

IAB2023:

MTL Industrial Advisory Board
Annual Meeting 2023



January 26, 2023
Cambridge, MA

AGENDA

7:45am	Breakfast
8:30am	MTL Director's update , <i>Tomás Palacios</i>
9:30am	VPR and MTL Integration with RLE , <i>Maria Zuber and Marc Baldo</i>
10:00am	Photo
10:10am	Break
10:30am	MIT.nano update , <i>Vladimir Bulovic</i>
11:00am	MTL and the CHIPS Act , <i>Tomás Palacios</i>
11:30am	MTL and Lincoln Laboratory Collaborations , <i>Craig Keast</i>
12:00pm	Lunch
1:00pm	Workforce Development in Microelectronics , <i>Lionel Kimerling</i>
1:30pm	Research Update 1: High throughput Material Discovery , <i>Jing Kong, Elsa Olivetti, Rafael Gomez-Bombarelli, Connor Coley</i>
2:10pm	Research Update 2: Integrated Photonics , <i>Jelena Notaros</i>
2:40pm	Break
3:00pm	CAD and other MTL computing resources , <i>Duane Boning</i>
3:15pm	Discussion with faculty
4:00pm	IAB discussion and feedback to MTL leadership
4:45pm	Adjourn

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.



Chorng-Ping Chang

Senior Director
Applied Materials

Dr. Chorng-Ping Chang is Senior Director of Strategic External Research in the office of CTO, Applied Materials. Prior to joining Applied Materials in 2004, Dr. Chang was a Distinguished Member of Technical Staff at Bell Laboratories, Murray Hill, New Jersey, where he had done extensive R&D on advanced plasma sources, processing technology, CMOS integration, and novel device architecture. He received his B.S. degree from National Tsing Hua University and Ph.D. degree from University of California at Berkeley. He has authored or co-authored over 120 conference and journal papers and has filed over 20 patents. Dr. Chang is a fellow of IEEE. He also served on the editorial board of IEEE.



Philip A. Kraus, Ph.D

Appointed Vice President
Head of Core R&D
Semiconductor Products Group
Applied Materials, Inc.

Dr. Philip Kraus is Appointed Vice President and leads Core R&D for the Semiconductor Products Group at Applied Materials. He oversees the development of innovative technologies and prototype products for the semiconductor wafer fabrication equipment market. Prior to rejoining Applied Materials in 2015, Dr. Kraus was at several start-up companies, including from 2012 to 2015 as CEO of Ultora, a manufacturer of carbon nanotube electrochemical energy storage devices. Previously at Applied Materials from 1999 to 2006, Dr. Kraus developed FEOL plasma systems. Dr. Kraus is the inventor of more than 50 patents and co-authored more than 40 publications. He earned a Ph.D. in Physics from the University of Minnesota and a B.S. in Engineering Science from the Pennsylvania State University.



DRAPER

David Carter
Laboratory Fellow
Draper

Dr. David Carter is Laboratory Fellow at Draper Laboratory. He has been at Draper for 20 years, where he has led 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. 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 33 journal and conference papers and has 21 patents in micro/nanofabrication, nanotechnology, and materials.



EDWARDS

George Courville
Business Development Manager, Technology
Partnerships
Edwards

Mr. Courville 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 startups. 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.

Mr. Courville 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).



Pushing Performance
Since 1945

Kurt Bettenhausen
HARTING Technology Group
Member of the Managing Board
New Technologies & Development

Dr. Bettenhausen joined HARTING Technology Group as Member of the Managing Board in September 2021. He is responsible for New Technologies & Development.

From October 2011 until June 2019 Dr. Bettenhausen served as Senior Vice President at Siemens Corporation USA. He was responsible for the global Technology Field "Future of Automation" and Corporate Technology in the United States of America.

Effective January 2023, Dr. Bettenhausen serves as President of DKE, the German Commission for Electrical, Electronic and Information Technology, as President of the German National Committee of the IEC and as Member of the IEC Board. He is a Member of the Stakeholder Executive Committee at the ARM Institute.

Dr. Bettenhausen attained a master's degree and a Ph.D. in electrical engineering from Technical University of Darmstadt.

Dr. Bettenhausen served as chairman of the interdisciplinary committee „Digital Transformation" at VDI (Association of German Engineers) and as chairman of the VDI/VDE Society for Measurement and Automatic Control.

In the USA Dr. Bettenhausen was member of the Advisory Board at UC Berkeley College of Engineering, member of the Advisory Board at CITRIS, member of the External Advisory Board of the Institute for Robotics and Intelligent Machines at Georgia Institute of Technology, member of MForesight Leadership Council, member of the Board of Directors of the Research & Development Council of New Jersey, as well as member of the Innovator's Roundtable of Darden School of Business at the University of Virginia.

Please find further information here: <https://www.linkedin.com/in/kurtdbettenhausen>



Pushing Performance
Since 1945

Vivek Dave

Director of Technology Development
HARTING, Inc. of North America

Vivek Earned his Bachelor’s degree in Engineering his Applied Science with Honor from the California Institute of Technology, and his Master’s and Doctorate degrees in Materials Engineering from the Massachusetts Institute of Technology. He has worked at Fortune 50 aerospace companies, National Labs, various startups in three states, and presently serves as the Director of Technology for North America for HARTING Inc., and family-owned private company based in Espelkamp, Germany with North American headquarters in Elgin, IL.

His current focus is on the Industrial Internet of Things (IIoT) and specifically how to provide Edge-level hardware and software solutions that will truly enable IIoT to reach its full potential. He is additionally a technical expert in problems pertaining to sensing, control, data analytics, manufacturing, quality control, understanding and eliminating sources of process variance, and the impact of manufacturing problems or defects on downstream product performance and process reliability. Significant experience as an Entrepreneur working with early-stage advanced technologies encompassing manufacturing, materials, and algorithms.



HITACHI
Inspire the Next

Hiroshi Suzuki

General Manager, Technology Strategy Division
Hitachi High-Tech Corporation

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

Miki Yamazaki, Ph.D.

Senior Engineer, Technology Strategy Division
Hitachi High-Tech Corporation

Dr. Miki Yamazaki is a senior engineer of the Technology Strategy Division of Hitachi High-Tech headquarters in Tokyo. She is in charge of developing strategies for creating new businesses related to the environment and energy.

She joined Hitachi, Ltd.'s Mechanical Engineering Research Laboratory in 1996 and worked at Hitachi, Ltd.'s Production Engineering Research Laboratory before joining Hitachi High-Tech's Technology Strategy Division in April 2022. Her research interests include design engineering, quality engineering, and systems engineering related to optimal design of machinery, industrial design, and environmentally friendly material design. She has been involved in the research and development of manufacturing technologies and systems for Hitachi's gas turbines, large computers, MRI, automotive electronic components, switchgear and transformers for power equipment, electronic components for rail vehicles, wind turbines, and O&M platforms. In particular, she is creating a new trend in design engineering regarding design methods that integrate multiscale theoretical models and advanced information technology as a new paradigm for nano-industrial research and development. She has received academic awards from the Japan Society of Mechanical Engineers, including the Best Paper Award, the Frontier Achievement Award, and the Achievement Award in Design Engineering and Systems. She has recognized as a Fellow of the Japan Society of Mechanical Engineers in 2018.

She received her M.S. in 1996 and Ph.D. in 2010 from the Department of Mechanical and Information Engineering, Graduate School of Engineering, the University of Tokyo. She was a visiting scholar at the University of Southampton, U.K., from 2003 to 2004 and has been a lecturer at the Department of System Design, Faculty of Science and Technology, Keio University since 2020, teaching New Product Planning Theory.



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, Dr. Pfeiffer has been the PI/coPI of several government projects within IBM research related to hardware based security and anti tampering. Dr. Pfeiffer 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. Dr. Pfeiffer 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. Dr. Pfeiffer 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 semiconductor industry. Her interests lie at the intersection of emerging technologies, strategy, communications, and people. In the Office of the CTO at Lam Research, Dr. Draeger guides implementation of Lam’s technology vision through open innovation. As Director of Global University Engagements, she enables new solutions for semiconductor fabrication through academic collaborations and leads partnerships to create diversity in Lam’s technology and talent pipelines. Prior to this role, Dr. Draeger managed programs on materials for advanced devices, new process and product development, strategic business and intellectual property development.

Dr. Draeger has over 20 years of experience in thin film deposition and surface science and has authored over 30 patents and numerous technical publications. She currently serves on the board of directors for the Materials Research Society (MRS) and UIDP.

She earned a Ph.D. in materials science and engineering from the University of Illinois, Urbana-Champaign where she received the department’s 2020 Alumni Loyalty Award, and a B.S.E. from the University of Michigan which sparked a lifelong fandom for Wolverines football. She is a voracious reader and member of a book club that has been together for two decades and enjoys long-distance trekking.



George S. Hurtarte
 Senior Director, Engineering, Office of the CTO
 Lam Research Corporation

Dr. George S. Hurtarte is currently Sr. Director, Engineering, Office of the CTO, at Lam Research. Dr. Hurtarte has held various technical, management, and executive positions at Lam Research, Teradyne, LitePoint, TranSwitch, and Rockwell Semiconductors. He holds Ph.D. and B.S. degrees in electrical engineering, M.S. in Telecommunications, M.S. in Computer Science, and an MBA. Dr. Hurtarte has served in the Advisory Board of Directors of the Global Semiconductor Alliance, TUV Rheinland of North America, and NSF’s Wireless Internet Center for Advanced RF Technology. He is co-chair of the IEEE Heterogeneous Integration Roadmap test working group. Dr. Hurtarte is also professor at the University of California, Santa Cruz and at the University of Phoenix. He is a Registered Professional Engineer in the State of California, and the lead co-author of the book Understanding Fabless IC Technology.



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.

Dr. Jeng 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.

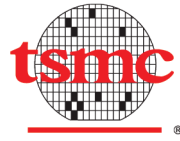
Dr. Jeng’s first immersion into engineering was at MIT where she learned to foster technical discourse and execution at all levels, from the use of liquid nitrogen to make the smoothest ice cream to the development of fluorescent carbon nanotube sensors. She believes that the most robust solutions are developed from open discussions where everyone contributes. Dr. Jeng 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.



Taizo Shibuya

Researcher, Secure System Platform Research
Laboratories
NEC Corporation

Dr. Taizo Shibuya is a member of NEC Secure System Platform Research Laboratories. He joined NEC Corporation in 2015. Since then, he has been developing oxide emitters for thermophotovoltaic (TPV) power generation and infrared detectors using quantum-dot and carbon nanotube networks. His current interests also lie in various use of molten salts, ranging from heat storage to chemical batteries to molten salt reactors. He received his B. Eng. degree in 2007, M. Sc. Eng. degree in 2009, and Ph.D. in Engineering in 2015 from Keio University, Japan. During his Ph.D., his research focused on the density functional theory calculations of TiO₂ surfaces.



Gary Chen
 Technical Manager
 TSMC

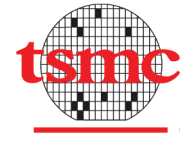
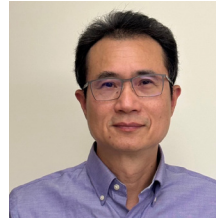
Experience

(15+ years in industry)

- Technical Manager, Corporate Research University Program, TSMC (2006-now)
- High k dielectric materials study (Ph. D thesis)
- Synopsys / Coventor simulation for advance transistor evaluation (PPA/ PPAC)
- High mobility transistors research: Channel / Source & Drain stressor
- Gate-All-Around transistors research and processes development
- Lead CRHDM for High Density Memory research with a 3D architecture
- SRC: TAB/SAB for JUMP and nCore since 2021
- 2022 SRC LMD TAB Chair
- 2021 / 2022 VLSI-TSA North America TPC Chair

Patent / Publication:

- 2017 TSMC patent campaign : win 1st prize
- 2019 TSMC patent campaign : win 1st prize
- More than 40 U.S. patents granted
- Cryogenic CMOS / 3D SRAM IEDM papers; 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). Dr. Shao 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.

Dr. Shao 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.



Chuei-Tang Wang

Technical Director
TSMC

Dr. Chuei-Tang Wang is Director of Pathfinding for System Integration (PSI) in TSMC. He is responsible for system electrical and thermal simulations for system technology solution development.

He received the B.S. and M.S. degrees in materials science and engineering from National Tsing Hua University, Hsinchu, Taiwan, in 1983 and 1985, respectively, and the Ph.D. degree from Stanford University, Stanford, CA, USA, in 1997. In 2000, he joined USI in Nantou, Taiwan and led EE and packaging team for wireless connectivity SIP module design & manufacturing. In 2011, he joined TSMC Integrated Interconnect and Packaging (IIP) R&D team as a Technical Director for system architectures and their SI, PI, and RF performance exploratory study.

In 2007, he had received a National Award of Industrial Technology Advancement (ITA), Taiwan, for the leadership of connectivity SiP module development in industry and a National Innovation and Creation Award for new SiP packaging invention, respectively. Now he is a committee member in RF, High-Speed Components & Systems subcommittee in ECTC. He holds more than 100 US patents and publishes more than 20 papers in IEDM, VLSI, ECTC, and etc



Jim Wieser

Director of University Research and Technology
Texas Instruments

Jim serves Texas Instruments as Director of University Research and Technology within the university relations organization in close collaboration with the CTO Office. 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. Most recent focus has been co-leading definition of key analog/mixed signal objectives for response to the CHIPs Act NSTC upcoming RFP.

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

Director of University Research and Technology
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



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.

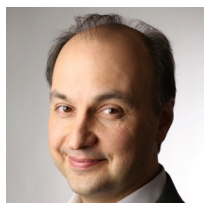


Duane S. Boning

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 directs the Organic and Nanostructured Electronics Laboratory, co-leads the MIT-Eni Solar Frontiers Center, leads the Tata GridEdge program, and is the Founding Director of MIT.nano, MIT's new 200,000 sqft nano-fabrication, nano-characterization, and prototyping facility that opened in the summer of 2018. He is an author of over 250 research articles and an inventor of over 110 U.S. patents (cumulatively cited over 50,000 times) 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 three start-up companies Bulović co-founded jointly employ over 400 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.



Connor W. Coley

Assistant Professor
Department of Chemical Engineering]
Department of Electrical Engineering and Computer
Science

Connor W. Coley is an Assistant Professor at MIT in the Department of Chemical Engineering and the Department of Electrical Engineering and Computer Science. He received his B.S. and Ph.D. in Chemical Engineering from Caltech and MIT, respectively, and did his postdoctoral training at the Broad Institute. His research group at MIT develops new methods at the intersection of data science, chemistry, and laboratory automation to streamline discovery in the chemical sciences with an emphasis on therapeutic discovery. Key research areas in the group include the design of new neural models for representation learning on molecules, data-driven synthesis planning, in silico strategies for predicting the outcomes of organic reactions, model-guided Bayesian optimization, and de novo molecular generation. Connor is a recipient of C&EN's "Talented Twelve" award, 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.



Rafael Gomez-Bombarelli

Professor, Department of Materials Science and Engineering

Rafael Gomez-Bombarelli (Rafa) is the Jeffrey Cheah Career Development Professor at MIT's Department of Materials Science and Engineering. His work aims to fuse machine learning and atomistic simulations for designing materials and their transformations. Through collaborations at MIT and beyond, they develop new practical materials such as heterogeneous thermal catalysts (zeolites), transition metal oxide electrocatalysts, therapeutic peptides, organic electronics for displays, electrolytes for batteries. By embedding domain expertise and experimental results into their models, alongside physics-based knowledge, the Learning Matter Lab designs materials that can be realized in the lab and scaled to practical applications.

Rafa received BS, MS, and PhD (2011) degrees in chemistry from Universidad de Salamanca (Spain), followed by postdoctoral work at Heriot-Watt (UK) and Harvard Universities, and a stint in industry at Kyulux North America. He has been awarded the Camille and Henry Dreyfus Foundation "Machine Learning in the Chemical Sciences and Engineering Awards" in 2021 and the Google Faculty Research Award in 2019. He was co-founder of Calculario a Harvard spinout company, was Chief Learning Officer of ZebiAI, a drug discovery startup acquired by Relay Therapeutics in 2022 and serves as consultant and scientific advisor to multiple startups



Craig L. Keast

Associate Head, Advanced Technology Division
MIT Lincoln Laboratory

Dr. Craig L. Keast is the Associate Head of the Advanced Technology Division at MIT Lincoln Laboratory. The Advanced Technology Division focuses on the R&D of novel materials, devices, and components to enable new system capabilities in support of national security and scientific discovery. Technical areas include advanced imagers, lasers, quantum computing, microsystems, RF technology, and chemical and biological sensors. Dr. Keast holds a BA degree from Hamilton College and SM, EE, and PhD degrees in electrical engineering and computer science from MIT.



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 was Head, Materials Physics Research at AT&T Bell Laboratories when he joined the faculty of MIT as Professor. He was Director of the 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 600 technical articles and more than 75 patents in the fields of integrated photonics and semiconductor processing. The Microphotonics Center Industry Consortium oversees more than 300 industrial, academic and government organizations that contribute to the Integrated Photonics System Roadmap, International (IPSR-I) releases. Kimerling was President, TMS; Chairman, Editorial Board of the Journal of Electronic Materials; and he has served on the Advisory Board, National Center for Photovoltaics, DOE and the National Materials Advisory Board, NRC. He is the recipient of the 1995 Electronics Division Award of the Electrochemical Society and the 1999 John Bardeen Award of TMS. He is a Fellow of the American Physical Society, the AAAS, TMS, MRS, Optica and the School of Engineering, UTokyo. 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.



Jing Kong

Associate Director, MTL
Professor, Department of Electrical Engineering & Computer Science

Jing Kong is a principal investigator in the Research Laboratory of Electronics (RLE) at the Massachusetts Institute of Technology (MIT). She received the B.S. in chemistry from Peking University in 1997 and the Ph.D. in chemistry from Stanford University in 2002. From 2002 to 2003, she was a research scientist at NASA Ames Research Center, and from 2003 to 2004, she was a postdoctoral researcher at Delft University. She joined the MIT faculty in 2004 in the Department of Electrical Engineering & Computer Science.

Professor Kong is a member of IEEE. The research in her group focuses on the synthesis, characterization, and application of nanomaterials including carbon nanotubes and two-dimensional materials such as graphene and transition metal dichalcogenides.



Jelena Notaros

Assistant Professor, Department of Electrical Engineering & Computer Science

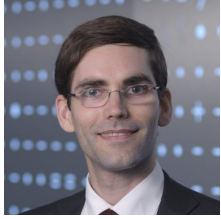
Jelena Notaros is the Robert J. Shillman Career Development Assistant Professor of Electrical Engineering and Computer Science at MIT. She received her Ph.D. and M.S. degrees from MIT in 2020 and 2017, respectively, and B.S. degree from the University of Colorado Boulder in 2015. Her research interests are in integrated silicon photonics devices, systems, and applications. Jelena was one of three Top DARPA Risers, a 2018 DARPA D60 Plenary Speaker, a 2023 NSF CAREER Award recipient, a 2021 Forbes 30 Under 30 Listee, a 2021 MIT Robert J. Shillman Career Development Chair recipient, a 2020 MIT RLE Early Career Development Award recipient, a 2015 MIT Grier Presidential Fellow, a 2015-2020 NSF Graduate Research Fellow, a 2019 OSA CLEO Chair's Pick Award recipient, a 2022 OSA APC Best Paper Award recipient, a 2022 OSA FiO Emil Wolf Best Paper Award Finalist, a 2014 IEEE Region 5 Paper Competition First Place recipient, a 2018 MIT EECS Rising Star, a 2014 Sigma Xi Undergraduate Research Award recipient, and a 2015 CU Boulder Chancellor's Recognition Award recipient, among other honors.



Elsa Olivetti

Co-Director, MIT Climate and Sustainability Consortium
Professor, Department of Materials Science and Engineering

Elsa Olivetti is the Esther and Harold E. Edgerton Career Development Professor in the Department of Materials Science and Engineering (DMSE) co-director of the MIT Climate and Sustainability Consortium at the Massachusetts Institute of Technology. Her research focuses on reducing the significant burden of materials production and consumption through increased use of recycled and waste materials; informing the early stage design of new materials for effective scale up; and understanding the implications of policy, new technology development, and manufacturing processes on materials supply chains. Dr. Olivetti received her B.S. degree in Engineering Science from the University of Virginia in 2000 and her Ph.D. in Materials Science Engineering from MIT in 2007.



Tomás Palacios

Director, Microsystems Technology Laboratories
Professor, Department of Electrical Engineering &
Computer Science

Tomás Palacios is a 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.



Maria T. Zuber

Vice President for Research
E. A. Griswold Professor of Geophysics

Maria Zuber is Vice President for Research and E. A. Griswold Professor of Geophysics at MIT, where she is responsible for research administration and policy.

She oversees MIT Lincoln Laboratory and more than a dozen interdisciplinary research laboratories and centers, including the Koch Institute for Integrative Cancer Research, the MIT Energy and Environmental Solutions Initiatives, the Plasma Science and Fusion Center, and the Research Laboratory of Electronics. She also oversees MIT's Climate Action Plan for the Decade.

Zuber's research bridges planetary geophysics and the technology of space-based laser and radio systems. Since 1990, she has held leadership roles associated with a dozen scientific experiments or instrumentation on ten NASA missions, most notably serving as Principal Investigator of the Gravity Recovery and Interior Laboratory (GRAIL) mission.

Zuber holds a B.A. from the University of Pennsylvania and an Sc.M. and Ph.D. from Brown. She is a member of the National Academy of Sciences and the American Philosophical Society, and is a fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Science, and the American Geophysical Union.

Vice President Zuber is the first woman to lead a science department at MIT and the first to lead a NASA planetary mission. In 2013, President Obama appointed her to the National Science Board, and in 2018 she was reappointed by President Trump. She served as Board chair from 2016-2018. In 2021, President Biden named Zuber as co-chair of the President's Council of Advisors on Science and Technology (PCAST).

MTL LEADERSHIP BIOGRAPHIES



Stacy McDaid
Administrative Officer, MTL

Stacy McDaid assumed the position of MTL Administrative Officer in July 2018. Ms. McDaid brings a multi-disciplinary background and more than 20 years of administrative and financial management experience. She has a BS from Northeastern University. Ms. McDaid started her career at Draper Laboratory, where she worked as an administrative assistant and then a program administrator. Stacy has now been at MIT for 13 years, with years of service as a Senior Fiscal Officer at both the Media Laboratory and the Mechanical Engineering Department, as well as a Contract Administrator in MIT's Office of Sponsored Programs.



Jeffrey Lang
Associate Director, MTL
Professor, Department of Electrical Engineering & Computer Science

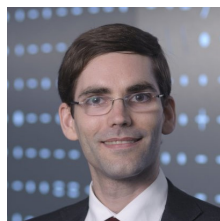
Jeffrey H. Lang received his SB (1975), SM (1977) and PhD (1980) degrees from the Electrical Engineering and Computer Science Department at the Massachusetts Institute of Technology. He joined the faculty of MIT in 1980 where he is now a professor of Electrical Engineering and a member of the Research Laboratory of Electronics (RLE) and the Microsystems Technology Laboratories (MTL). He served as the Associate Director of the MIT Laboratory for Electromagnetic and Electronic Systems (now part of RLE) between 1991 and 2003, and as an Associate Editor of Sensors and Actuators from 1991 to 1994. He has been an Associate Director of MTL since 2012. Prof. Lang is a Fellow of the IEEE and a past Hertz Foundation Fellow. Prof. Lang's research and teaching interests focus on the analysis, design and control of electromechanical systems with an emphasis on rotating machinery; micro/nano-scale sensors, actuators and energy converters; flexible structures; and the dual use of electromechanical actuators as motion and force sensors. He has written over 300 papers and holds 29 patents in the areas of electromechanics, micro/nano-electromechanical systems (MEMS/NEMS), power electronics and applied control, and has received seven best-paper awards from IEEE/ASME societies. He has also received three teaching awards from MIT. Finally, Prof. Lang is a coauthor of Foundations of Analog and Digital Electronic Circuits, an undergraduate text published by Morgan Kaufman, and the editor of, and a contributor to, Multi-Wafer Rotating MEMS Machines: Turbines Generators and Engines, a book published by Springer documenting the research results of the 15-year-long MIT Micro-Engine Project.



Duane S. Boning
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Tomás Palacios
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MTL ● MICROSYSTEMS
● TECHNOLOGY
● LABORATORIES

IN APPRECIATION OF OUR
MICROSYSTEMS INDUSTRIAL GROUP
MEMBER COMPANIES:

Analog Devices, Inc.
Applied Materials
Draper
Edwards Vacuum
HARTING
Hitachi High-Tech Corporation

IBM
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NEC
TSMC
Texas Instruments