domain metrologies employing both lasers and electron beams.



### **Dirk Pfeiffer**

Sr. Manager, Microelectronics Research Laboratory  
IBM

Dr. Dirk Pfeiffer currently oversees all advanced hardware prototyping and fabrication services within IBM Research. The facilities he manages are staffed with 200+ engineers and scientist and include a 200 mm wafer scale fabrication line with a fleet of 150+ processing tools, 40000sf of clean room space, offline laboratories and model shop, offering a wide range of design and fabrication services, ranging from novel devices fabrication all the way to packaging, test, design, characterization, electronics, system integration and assembly. The wafer scale fabrication line is equipped with 200mm silicon wafer semiconductor processing tools ranging from ebeam/optical lithography, reactive ion etching, films, wets, CMP, plating, characterization tools to packaging tools such as wafer/chip bonding, deep silicon etch, others. The laboratory supports a broad scope of advanced device and hardware prototype development projects including CMOS scaling (5nm and beyond), non volatile memory, photonics, quantum computing, neuromorphic devices for AI based computing architectures, IoT devices for applications in health care, supply chain others.

Prior management assignments, he has been the PI/coPI of several government projects within IBM research related to hardware based security and anti tampering. He started his career at IBM in the lithography group as a polymer chemist, where he ran a joint development project with commercial partners to develop new polymer films for high resolution lithography. His innovations were implemented in lithography processes at the IBM semiconductor manufacturing facilities in East Fishkill, NY for product generations at 32nm node and beyond. He also worked as the technical assistant to the director of silicon technology at IBM prior becoming an IBM manager. Dirk holds a Ph.D. in organometallic chemistry from Wayne State University, Detroit, MI and completed a postdoctoral assignment at the University of Pennsylvania, PA working on organic synthesis and catalysis. He has authored and co-authored over 150 patents and publications and received several IBM outstanding technical achievement awards.



**Nerissa Draeger, Ph.D.**  
 Director of Global University Engagements  
 Lam Research Corporation

Dr. Nerissa Draeger is a senior innovation leader in the Office of the CTO at Lam Research, a semiconductor equipment company. Her interests lie at the intersection of emerging technologies, strategy and people. As Director of Global University Engagements at Lam, she drives innovation programs, guides external research collaborations to make industry impact, and builds academic partnerships to foster diversity in Lam’s technology and talent pipelines.

Prior to this role, Nerissa managed programs on advanced materials and processes, emerging electronic devices, strategic business and intellectual property development. She earned her Ph.D. in materials science and engineering from the University of Illinois at Urbana-Champaign and her B.S.E. from the University of Michigan at Ann Arbor. She currently holds positions on the Board of Directors for UIDP and the Materials Research Society (MRS), in addition to industry advisory roles for academic research consortia.



**Esther Jeng, Ph.D.**  
 Senior Manager of Open Innovation  
 Lam Research Corporation

Dr. Esther Jeng is senior manager of open innovation in the Office of the CTO at Lam Research where she connects emerging technologies to Lam’s semiconductor products for manufacturing new generations of chips. She manages a portfolio of exploratory technologies in partnership with university and startup ecosystems to find solutions to the industry’s grand challenges.

Esther has held multiple roles at Lam, leveraging 14 years of experience in ALD and CVD metals thin-film deposition. She has collaborated closely with leading-edge customers and led globally located engineering teams to develop products from initial power-up in the lab to high-volume production for logic and memory fabrication. Her areas of expertise include plasma and thermal thin film deposition, chemical process development and precursor handling in vacuum systems, and defect management.

Her first immersion into engineering was at MIT where she learned to foster technical discourse and execution at all levels, from the use of liquid nitrogen to make the smoothest ice cream to the development of fluorescent carbon nanotube sensors. She believes that the most robust solutions are developed from open discussions where everyone contributes. Esther earned B.S. and Ph.D. degrees from MIT and an M.S. from the University of Illinois Urbana-Champaign in chemical engineering and has authored several papers and patents. She enjoys exploration: from cities worldwide to seedlings sprouting in her backyard.



**John Callahan**

Research Scientist, Senior Staff  
Lockheed Martin

John J. Callahan, Ph.D. is a Research Scientist, Senior Staff at Lockheed Martin Space in Billerica, MA. John received his PhD and Masters degrees from the Georgia Institute of Technology and BSEE from the University of Lowell. His graduate work focused on optoelectronic heterogenous integration creating one of the first optical transceivers. Dr. Callahan has a career spanning over two decades advancing commercial semiconductor, assembly, and optoelectronic technologies. His current efforts at Lockheed Martin focus on advancing GaN technology for high-temperature applications, integrated optoelectronics and heterogenous integration utilizing chiplet technology for advanced processing platforms.

Prior to joining Lockheed Martin, John was the VP of Technology at BRIDG, a 200mm semiconductor fabrication organization. While at BRIDG he spearheaded the creation and managing of BRIDG’s technology roadmap, managed the operations and facilities teams, and provided technical sales by creating processing solutions to customer requests. Prior to BRIDG, he served at the Vice President of Engineering at SemiNex, a developer of long wavelength high-power semiconductor lasers. He oversaw both engineering and operations, managing the international supply chain. He was responsible for the creation of eight major product lines and over 300 products for the military, industrial, consumer and datacom markets. Before his tenure at Seminex, John served as the Director of Engineering at Cubic Wafer, where he led the efforts to create manufacturing process for 3D Heterogeneous Integration assembly techniques. His organization was one of the first to produce through silicon vias (TSV’s) and 3D assembly using microcontacts. Prior to Cubic Wafer, he was the Director of Research and Development at Xanoptix where he oversaw Process, Mechanical, IC Design Engineering teams to create a high-speed large aggregated data optical transceiver for the datacom market.



**Keith Lynn**

General Manager and Site Lead for the Space  
Microelectronics R&D Center  
Lockheed Martin

Keith Lynn is General Manager and site lead for the Space Microelectronics R&D Center at Lockheed Martin (LM). Since taking this position in 2020, Keith has expanded the 5,000 sq. ft. laboratory capability to create LM’s only Gallium nitride fabrication line and state-of-the-art anti-tamper hardware device fabrication. With over \$2M in capital investment, the Center is now leading strategic efforts for edge digital processing and next-gen hypersonic strike.

In addition to program execution, Keith has supported Corporate in the development of multiple Fortune 100 partnerships. This includes MoU and co-bidding efforts with Intel, GlobalFoundries, and Microsoft, with additional support to GE, GM, and IBM relationship development. Keith was also nominated as the LM representative to NextFlex’s Governing Council, where he helps shape future research programs toward top DoD needs.



**Aki Sato**

Senior Manager, ETA Wireless  
Murata Electronics North America, Inc.

Aki Sato is the Senior Manager of ETA Wireless (a Murata company) in Cambridge and a member of Corporate Technology & Innovation at Murata Electronics North America, Inc.

He worked for Renesas Electronics and Fujitsu semiconductor and joined Murata Manufacturing in 2013 and worked with customers in Silicon Valley California before moving to Massachusetts.

He graduated with his master's degree from University of Electro-Communications in Tokyo in 2009.



**Johan Suzuki**

Manager, Corporate Technology & Innovation  
Murata Electronics North America, Inc.

Johan Suzuki is a Manager of Corporate Technology & Innovation at Murata Electronics North America, Inc. He is responsible for accelerating innovation and developing new technology through industry partnerships and leveraging Murata strengths.

He received Bachelor's and Master's degrees in electrical engineering from Keio University in 2006 and 2008. He began his career with Murata in 2015 as a senior engineer and developed wireless communication modules.

The research in his group focuses on next-generation communication / 6G, optics&Semiconductor, the environment, and bioelectronics.



**NEC**

**Sota Kagami**

Researcher, Secure System Platform Research Laboratories  
NEC Corporation

Mr. Sota Kagami is a Researcher at NEC Secure System Platform Research Laboratories. His research has focused on quantum sensing, including atomic clocks based on atomic vapor cells and cold atoms. He received B.S. and M.S. degrees in physics from Tokyo Institute of Technology, Japan, in 2007 and 2009, respectively. He joined NEC Corporation in 2009 and engaged in the research and development of infrared detectors based on semiconductor nanostructures. From 2016 to 2017, he joined NIST in Boulder, Colorado, U.S. as a visiting scholar and was engaged in developing atomic optical magnetometers. His research interests include devices and sensors based on quantum nanostructures, superconducting circuits, atoms, and nitrogen vacancy centers in diamond.



**NEC**

**Akihiro Kirihara**

Senior Manager, System Platform Research Laboratories  
NEC Corporation

Mr. Akihiro Kirihara is a Senior Manager in NEC System Platform Research Laboratories, and is responsible for managing research projects on nano and quantum devices (e.g. quantum atomic clocks and nano-carbon sensors), and data-driven material R&D.

After he obtained B. Eng. (in 2002) and M. Eng. (in 2004) from the University of Tokyo, he joined NEC Corporation in 2004. Since then, he has studied on quantum-dot emitters, spintronic devices, and quantum atomic clocks. From 2013 to 2014, he was a visiting researcher in Technische Universitaet Kaiserslautern. His current interest is highly accurate sensing and positioning based on quantum effects.



**Dr. Ionut Radu**  
Senior Director, Innovation  
Soitec

Ionut Radu is Senior Director, Innovation at Soitec being responsible for path finding and worldwide partnerships with industrial and academic innovation platforms supporting strategic developments of substrate technologies for semiconductor industry.

Dr. Radu obtained his B.S. in physics from University of Bucharest in 1999 and Ph.D (Dr. rer. nat.) in physics from Martin-Luther University Halle-Wittenberg in 2003. He has co-authored more than 100 papers in peer-reviewed journals, conference proceedings and reference handbooks and holds more than 80 patents in the field of semiconductor technologies. Dr. Radu has been elected IEEE fellow effective January 2024 and serves as Vice-President of the IEEE-EDS France chapter since 2018. Ionut was keynote and invited speaker at major international conferences, such as IEDM, ECS, ICICDT, VLSI Symposium, IEEE VLSI-TSA, etc



**Cesar Roda Neve**  
R&D Program Manager  
Soitec

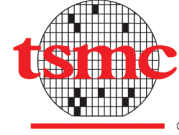
Cesar Roda Neve was born in Madrid, Spain, in 1975. He received the Msc. Engineer degree from the ICAI Universidad Pontificia de Comillas, Madrid, Spain, in 2000. In 2012, he received the Ph.D. degree in engineering sciences from the Université catholique de Louvain (UCL), Belgium. From 2004 to 2006, he was with the Electronics Department of the University Carlos III of Madrid, Spain, where he worked on ROF links and optoelectronic devices. From 2006 to 2012, he joined the Microwave Laboratory at the Université catholique de Louvain (UCL), Belgium, where he worked on the characterization and application of Si-based substrates for RF integration, in particular the use of HR-Si, HRSOI, and trap-rich HR-SOI substrates, non-linearities and parasitic effects. From 2013 to 2016 he was with the 3D and Optical Technology group of IMEC, Leuven, Belgium, focusing on new technologies development with special attention to 2.5D, 3D stacking and packaging. From 2016 to 2021 he worked at M3 Systems Belgium, as senior project manager and coordinator on GNSS related projects and satellite / UAV communications, in close cooperation with the European Space Agency. In 2021 he joined SOITEC as R&D Program Manager working on strategic research applications and products; mainly focusing on RF, 6G, quantum, and advanced CMOS technologies.



**Gary Chen**

Technical Manager  
TSMC

Gary Chen is a technical manager at TSMC with 15+ years of experience. He specializes in high k dielectric materials, advanced transistor evaluation, and Gate-All-Around transistors research. He's been involved in various SRC projects, including TAB/SAB for JUMP and nCore since 2021. Gary is the 2022 SRC LMD TAB Chair and the 2021/2022 VLSI-TSA North America TPC Chair. He has won first prize in the 2017 and 2019 TSMC patent campaigns and has over 100 U.S. patents granted. Gary has also published papers on Cryogenic CMOS/3D SRAM IEDM and FTJ paper 2022 Symposium VLSI.



**Tony Shao**

Department Manager, Forward Looking Program PDF for System Integration  
TSMC

Dr. Tony Shao is department manager of Pathfinding for System Integration at Taiwan Semiconductor Manufacturing Co. Ltd. (TSMC). He received his BSc degree from National Cheng Kung University, MSc degree from National Taiwan University, and PhD degree on materials science from National Chiao Tung University in Taiwan.

Tony served in a variety of roles throughout his career including R&D in system integration technologies including Flip-Chip, Fan-In, Fan-Out, and direct bonding. Before joining TSMC, Dr. Shao was a senior R&D manager at AU Optronics Corporation in Taiwan, and responsible for LCD display development from 2002 to 2008. He has received more than 50 worldwide patents.





**Jim Wieser**

Director of University Research and Technology  
Texas Instruments

Jim serves Texas Instruments as Director of Technology and University Research within the CTO Office at Texas Instruments. In this role he identifies and drives strategic technology initiatives, research strategy and aligns university research to the needs of the company. His semiconductor experience spans over 40 years in the areas of design, product development management and technologist. He is an IEEE Life Senior Member and SRC Executive Technical Advisory Board member for TI. Jim has been an active member of the SRC-SIA Decadal Plan for Semiconductors committee, chairing the analog focus area workshop and report. Additionally, he has been a member of the SRC-NIST MAPT roadmap executive committee and workforce development chapter which was released in Oct 2023. He is also currently active in leading Analog and Mixed Signal efforts towards an NSTC proposal.

Jim received his BSEE and MSEE from University of Michigan and joined National Semiconductor starting his career in the semiconductor industry. He began as a circuit designer in the pioneering days of analog CMOS, including switched capacitor filters and data converters. Jim developed circuits and managed design of telecom products, including voice band codecs, modems, ISDN and ADSL. Jim spent two years as Director/VP of Analog/Mixed Signal Methodology refining the analog design flow to address National's SoC product strategy. Later he led the development of 10/100 and Gigabit Ethernet Phys and MACs in the Networking division as Design Director. In 2002 Jim was promoted to Chief Technologist of the Interface Division and was later promoted to Chief Technologist for the Product Group covering four product divisions. He later joined the CTO office to drive strategic technology and university research. Jim holds 21 patents in the area of analog circuits and system design.



**Michael H. Perrott**

Systems Engineer  
Texas Instruments

Michael H. Perrott received the B.S. degree in electrical engineering from New Mexico State University, Las Cruces, NM, and the M.S. and Ph.D. degrees in electrical engineering and computer science from Massachusetts Institute of Technology (MIT), Cambridge, MA. He was a visiting Assistant Professor with the Hong Kong University of Science and Technology in 1999, was an Assistant and then Associate Professor with the Department of Electrical Engineering and Computer Science, MIT, Cambridge, MA from 2001 to 2008, and was a Professor with the Masdar Institute of Science and Technology, Abu Dhabi, UAE, from 2011 to 2013. He has worked in industry at Hewlett-Packard Laboratories, Palo Alto, CA (1999), Silicon Laboratories, Austin, TX (1999-2001, 2013-2014), SiTime Corporation, Sunnvale, CA (2008-2010), Invensense, San Jose, CA (2014-2019), and is now at Texas Instruments, Manchester, NH as of 2019. His key areas of interest include high performance timing circuit architectures, such as wide bandwidth, low jitter fractional-N phase-locked loops, and precision circuit architectures. He is a Fellow of the IEEE.



# MIT FACULTY AND STAFF BIOGRAPHIES



## **Iwnetim Abate**

Assistant Professor, Department of Materials Science and Engineering

Iwnetim (Tim) Abate is an Assistant Professor in the Department of Materials Science and Engineering at the Massachusetts Institute of Technology. His work combines electrochemistry, X-ray and electrochemical characterization with quantum mechanical simulations to design materials for decarbonization and sustainability. Prior to joining MIT DMSE, he was both a Miller and Presidential Postdoctoral Fellow at UC Berkeley working on layered materials (including 2D materials and heterostructures) for application in computing, catalysis, and sensing. He completed his Materials Science and Engineering Ph.D. at Stanford, with or under Prof. William Chueh and Prof. Thomas Devereaux. His PhD aimed at improving the energy capacity of Li- and Na-ion batteries to meet the ever-growing global demand for energy storage. Prior to joining Stanford, he did a research stint at IBM Almaden and Los Alamos National Laboratory working on metal-air batteries and hybrid perovskite solar cells, respectively. Iwnetim was born and raised in Ethiopia.

Outside the lab, Iwnetim is a co-founder and president of a non-profit organization ([www.scifro.org](http://www.scifro.org)) working on empowering the African youth to solve local problems through scientific research and innovation. The organization is generously supported by the Bill & Melinda Gates Foundation, National Science Foundation, American Physical Society and others.



## **Marc Baldo**

Director, Research Laboratory of Electronics  
Professor, Department of Electrical Engineering

Marc Baldo is the Dugald C. Jackson Professor of Electrical Engineering and the Director of the Research Laboratory of Electronics (RLE) at the Massachusetts Institute of Technology (MIT). Professor Baldo's research interests include light emitting devices and solar cells, electrical and exciton transport in organic materials, exciton fission and fusion, chemical sensors, and spintronics. Professor Baldo has been at MIT since 2002. Before that he received his B. Eng. (Electrical Engineering) from the University of Sydney in 1995 with first class honors and university medal, and his M.A. and Ph.D. from Princeton in 1998 and 2001, respectively. Notable awards include the Jan Rajchman Prize from the Society for Information Display for his contributions to modern phosphorescent organic light emitting displays.



### **Duane S. Boning**

Associate Director, MTL  
Clarence J. LaBel Professor, Department of  
Electrical Engineering & Computer Science  
Engineering Faculty Co-Director, MIT Leaders for  
Global Operations (LGO) Program

Duane S. Boning is the Clarence J. LeBel Professor in the Electrical Engineering and Computer Science Department at MIT. He is affiliated with the MIT Microsystems Technology Laboratories and serves as MTL Associate Director for Computation and CAD. From 2004 to 2011, he served as Associate Head of the EECS Department at MIT, from 2011 through 2013 as Director/Faculty Lead of the MIT Skoltech Initiative, and from 2011 to 2018 as the Director of the MIT/Masdar Institute Cooperative Program. From July 2019 to June 2021, he served as Associate Chair of the Faculty at MIT. He is currently the Engineering Faculty Co-Director for the MIT Leaders for Global Operations (LGO) Program.

He received his S.B. degrees in electrical engineering and in computer science in 1984, and his S.M. and Ph.D. degrees in electrical engineering in 1986 and 1991, respectively, all from the Massachusetts Institute of Technology. He was an NSF Fellow from 1984 to 1989, and an Intel Graduate Fellow in 1990. From 1991 to 1993 he was a Member Technical Staff at the Texas Instruments Semiconductor Process and Design Center in Dallas, Texas, where he worked on semiconductor process representation, process/device simulation tool integration, and statistical modeling and optimization. His research at MIT focuses on statistical and machine learning for understanding, controlling and reducing variation in semiconductor, photonics, and MEMS processes, devices, and circuits. Forbes Magazine's "30 Under 30" for Healthcare, the NSF CAREER award, the Bayer Early Excellence in Science Award, and is a Schmidt AI2050 Early Career Fellow.



### **Vladimir Bulović**

Founding Director, MIT.nano  
Maseeh Professor, Department of Electrical Engineering  
& Computer Science

Vladimir Bulović is a Professor of Electrical Engineering at the Massachusetts Institute of Technology, holding the Fariborz Maseeh Chair in Emerging Technology. He directs the Organic and Nanostructured Electronics Laboratory, and is the Founding Director of MIT.nano, MIT's nano-fabrication, nano-characterization, and prototyping facility. He is an author of over 300 research articles (cited over 70,000 times and recognized as the top 1% of the most highly cited in the Web of Science). He is a fellow of the National Academy of Inventors and an inventor of over 120 U.S. patents in areas of light emitting diodes, lasers, photovoltaics, photodetectors, chemical sensors, programmable memories, and micro-electro machines, majority of which have been licensed and utilized by both start-up and multinational companies. The start-up companies Bulović co-founded jointly employ over 350 people, and include Ubiquitous Energy, Inc., developing nanostructured solar technologies, Kateeva, Inc., focused on development of printed electronics, and QD Vision, Inc. (acquired in 2016) that produced quantum dot optoelectronic components. Products of these companies have been used by millions. Bulović was the first Associate Dean for Innovation of the School of Engineering and the Inaugural co-Director of MIT's Innovation Initiative, which he co-led from 2013 to 2018. For his passion for teaching Bulović has been recognized with the MacVicar Fellowship, MIT's highest teaching honor. He completed his Electrical Engineering B.S.E. and Ph.D. degrees at Princeton University.



### **Suraj Cheema**

Principal Investigator, Research Laboratory of Electronics  
Assistant Professor, Department of Materials Science  
and Engineering, Department of Electrical Engineering  
and Computer Science

Suraj Cheema is a Principal Investigator in the Research Laboratory of Electronics (RLE) and an incoming Assistant Professor in the Department of Materials Science and Engineering (DMSE) and the Department of Electrical Engineering and Computer Science (EECS) at MIT. His research explores the physical limits of collective electronic order and negative electronic phenomena in CMOS-compatible materials, which are engineered to exhibit unprecedented electronic properties and device performance towards next-generation microelectronics, spanning ultra-low power computing and memory to ultra-fast on-chip energy storage and power delivery. Suraj previously interned with MIT Lincoln Laboratory to integrate his patented negative permittivity HfO<sub>2</sub>-ZrO<sub>2</sub> gate dielectric into U.S. defense foundry transistor technology.

For his discovery of ferroelectric order and negative capacitance in atomically-thin HfO<sub>2</sub>-ZrO<sub>2</sub> films on silicon, Suraj was the recipient of the 2023 APS Richard Greene Dissertation Award in Experimental Condensed Matter Physics, the 2022 DARPA Riser Award, and the 2020 MRS Graduate Student Gold Award. Suraj completed his Ph.D. in MSE from U.C. Berkeley in 2021 and postdoc in EECS at U.C. Berkeley in 2024. Suraj received his B.S. from Columbia University in the Applied Physics and Applied Mathematics department in 2012, where he was awarded the Francis Rhodes Prize.



### **Kevin Chen**

Assistant Professor, Department of Electrical  
Engineering and Computer Science

Kevin Chen is currently the D. Reid Weedon, Jr. '41 Career Development Assistant Professor at the Department of Electrical Engineering and Computer Science, MIT, USA. He received his PhD in Engineering Sciences at Harvard University in 2017 and his bachelor's degree in Applied and Engineering Physics from Cornell University in 2012. His research interests include developing high bandwidth and robust soft actuators for microrobot manipulation and locomotion.

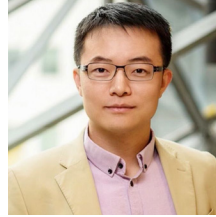
He has published in top journals including Nature, Science Robotics, Advanced Materials, PNAS, Nature Communications, IEEE TRO, and Journal of Fluid Mechanics. He is a recipient of the NSF CAREER award, the TRO 2021 best paper award, the RAL 2020 best paper award, the IROS 2015 best student paper award, the RAL 2021 Outstanding Associate Editor award, and the Ruth and Joel Spira Teaching Excellence Award.



### **Sam Coday**

Assistant Professor, Department of Electrical Engineering and Computer Science

Samantha Coday is the Emanuel E. Landsman (1958) Career Development Assistant Professor of Electrical Engineering at Massachusetts Institute of Technology. Samantha is a Principal Investigator in the Research Laboratory of Electronics and is affiliated with the Microsystems Technology Laboratories. She received the M.S. degree and Ph.D. degree in electrical engineering and computer sciences in 2019 and 2023, respectively, from the University of California, Berkeley. Her research interests include ultra dense power converters enabling renewable energy integration, hybrid electric aircraft and future space exploration. She focuses on the optimization, design and control of hybrid switched-capacitor converters. Samantha has received the Outstanding Graduate Student Instructor Award at University of California, Berkeley, the Cadence Women in Technology Scholarship, and the ThinkSwiss Research Scholarship.



### **Song Han**

Associate Professor, Department of Electrical Engineering and Computer Science

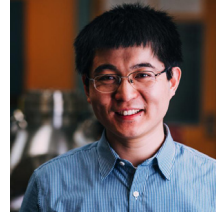
Song Han is an associate professor at MIT EECS. He received his PhD degree from Stanford University. He proposed the “Deep Compression” technique including pruning and quantization that is widely used for efficient AI computing, and “Efficient Inference Engine” that first brought weight sparsity to modern AI chips, which is top-5 most cited papers in 50 years of ISCA. He pioneered the TinyML research that brings deep learning to IoT devices, enabling learning on the edge (appeared on MIT home page). His team’s work on hardware-aware neural architecture search (once-for-all network) enables users to design, optimize, shrink and deploy AI models to resource-constrained hardware devices, receiving the first place in many low-power computer vision contests in flagship AI conferences. His team’s recent work on large language model quantization/acceleration (SmoothQuant, AWQ, StreamingLLM) has effectively improved the efficiency of LLM inference, adopted by NVIDIA TensorRT-LLM. Song received best paper awards at ICLR and FPGA, faculty awards from Amazon, Facebook, NVIDIA, Samsung and SONY. Song was named “35 Innovators Under 35” by MIT Technology Review for his contribution on “deep compression” technique that “lets powerful artificial intelligence (AI) programs run more efficiently on low-power mobile devices.” Song received the NSF CAREER Award for “efficient algorithms and hardware for accelerated machine learning”, IEEE “AI 10 to Watch: The Future of AI” award, and Sloan Research Fellowship. Song’s research in efficient AI computing has witnessed successful commercialization and influenced the industry. He was the cofounder of DeePhi (now part of AMD), and cofounder of OmniML (now part of NVIDIA). Song developed the EfficientML.ai course to disseminate efficient ML research.



### **Lionel C. Kimerling**

Director, MIT Microphotonics Center  
Professor, Department of Materials Science and Engineering

Lionel C. Kimerling is the Thomas Lord Professor of Materials Science and Engineering at MIT and the Director of the MIT Microphotonics Center where he conducts an active research program in the design and processing of semiconductor materials and devices. He is an alumnus of MIT, having earned a baccalaureate in Metallurgical Engineering and a doctorate in Materials Science at MIT. He was Head, Materials Physics Research at AT&T Bell Laboratories when he joined the faculty of MIT as Professor. He was Director of the MIT Materials Processing Center for 15 years, establishing it as the industry portal for faculty across all materials-related disciplines. He is the lead for MIT's Initiative for Knowledge and Innovation in Manufacturing and the AIM Photonics Institute Executive for Education, Workforce Development. He has authored more than 700 technical articles and more than 75 patents in the fields of integrated photonics and semiconductor processing. The MIT Microphotonics Center Industry Consortium founded the Integrated Photonics System Roadmap, International (IPSR-I). Kimerling has had a fundamental impact on the understanding of the chemical and electrical properties of defects in semiconductors and the use of this knowledge in materials processing and component reliability. His research teams have enabled long-lived telecommunications lasers, developed semiconductor diagnostic methods such as DLTS, SEM-EBIC and RF-PCD, and pioneered silicon microphotonics.



### **Luqiao Liu**

Associate Professor, Department of Electrical Engineering and Computer Science

Luqiao Liu is an Associate Professor of Electrical Engineering at Massachusetts Institute of Technology. He received his B.S. in physics from Peking University in 2006, and Ph.D. in Applied Physics from Cornell University in 2012. He worked as a Research Staff Member at IBM Watson Research Center before joining MIT in 2015.

Luqiao's current research focuses on spintronic material and devices for memory and logic applications. Luqiao Liu has received McMillan Award, NSF Career Award, Air Force Young Investigator Award, Sloan Fellowship, and International Union of Pure and Applied Physics Young Scientist Award.



### **Elsa Olivetti**

Associate Dean of Engineering  
Jerry McAfee (1940) Professor in Engineering  
Professor of Materials Science and Engineering  
MacVicar Faculty Fellow

Professor Olivetti received a BS in engineering science from the University of Virginia in 2000, and a PhD in materials science and engineering from MIT in 2007. She spent her PhD program studying the electrochemistry of polymer and inorganic materials for electrodes in lithium-ion batteries. In 2014, she joined DMSE as an assistant professor. As an educator, Olivetti overhauled DMSE's undergraduate curriculum and developed new courses, including one for the MIT Climate and Sustainability Consortium Climate Scholars. She's a member of the MIT Climate Nucleus and co-director of the MIT Climate & Sustainability Consortium.

Professor Elsa Olivetti's research focuses on improving the environmental and economic sustainability of materials. Specifically, she develops analytical and computational models to provide early-stage information on the cost and environmental impact of materials. Professor Olivetti and her research-group colleagues work toward improving sustainability through increased use of recycled and renewable materials, recycling-friendly material design, and intelligent waste disposition. The Olivetti Group also focuses on understanding the implications of substitution, dematerialization, and waste mining on materials markets.

Olivetti was appointed as associate dean of engineering, effective September 1, 2023. She will oversee a number of strategically important programs and initiatives across MIT's School of Engineering. She will help lead and shape school-wide efforts related to climate and sustainability. In close collaboration with Nandi Bynoe, the assistant dean for diversity, equity, and inclusion; the school's DEI faculty lead; and various program faculty leads, Olivetti will oversee the school's DEI activities and programs. She will also assist with the faculty promotion process and will support both faculty and students across the school with regard to fellowships, awards, and honors.



### **Tomás Palacios**

Director, Microsystems Technology Laboratories  
Clarence J. LeBel Professor, Department of Electrical Engineering & Computer Science

Tomás Palacios is the Clarence J. LeBel Professor in the Department of Electrical Engineering and Computer Science at MIT. He received his PhD from the University of California - Santa Barbara in 2006, and his undergraduate degree in Telecommunication Engineering from the Universidad Politécnica de Madrid (Spain). His current research focuses on demonstrating new electronic devices and applications for novel semiconductor materials such as graphene and gallium nitride. His work has been recognized with multiple awards including the Presidential Early Career Award for Scientists and Engineers, the IEEE George Smith Award, and the NSF, ONR, and DARPA Young Faculty Awards, among many others. Prof. Palacios is the founder and director of the MIT MTL Center for Graphene Devices and 2D Systems, as well as the Chief Advisor and co-founder of Cambridge Electronics, Inc. He is a Fellow of IEEE.



# MTL LEADERSHIP BIOGRAPHIES



## **Tomás Palacios**

Director, Microsystems Technology Laboratories  
Clarence J. LeBel Professor, Department of Electrical Engineering & Computer Science

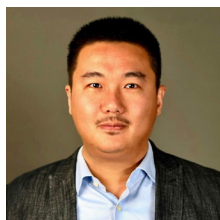
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## **Duane S. Boning**

Associate Director, MTL  
Clarence J. LaBel Professor, Department of Electrical Engineering & Computer Science  
Engineering Faculty Co-Director, MIT Leaders for Global Operations (LGO) Program

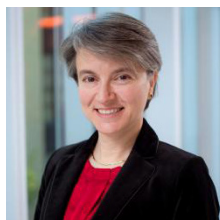
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## **Ruonan Han**

Associate Director, MTL  
Associate Professor, Department of Electrical Engineering and Computer Science  
Director of MTL Center of Integrated Circuits and Systems

Ruonan received his B.S. degree in microelectronics from Fudan University, China, in 2007, M.S. degree in electrical engineering from University of Florida in 2009, and Ph.D. in electrical and computer engineering from Cornell University in 2014. He joined MIT in July 2014 and is now an associate professor at the Department of Electrical Engineering and Computer Science. His research group aims to explore microelectronic circuits and systems to bridge the terahertz gap between microwave and infrared domains. He has served on the committees of a few conferences, including the technical-program committee (TPC) of IEEE International Solid-State Circuits Conference (ISSCC) (2022-present), IEEE Radio-Frequency Integrated Circuits (RFIC) Symposium (2017-present), and 2019 International Microwave Symposium (IMS) Steering Committee. He was the associate editor of the IEEE Transactions on Quantum Engineering (2020-present) and IEEE Transactions on Very-Large-Scale Integration (VLSI) Systems (2018-2021), and the Guest Editor of the IEEE Transactions on Microwave Theory and Techniques (T-MTT) (2019). He is the 2020-2022 Distinguished Microwave Lecturer of IEEE Microwave Theory Techniques Society (MTT-S). Ruonan is the recipient of three Best Student Paper Awards from IEEE RFIC Symposium (2012, 2017 and 2021), NSF Faculty Early CAREER Development Award (2017), Intel Outstanding Researcher Award (2019) and the IEEE Solid-State Circuit Society New Frontier Award (2023). In 2023, he was appointed as the Associate Director of Microsystem Technology Laboratories (MTL) and Director of MTL Center of Integrated Circuits and Systems (CICS).



## **Bilge Yildiz**

Associate Director, MTL  
Professor, Department of Nuclear Science and Engineering

Bilge Yildiz is the Breene M. Kerr (1951) Professor at Massachusetts Institute of Technology, where she leads the Laboratory for Electrochemical Interfaces. Yildiz's research focuses on laying the scientific groundwork to enable next generation electrochemical devices for energy conversion and information processing. Yildiz's teaching and research efforts have been recognized by the Argonne Pace Setter (2006), ANS Outstanding Teaching (2008), NSF CAREER (2011), IU-MRS Somiya (2012), the ECS Charles Tobias Young Investigator (2012), the ACerS Ross Coffin Purdy (2018) and the LG Chem Global Innovation Contest (2020) awards. She is a Fellow of the American Physical Society (2021), the Royal Society of Chemistry (2022), and the Electrochemical Society (2023) and an elected member of the Austrian Academy of Science (2023)

# ELEVATOR PITCH PRESENTATIONS



## **Ultra-low-noise Deep-cryogenic Amplifier Based on Hydrodynamic Charge Transport in GaAs/AlGaAs**

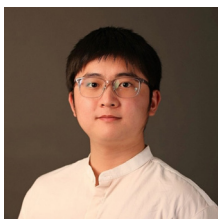
Mani Chandra is the CEO of nOhm Devices, a recently incorporated startup being incubated at MIT.nano. nOhm is developing a new type of amplifier with superior performance in terms of electrical noise, bandwidth and heat dissipation, based on non-Ohmic (“nOhm”) charge transport in two-dimensional semiconductors, initially targeting quantum computing and quantum sensing applications. He obtained his PhD in 2016 in high-energy astrophysics from the University of Illinois, Urbana-Champaign where he was an Illinois Distinguished Fellow. His thesis on extended general relativistic magnetohydrodynamics to model accretion disks around supermassive black holes has been awarded the Chu award for research excellence. He has since applied his expertise in fluid dynamics and kinetic theory to device physics, motivated by recent discoveries of hydrodynamic charge transport in various materials. nOhm Devices is an outcome of work by him and his collaborators to develop a new technological platform that overcomes the fundamental limitations inherent to field effect transistors that underlie all current electronics.



## **Conformable Ultrasound Breast Patch (cUSBr-Patch) for Early Breast Cancer Detection**

Canan Dagdeviren is LG career development professor of media arts and sciences at Massachusetts Institute of Technology, where she leads a research group, called Conformable Decoders.

Dagdeviren earned her Ph.D. in materials science and engineering from the University of Illinois at Urbana-Champaign. Her collective research aims to design and fabricate conformable, hybrid electromechanical systems to convert the patterns of nature and the human body into beneficial signals and energy.



## **Massively Parallel In-memory Computing Using Stochastic Magnetic Tunnel Junctions.**

Qiuyuan Wang received his B.S. in Physics from Peking University and is currently pursuing his Ph.D. in MIT EECS. His research targets enhancing memory processing and computing powers via in-memory computing using spintronics memories like MRAM. His work heavily employs essential skills in hardware design, computer architecture, and CMOS chip design, with the overarching aim of uncovering ultrahigh-efficiency and low-power computing methods for the evolving digital age.

# ELEVATOR PITCH PRESENTATIONS

## Fabublox: Connecting the Microtechnology World



Jack Muller is a software engineer and former engineering manager with over 6 years of industry experience. At his previous company, Jack worked on products to digitize the maritime shipping sector, an industry grappling with data standardization challenges and a heavy reliance on proprietary tools. His experience mirrors the issues faced by the micro and nanofabrication sector. Jack's understanding of industries undergoing digital revamps positions Fabublox for success. From his insights, we aim to offer practical, tailored solutions for the micro and nanofabrication sector.



Josh Perozek is a PhD student working in the Professor Palacios Group at MIT. His research focuses on the theory and fabrication of high-power vertical GaN transistors. With 8 years of research-based cleanroom experience, he is well-versed in the challenges facing the micro and nanofabrication industry.



Eyal Perry is a PhD student at the MIT Media Lab, where his research focuses on DNA nanotechnology with applications in nanofabrication by self-assembly. Before MIT, Eyal had worked for five years as an algorithms engineer in various startup companies in Tel Aviv and Shenzhen, utilizing computer vision to solve problems in digital health and 3D understanding.



Jan Tiepelt is a PhD Candidate in the Department of Electrical Engineering and Computer Science at MIT working in Prof. Marc Baldo's Spin and Excitonic Engineering group. His research is focused on the design and study of degradation phenomena in organic light-emitting diodes. With over 8 years of cleanroom experience in facilities at RWTH Aachen and MIT, he has gained expertise in a large variety of cleanroom fabrication techniques. Combined with a passion for education, he is well-positioned to tackle challenges in both R&D and workforce development for micro- and



## Convex Electron Lithography

Alex Kashkin is an engineer with a wide background spanning biotech, semiconductors, and art conservation among other fields. He received his SM in Mechanical Engineering from MIT in 2023, and is currently still continuing with graduate studies. Previously, Alex founded and was CEO of GeneTiger, a genetic testing device, developed with DoD/SBIR funding and commercialized with sales to Thermo Fisher and academic institutions. His award-winning research at MIT, as well as connections with venture and government funding, have led to inter-academic and international collaborations for the development of new hard tech solutions to challenges faced by humanity.



IN APPRECIATION OF OUR  
MTL INDUSTRIAL GROUP MEMBER  
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