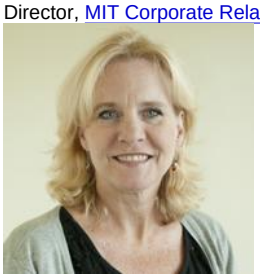
MIT Industrial Liaison Program Faculty Knowledgebase Report

Energy @MIT

April 13, 2021 10:00 am - 12:00 pm

10:00 AM

Welcome and Introduction
Sheri Brodeur
Director, MIT Corporate Relations



Sheri Brodeur
Director
MIT Corporate Relations

Sheri Brodeur is a Director of Corporate Relations at MIT. Prior to this, she spent 22 years at Hewlett-Packard Company in several roles. Her most recent position was in the HP Labs Strategy and Innovation Office. The role of this organization is to set HP Labs' research strategy and extend HP's internal research capacity by partnering with universities, governments, and other companies on a global scale to rapidly advance the positive impact of technology on the world.

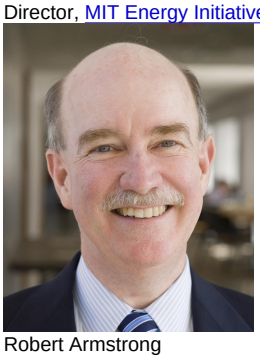
Sheri spent 15 years with HP Labs, HP's corporate researcher center, managing major university alliances and programs, including a $25M program with MIT. She has been responsible for managing global higher education technology programs in the areas of Security, Digital Libraries (DSpace), Information Management, and Sustainability.

Prior to this role she spent the previous eight years at Hewlett-Packard in the sales organization moving from the position of Field Sales Engineer to Global Account Manager. In this role she was responsible for selling, supporting and delivering high end test and measurement solutions for the communications industry.

Brodeur has a BS in Ceramic Engineering from Alfred University and an MS in Solid State Science from the Materials Research Laboratory at Penn State University.

10:05 AM

A Low-Carbon Energy Future and the Opportunities for Industry
Robert Armstrong
Chevron Professor of Chemical Engineering
Director, MIT Energy Initiative (MITEI)



Robert Armstrong
Chevron Professor of Chemical Engineering
Director
MIT Energy Initiative (MITEI)

Professor Robert C. Armstrong directs the MIT Energy Initiative, an Institute-wide effort at MIT linking science, technology, and policy to transform the world's energy systems. A member of the MIT faculty since 1973, Armstrong served as head of the Department of Chemical Engineering from 1996 to 2007. His research interests include polymer fluid mechanics, rheology of complex materials, and energy.

Armstrong has been elected into the American Academy of Arts and Sciences (2020) and the National Academy of Engineering (2008). He received the Founders Award for Outstanding Contributions to the Field of Chemical Engineering (2020), Warren K. Lewis Award (2006), and the Professional Progress Award (1992), all from the American Institute of Chemical Engineers. He also received the 2006 Bingham Medal from the Society of Rheology, which is devoted to the study of the science of deformation and flow of matter,

Armstrong was a member of MIT's *Future of Natural Gas* and *Future of Solar Energy* study groups. He advised the teams that developed MITEI's most recent reports, *The Future of Nuclear Energy in a Carbon-Constrained World* (2018) and *Insights into Future Mobility* (2019), and is co-chairing the new MITEI study, *The Future of Storage*. He co-edited *Game Changers: Energy on the Move* with former U.S. Secretary of State George P. Shultz.

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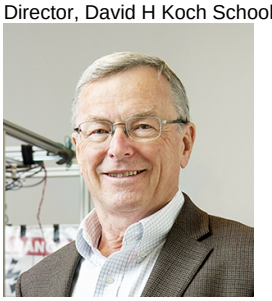
10:20 AM

CCUS in a Carbon Constrained World
T. Alan Hatton
Ralph Landau Professor of Chemical Engineering Practice
Director, David H Koch School of Chemical Engineering Practice



T. Alan Hatton
Ralph Landau Professor of Chemical Engineering Practice
Director, David H Koch School of Chemical Engineering Practice

Our research focuses primarily on the development of electrochemical processes to facilitate chemical separations and to mediate the transformation of captured waste to useful commodity chemicals. The electrochemically-mediated separation processes that are currently under development and investigation in our group can primarily be divided into two areas: (i) carbon capture from both point (power plants, industrial emissions) and distributed (ambient air, ocean waters) sources; and (ii) water purification (including decontamination of wastewater and desalination). These research projects are supported by both government agencies and industrial partners.

We also have experience in the synthesis, characterization, and application of stimuli-responsive materials, which include nanoparticles, nanofibers, surfactants, polymers, and gels; these materials have a wide variety of applications in, for example, drug delivery, protein, environmental separations, rheology, and surface tension modification. We have particular experience with redox-active polymers for selective separations, and on the use of superparamagnetic nanoparticles (e.g. magnetic fluids) in environmental, biological and chemical separations.

Research advances in our group have resulted in the formation of a start-up company, Verdox Inc., developing electro-swing adsorption processes for removal of CO_2 and other acid gases from process streams and the ambient environment. Other potential start-up ventures are currently under consideration.

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10:35 AM

Fusion, Present and Future
Dennis G. Whyte
Director, MIT Plasma Science and Fusion Center
Hitachi America Professor of Engineering

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Director, MIT Plasma Science and Fusion Center
Hitachi America Professor of Engineering

A recognized leader in fusion research, Whyte's research in the magnetic confinement of plasmas sets us on an innovative and faster path to producing fusion energy. He is one of the leaders of the SPARC project, a collaboration between Commonwealth Fusion Systems and MIT, to design and build a high-field fusion device to demonstrate net energy production for the first time. Many of the technology approaches underpinning the high-field approach to fusion energy, including SPARC, were formed over the last decade in his MIT fusion design class: utilizing magnets from high-temperature superconductors, demountable magnets for modular assembly and maintenance, and liquid immersion blankets for robust energy removal. He is a fellow of the American Physical Society, has served on panels for the National Academies and Royal Society, and has won the Fusion Power Associates Leadership Award and the 2013 Nuclear Fusion Prize. His is a co-founder of Commonwealth Fusion Systems, whose goal is the rapid commercialization of fusion energy to tackle climate change. Whyte earned his BS and PhD in Canada.

10:50 AM

MIT Startup Exchange Lightning Talk

PolyJoule : Non-lithium based energy storage for the electricity grid

Eli Paster
CEO
PolyJoule

MIT Startup Exchange Lightning Talk

JETCOOL: Cooling for high power electronics

Bernie Malouin
Founder & CEO
JETCOOL

MIT Startup Exchange Lightning Talk

Takachar: Trash is cash: small-scale, decentralized biomass upgrading

Kevin Kung
Co-founder, President & CTO
Takachar

MIT Startup Exchange Lightning Talk

Syzygy Plasmonics: First photocatalytic reactor for low-cost, on-demand hydrogen

Trevor Best
CEO
Syzygy Plasmonics

11:10 AM

Battery Technologies and Recent Advances
Ju Li

Battelle Energy Alliance Professor, MIT Department of Nuclear Science & Engineering
Professor, MIT Department of Materials Science and Engineering

Ju Li

Battelle Energy Alliance Professor, MIT Department of Nuclear Science & Engineering
Professor, MIT Department of Materials Science and Engineering

Ju Li is the Tokyo Electric Power Company Professor in Nuclear Engineering and a Professor at the MIT Department of Materials Science and Engineering. Prof. Li's group investigates the mechanical, electrochemical, and transport behaviors of materials, as well as novel means of energy storage and conversion. His research has led to advances in materials with applications in nuclear energy, batteries, and electrolyzers—and near- and long-term implications for decarbonizing the planet. His group also works on various aspects of computing, from the development of the first universal neural network interatomic potential to energy-efficient neuromorphic computing hardware.

Li is a recipient of the 2005 Presidential Early Career Award for Scientists and Engineers, the 2006 Materials Research Society Outstanding Young Investigator Award, and the TR35 award from Technological Review. He was elected Fellow of the American Physical Society in 2014 and a Fellow of the Materials Research Society in 2017. Li is the chief organizer of the yearly MIT A+B Applied Energy Symposia that aims to develop practical solutions to global climate change with "A-Action before 2040" and "B-Beyond 2040" technologies.

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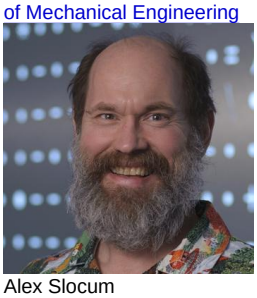
Integrated, Renewable Energy Systems
Alex Slocum
Director, Precision Engineering Research Group (PERG)
Walter M. May (1939) and A. Hazel May Chair in Emerging Technologies, MIT Department of Mechanical Engineering



Alex Slocum
Director, Precision Engineering Research Group (PERG)
Walter M. May (1939) and A. Hazel May Chair in Emerging Technologies
MIT Department of Mechanical Engineering

Alexander Slocum is the Walter and Hazel May Professor of Mechanical Engineering at MIT and a member of the US National Academy of Engineering. He has 130+ patents and has helped develop 12 products that have received R&D 100 awards for “one of the one hundred best new technical products of the year”. He has helped start several successful precision manufacturing equipment companies and has a passion for working with industry to solve real problems and identify fundamental research topics. For the past decade his prime focus has been on renewable energy systems.

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Closing Remarks