2022 MIT Build.nano Conference

April 13, 2022 9:00 am - 5:00 pm

8:00 AM	Registration and Light Breakfast

9:00 AM

Welcome Remarks
John Roberts
Executive Director (Interim), MIT Corporate Relations

John Roberts
Executive Director (Interim)
MIT Corporate Relations

John Roberts has been Executive Director of MIT Corporate Relations (Interim) since February 2022. He obtained his Ph.D. in organic chemistry at MIT and returned to the university after a 20-year career in the pharmaceutical industry, joining the MIT Industrial Liaison Program (ILP) in 2013. Prior to his return, John worked at small, medium, and large companies, holding positions that allowed him to exploit his passions in synthetic chemistry, project leadership, and alliance management while growing his responsibilities for managing others, ultimately as a department head. As a program director at MIT, John built a portfolio of ILP member companies, mostly in the pharmaceutical industry and headquartered in Japan, connecting them to engagement opportunities in the MIT community. Soon after returning to MIT, John began to lead a group of program directors with a combined portfolio of 60-80 global companies. In his current role, John oversees MIT Corporate Relations which houses ILP and MIT Startup Exchange.

David Martin
Program Director, MIT Industrial Liaison Program

David Martin
Program Director
MIT Industrial Liaison Program

Mr. David Martin joined Corporate Relations on August 15, 2018 as Program Director for the ILP. Martin comes to OCR with deep and broad knowledge and expertise in program management, innovation, commercial and government contracting, and strategic planning. In his most recent position at Altran (Burlington, MA) as the VP Programs, Dave had many major accomplishments including leading an innovation team to develop new technology in the beverage-filling industry, and managing client-facing relations supporting sales and execution of projects. Before that, he was at Windmill International as VP, Product Development, R&D. There he spearheaded the move into new markets for an innovative satellite communications product including through the SBIR program where he secured funding and sponsorship. Martin also leveraged other government programs collaborating with the DoD and congressional contacts. He began his career in the US Air Force as an Active Duty Captain and served for 10 years as an Acquisition Manager, Scientist, Test Director, and finally as Executive Officer in the Executive Office for Command, Control and Communications Systems in the Pentagon. Martin also served in the US Air Force Reserves before joining Windmill.

Mr. Martin earned his B.S., Physics from MIT, and his M.S., Systems Management from the University of Denver. He also earned a Certificate in Information Systems at the University of Denver.

9:15 AM

Technology, Innovation, and the Future of the Built Environment
Andrea Chegut
MIT Center for Real Estate
Director, MIT Real Estate Innovation Lab

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MIT Center for Real Estate
Director
MIT Real Estate Innovation Lab

Dr. Andrea Chegut is a research scientist at the MIT Center for Real Estate and the Director of the MIT Real Estate Innovation Lab, which investigates innovative products and technologies, financial value, and economic growth impacts in the built environment. Dr. Chegut also heads entrepreneurial research for DesignX, a venture accelerator for student and faculty firms from MIT's School of Architecture and Planning that focuses on design, cities and the built environment. Her applied and published academic research is in asset pricing of innovative commercial and residential real estate products, entrepreneurial firm performance, and design and technological progress in buildings. Dr. Chegut has a PhD in financial economics with a concentration in real estate and has worked at the intersection of innovation, urban economics and real estate finance for over a decade.

In addition to research, Dr. Chegut teaches classes on technology and innovation, real estate finance, data science and machine learning at MIT. Prior to her work at MIT, Andrea had a career in securities asset pricing, mortgage back securitization and worked across Europe on developing asset pricing models for commercial real estate, green buildings and digital infrastructure.

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BUILDING MATERIALS

9:40 AM

Creating Self-Healing Concrete: Lessons from an Ancient Material

Admir Masic
Associate Professor of Civil and Environmental Engineering
MIT Department of Civil and Environmental Engineering

9:55 AM

99% Air: Nanoarchitected Materials

Carlos Portela
d'Arbeloff Career Development Assistant Professor
MIT Department of Mechanical Engineering

10:10 AM

Emerging Nanomaterials and Nanotechnology Enabled Concepts for Sustainable Living
Michael Strano

Professor of Chemical Engineering
MIT Department of Chemical Engineering

Michael Strano

Professor of Chemical Engineering
MIT Department of Chemical Engineering

Professor Michael S. Strano is currently the Charles and Hilda Roddey Professor in the Chemical Engineering Department at the Massachusetts Institute of Technology. He received is B.S from Polytechnic University in Brooklyn, NY and Ph.D. from the University of Delaware both in Chemical Engineering. He was a post doctoral research fellow at Rice University in the departments of Chemistry and Physics under the guidance of Nobel Laureate Richard E. Smalley. From 2003 to 2007, Michael was an Assistant Professor in the Department of Chemical and Biomolecular Engineering at the University of Illinois at Urbana-Champaign before moving to MIT. His research focuses on biomolecule/nanoparticle interactions and the surface chemistry of low dimensional systems, nano-electronics, nanoparticle separations, and applications of vibrational spectroscopy to nanotechnology. Michael is the recipient of numerous awards for his work, including a 2005 Presidential Early Career Award for Scientists and Engineers, a 2006 Beckman Young Investigator Award, the 2006 Coblentz Award for Molecular Spectroscopy, the Unilever Award from the American Chemical Society in 2007 for excellence in colloidal science, and the 2008 Young Investigator Award from the Materials Research Society, the 2008 Allen P. Colburn Award from the American Institute of Chemical Engineers, and recently selected as a member of Popular Science's Brilliant 10.

View full bio

10:25 AM

Taking a Lifecycle Perspective on Nano-Materials
Randolph Kirchain

Principal Research Scientist
Materials Systems Laboratory
MIT Engineering Systems Division

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Principal Research Scientist
Materials Systems Laboratory
MIT Engineering Systems Division

Dr. Kirchain received a Ph.D. from MIT. His research focuses on the environmental and economic implications of materials selection.

The choice of material potentially has sweeping implications on the realization of a product. Materials affect not only properties, but also dictate available production processes, and therefore the physical constraints within which a designer must work. Similarly, the synergism of design, materials, and process affect the environmental impacts associated with a product's manufacture, its use, and its ultimate disposal. As such, understanding the implications of a material selection decision requires understanding throughout the design and production systems.

To address this, Dr. Kirchain's research deals with two broad topic areas: (1) the development of methods to model the cost of manufacture, using limited design information and (2) the sustainability of current and emerging materials systems. To these ends, Dr. Kirchain has focused on automotive manufacturing systems, including working on projects for all three major automobile manufacturers. These projects include extensive study of the functioning of the system for reclaiming materials from end-of-life vehicles. The specific focus of this work has been to understand the economic implications of changing vehicle composition and emerging policy strictures on the successful operation of this system.

Dr. Kirchain's teaching responsibilities include ESD.123 - Industrial Ecology and ESD.80 - Seminar in Technology Policy Research.

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10:50 AM

Networking Break

ENERGY

11:10 AM

GENERATION: Transparent solar technology for electricity-generating facades

Miles Barr
Co-founder & CTO
Ubiquitous Energy

11:25 AM

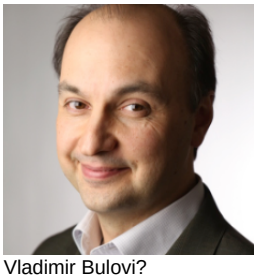
STORAGE: From Molecules to Megacities: Ultrasafe, Sustainable Batteries, Built from the Ground Up

Eli Paster
CEO
PolyJoule

11:40 AM

DEPLOYMENT: Rethinking Solar Technology for the Built Environment
Vladimir Bulovi?

Director, MIT.nano,
Fariborz Maseeh (1990) Professor of Emerging Technology, MIT Electrical Engineering and Computer Science (EECS)



Vladimir Bulovi?

Director, MIT.nano,
Fariborz Maseeh (1990) Professor of Emerging Technology, MIT Electrical Engineering and Computer Science (EECS)

Vladimir Bulovi? 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, 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. He is an author of over 250 research articles (cited over 50,000 times and recognized as the top 1% of the most highly cited in the Web of Science). He is an inventor of over 100 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 three start-up companies Bulovi? 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. Bulovi? 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 Bulovi? 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.

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11:55 AM

Commentary: What Can Building a Nano Building Teach Us

Travis Wanat
Senior Project Manager, Capital Projects
MIT Department of Facilities

Julie Newman
Lecturer of Environmental Planning and Sustainability
Director
MIT Office of Sustainability

PJ Johnson
Construction Executive
Turner Construction Company

Samir Srouji
AIA, LEED AP
HGA

12:25 PM

MIT Startup Exchange Lightning Talks
Steve Weikal
Industry Chair, MIT Real Estate Technology Initiative
General Partner, The MET Frontier Fund

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Industry Chair, MIT Real Estate Technology Initiative
General Partner, The MET Frontier Fund

Steve Weikal is a lecturer, researcher, and Industry Chair of the Real Estate Technology Initiative at the MIT Center for Real Estate, focused on innovative new technology and business models that are reinventing the traditional ways of developing, transacting and managing real estate. He is also a General Partner at the MET Frontier Fund, an early-stage investor in startups that have an MIT connection and focus on solutions for the built environment.

Steve is a member of the Global Insights Panel for MIT Technology Review, a member of the CREtech Climate Leadership Board, and sits on the advisory boards of six real estate and technology companies. He was the Founder of MIT Real Disruption, a successful series of conferences discussing the impact of emerging technology on the real estate industry that is now part of the global CREtech media platform. Steve speaks extensively about real estate technology for corporate clients around the world and at conferences for AFIRE, AsRES, BOMA, CCIM, CoreNet, CREW, ICSC, IREM, NAIOP, PERE, SIOR, and ULI. He has been quoted by numerous media outlets, including BuzzFeed, TechInsider, Medium, USA Today, CP Executive, Harvard Real Estate Review, the Boston Globe, GlobeSt. the Real Reporter, Travel Weekly, IPE Real Assets Europe and Anuario Inmobiliario LatinoAmerica.

Steve holds a Master's of Science in Real Estate Development (MSRED) and Master's in City Planning (MCP) from the Massachusetts Institute of Technology, and a law degree from Suffolk University Law School.

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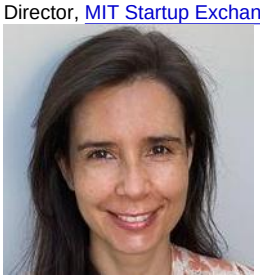
Catarina Madeira
Director, MIT Startup Exchange



Catarina Madeira
Director
MIT Startup Exchange

Catarina has been working with the Cambridge/Boston startup ecosystem for over 10 years and joined Corporate Relations with a solid network in the innovation and entrepreneurial community. Prior to MIT, she was part of the team that designed and launched the startup accelerator IUL MIT Portugal, which was later rebranded as Building Global Innovators. She was based in Lisbon and worked in direct relation with the Cambridge team. She held positions including Operations Coordinator, Program Manager, and Business Developer. The accelerator soon achieved steady growth in large part due to the partnerships that Catarina led with regional and global startup ecosystems. After that, she worked at NECEC, leading a program that connects cleantech startups and industry. In this role, she developed and built a pipeline of startups and forged strong relationships with both domestic and European companies. She has also held positions in Portugal and France, including at Saboaria e Perfumaria Confiança and L'Oréal as Technical Director and Pharmacist. Catarina earned her bachelor's in chemistry and pharmaceutical sciences in Portugal. She went on to earn her Master of Engineering for Health and Medicines in France.

Scott Tudman
CTO
Sweetwater Energy

Ross Bonner
CTO
Transaera

Hunter McDaniel

1:10 PM Lunch with Startup Exhibit

2:10 PM Afternoon Welcome
Kairos Shen
Executive Director, Center for Real Estate

Kairos Shen
Executive Director
Center for Real Estate

Kairos Shen is the Executive Director and Associate Professor of the Practice at MIT's Center for Real Estate (CRE). He oversees the Master of Science in Real Estate Development program as well as the CRE's industry relations and partnerships. In addition to his administrative role, Mr. Shen also teaches and is a proponent for the CRE's interdisciplinary curriculum of "City Making" that draws on knowledge, research and practice across the fields of design, city planning, public policy, finance and real estate. The pedagogical objective of this curriculum is to prepare students for solving the most pressing and complex urban challenges such as social equity, housing affordability, climate resiliency, and the rebuilding of decaying infrastructure.

Prior to his academic appointment at MIT, Mr. Shen was the Director of Planning at the Boston Redevelopment Authority, Boston's Economic Development and Planning Agency for thirteen years. In his capacity as Boston's Chief City Planner, he worked closely with the Mayor of Boston to envision, coordinate and administer the city's planning and economic development policies and regulations. Mr. Shen was intimately involved in many of Boston's most important planning and economic development initiatives for over two decades from 1993 to 2015. They include the development guidelines for the Rose Kennedy Greenway, the planning and implementation of the South Boston Waterfront Innovation District, the refurbishment of Fenway Park, and the revitalization of Nubian Square.

Throughout his professional and academic career, Mr. Shen has been a staunch advocate for design quality, diversity and livability in cities. Mr. Shen is a graduate of Swarthmore College and has a Master of Architecture from MIT.

MATERIALS and SURFACES

2:20 PM Innovation at Interfaces: A Ubiquitous Platform for Efficiency Enhancements and Sustainability
Kripa Varanasi
Professor of Mechanical Engineering
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Professor of Mechanical Engineering

Kripa K. Varanasi is a Professor of Mechanical Engineering at MIT. He received his B.Tech from IIT Madras, India and his SM (ME and EECS) and Ph.D from MIT. Prior to joining MIT as a faculty member, Prof. Varanasi was a lead researcher and project leader at the GE Global Research Center. At GE he received many awards for his work including Best Patent, Best Technology Project and Leadership Award. At MIT, the focus of his work is in understanding the physico-chemical phenomena at interfaces and developing novel materials, devices, and products that can dramatically enhance performance in energy, water, agriculture, transportation, medical, and consumer devices. He is passionate about entrepreneurship and translating technologies from lab to market. He has co-founded multiple companies including LiquiGlide, Infinite Cooling, AgZen, and Everon24. Time and Forbes Magazines have named LiquiGlide to their "Best Inventions of the Year". His Infinite Cooling project has won first prize at DOE's National Cleantech University Prize, MIT 100K, Harvard Business School Energy & Environment Start-up, and MassChallenge. Prof. Varanasi has received numerous awards for his work NSF Career Award, DARPA Young Faculty Award, SME Outstanding Young Manufacturing Engineer Award, ASME Bergles-Rohsenow Heat Transfer Award, Boston Business Journal's 40 under 40. ASME Gustus L. Larson Memorial Award for outstanding achievements in mechanical engineering, APS Milton van Dyke award, and MIT Graduate Student Council's Frank E. Perkins Award for Excellence in Graduate Advising.

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2:35 PM

Adding Value to R Value: Aerogel insulating windows

Elise Strobach
CEO & Co-founder
Aeroshield

2:50 PM

Thermoregulation: Scalable Nano-Engineering of Materials to Trap, Dissipate or Reflect Heat
Svetlana Boriskina
Principal Research Scientist, MIT Department of Mechanical Engineering
Svetlana Boriskina
Principal Research Scientist
MIT Department of Mechanical Engineering

Svetlana Boriskina develops new materials and technologies to harvest and manipulate light and other forms of radiation. Her multi-disciplinary research blends nanophotonics, plasmonics, electronics, thermodynamics and mechanics. Svetlana makes smart fabrics that provide thermal comfort indoors and outdoors and stay clean no matter what, new meta-materials that exhibit color without any dyes or pigments and change it in response to external stimuli, and novel solar harvesting platforms that can provide clean energy and fresh water to off-electrical-grid and disaster-stricken communities. She is the author and co-author of more than 115 peer-reviewed papers, several award-winning courses, and multiple patens. Svetlana is a passionate advocate for science education and science public communication, which she supports via leadership in professional science organizations, conferences, and journal editorial boards, mentorship of student groups, and public outreach.

3:05 PM

If You Build It, They Will Come: How innovations in building materials are uniquely positioned to advance sustainability
Desirée Plata
Associate Professor, MIT Department of Civil and Environmental Engineering

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Associate Professor
MIT Department of Civil and Environmental Engineering

Desirée Plata's research seeks to maximize technology's benefit to society while minimizing environmental impacts in industrially important practices through the use of geochemical tools and chemical mechanistic insights. Plata earned her doctoral degree in Chemical Oceanography and Environmental Chemistry from the Massachusetts Institute of Technology and the Woods Hole Oceanographic Institution's Joint Program in Oceanography (2009) and her bachelor's degree in Chemistry from Union College in Schenectady, NY (2003). Plata is an NSF CAREER Awardee (2016), an Odebrecht-Braskem Sustainable Innovation Awardee (2015), a two-time National Academy of Engineers Frontiers of Engineering Fellow (2012, 2020), a two-time National Academy of Sciences Kavli Frontiers of Science Fellow (2011, 2013), a Caltech Resnick Sustainability Fellow (2017), and winner of MIT's Junior Bose Teaching Award (2019),Edgerton Faculty Achievement Award (2021), and Perkins Graduate Advising Award (2021). Having previously served as John J. Lee Assistant Professor of Chemical and Environmental Engineering at Yale University and Associate Director for Research at the Center for Green Chemistry and Green Engineering at Yale, Plata is now Associate Professor of Civil and Environmental Engineering at MIT, co-director of the MIT Climate and Sustainability Consortium, and Faculty Lead of Belonging, Achievement, and Composition in the MIT School of Engineering. Plata directs MIT's Methane Network, serves on the Scientific Advisory Board of Spark Climate, and served on the National Academy of Science Engineering and Medicine's Atmospheric Methane Removal study (recused).Plata is co-founder of N^{th} Cycle(nthcycle.com), co-founder and President of Sustainable Chemical Resource Advisors LLC, and co-founder and President of Moxair Inc.

View full bio

3:30 PM

Networking Break

BODIES and BIOLOGY

3:50 PM

If These Walls Could Talk: An Inside Look at Ambient Monitoring
Brian W Anthony

Associate Director, MIT.nano
Director, Immersion Lab
Co-Director, Advanced Manufacturing and Design Program
Technology Director, MIT Center for Clinical and Translational Research

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Associate Director, MIT.nano
Director, Immersion Lab
Co-Director, Advanced Manufacturing and Design Program
Technology Director, MIT Center for Clinical and Translational Research

Dr. Anthony is an expert in designing instruments and techniques to monitor, measure, and control complex physical systems. His work integrates mechanical, electrical, and optical engineering with computer science and optimization to deliver innovative solutions across various manufacturing industries.

The core of Dr. Anthony's research lies in *computational instrumentation*—the development of tools and methods to monitor and control intricate systems in fields like manufacturing and medical diagnostics. His work includes creating advanced measurement and instrumentation solutions for both manufacturing systems and medical imaging technologies.

Beyond academia, Dr. Anthony brings extensive experience in technology innovation, product realization, and business entrepreneurship, particularly at the convergence of information technology and advanced manufacturing. He has over 25 years of experience driving market-driven technology solutions from concept to commercialization. His achievements include winning an Emmy Award from the Academy of Television Arts and Sciences for broadcast technical innovation.

In the classroom, Dr. Anthony focuses on teaching the modeling of large-scale systems for decision-making across various domains. He is also deeply involved in developing optimization algorithms and software for analyzing and designing these systems. His dual experience in academia and industry positions him as a leader in translating cutting-edge research into practical, impactful technologies.

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4:05 PM

Spider Intelligence: Learning from Nature’s Master Builder
Markus J. Buehler

Jerry McAfee Professor of Engineering, MIT Department of Civil and Environmental Engineering and MIT Department of Mechanical Engineering

Markus J. Buehler

Jerry McAfee Professor of Engineering, MIT Department of Civil and Environmental Engineering and MIT Department of Mechanical Engineering

Dr. Markus J. Buehler, Jerry McAfee Professor of Engineering at MIT, is a leading researcher in computational modeling across domains, from materials to biology to physics. Markus' expertise bridges AI to multi scale materials modeling. He recently co-developed a method that uses artificial intelligence to generate new protein designs with specific strengths, mimicking natural materials like silk. This approach, which uses computer simulations for testing, allows the creation of proteins with desired mechanical properties, such as strength and flexibility, beyond what is naturally available. Markus earned a Ph.D. at the Max Planck Institute for Metals Research at the University of Stuttgart and held post-doctoral appointments at both Caltech and MIT. Buehler has received many awards, including the Feynman Prize, the Drucker Medal, and the Washington Award. He is a member of the National Academy of Engineering.

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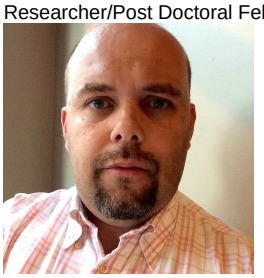
4:20 PM

Commentary: Sensing and Economies of (City) Scale
Ricardo Alvarez
Researcher/Post Doctoral Fellow, MIT Senseable City Lab



Ricardo Alvarez
Researcher/Post Doctoral Fellow
MIT Senseable City Lab

Dr. Ricardo Alvarez is an academic and researcher whose work focuses on exploring the boundaries of digital technologies used for urban design purposes. He has performed research and teaching work as part of the City Design and Development Group and as a member of the Senseable City Lab, at the Massachusetts Institute of Technology for the past nine years.

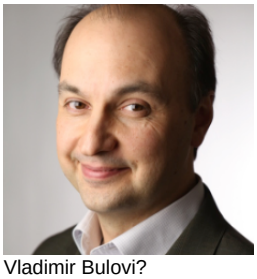
Dr. Alvarez has participated in urban innovation research projects that use Mixed Media, IoT, and A.I. in cities as diverse as Dallas, Laval, Cambridge, Amsterdam, Melbourne, Shenzhen, Paris, Medellin, Curitiba, and others. While his work covers a wide range of topics, from autonomous vehicles to urban innovation districts, and smart infrastructure systems, his passion lies in exploring processes that foster social imagination for spatial design, in particular on the collaborative use of VR and AR platforms for new urban systems and public spaces design. He considers himself a life-long gamer and is a strong proponent of cross-pollination between disciplines that create interactive spaces both in the physical and virtual realms, such as architecture, urban planning, video games, and synthetic simulations development.

He is also an international speaker, having lectured in several countries in America, Europe, Asia, and Australia on topics related to innovation, cities, and technology. Before MIT, he worked in the Mexican Federal Government as a founding member of ProMexico (the country's Trade and Investment promotion Federal Agency), as well as in media, retail, financial industries.

4:45 PM

Closing Remarks
Vladimir Bulovi?

Director, MIT.nano,
Fariborz Maseeh (1990) Professor of Emerging Technology, MIT Electrical Engineering and Computer Science (EECS)



Vladimir Bulovi?

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4:50 PM

Networking Reception