MIT Industrial Liaison Program Faculty Knowledgebase Report

Energy Innovation (Session 3: Energy Storage Systems)

May 21, 2020 10:00 am - 12:00 pm

10:00am - 10:05am

Introduction
CJ (Changjie) Guo
Program Director, MIT Corporate Relations

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Dr. CJ Guo joined the Office of Corporate Relations as a Senior Industrial Liaison Officer in July, 2015. CJ comes to OCR with 25 years of extensive global experience in technology innovations, portfolio management and business development in emerging and conventional energy sectors with leading multinational corporations in the US, China and Canada.

CJ is a leading expert in emerging energy technologies and energy system transitions. With Shell, he was the Emerging Technology Theme Leader in China/Beijing (2011 to 2015), worked extensively with the Chinese energy communities on the country's future energy landscape, and the Senior Technology Advisor in alternative transportation fuels in the US / Houston (2006-2010), and served during 2010 as Chairman of the Fuel Operations Group for the US DOE FreedomCar Partnership. Prior to joining Shell, CJ has held technology development, commercialization and management positions with Air Liquide (2002-2006) and The BOC Group (1995-2001) after working as a research scientist in oil-sands upgrading with CANMET in Canada (1992-1994).

CJ earned his Ph.D., Chemical Engineering, at CSU, Ohio, his M.S. and B.S., Chemical Engineering at TYUT, China. He has earned various awards from Shell, Air Liquide, BOC, Shanxi Province (China). He holds many patents and has sat on the board of Shenzhen Sanmu Battery Technology Company as an independent board member during 2009-2010.

10:05am - 10:10am

MITEI and Energy Storage Technologies
Robert Stoner
Deputy Director for Science and Technology, MIT Energy Initiative (MITEI)
Founding Director, MIT Tata Center

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Robert J. Stoner is an inventor and technology entrepreneur who has worked extensively in academia and industry throughout his career, having built and managed successful technology firms in the semiconductor, IT and optics industries. From 2007 through 2009 he lived and worked in Africa and India while serving in a variety of senior roles within the Clinton Foundation. Stoner also serves as Director of the Tata Center for Technology and Design at MIT, and as the faculty co-director of the MITEI Electric Power Systems Center. His current research relates to energy technology and policy for developing countries. He earned his Bachelor's degree in engineering physics from Queen's University, and his Ph.D. from Brown University in condensed matter physics.

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10:10am - 10:45am

Cost-Informed Discovery of New Battery Chemistries
Donald Sadoway
John F. Elliott Professor Emeritus of Materials Chemistry, MIT Department of Materials Science and Engineering

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John F. Elliott Professor Emeritus of Materials Chemistry
MIT Department of Materials Science and Engineering

Donald R. Sadoway is the John F. Elliott Professor Emeritus of Materials Chemistry in the MIT Department of Materials Science and Engineering. He obtained the B.A.Sc. in Engineering Science, the M.A.Sc. in Chemical Metallurgy, and the Ph.D. in Chemical Metallurgy, all from the University of Toronto. After a year of postdoctoral study at MIT as a NATO Fellow, Dr. Sadoway joined the faculty in 1978. He is the author of over 180 scientific papers and holder of over 37 U.S. patents, and his research is directed towards the development of batteries for grid-level storage and mobile applications as well as environmentally sound technologies for the extraction of metals. Sadoway's contributions include two breakthroughs. First came the liquid metal battery, which could enable the large-scale stationary storage of renewable energy. That represents a huge step forward in the transition to green energy, according to António Campinos, president of the European Patent Office, when Sadoway won the 2022 European Inventor Award for the invention in the category for non-European Patent Office Countries. The second breakthrough is molten oxide electrolysis, which produces metal from ore with no CO_2 emissions. Discovered at MIT, Sadoway spun out the company today known as Boston Metal, which is the most credible solution to green steel. In 2012 he was named by Time magazine as one of the 100 Most Influential People in the World.

Professor Donald Sadoway's research seeks to establish the scientific underpinnings for technologies that make efficient use of energy and natural resources in an environmentally sound manner. The overarching theme of his work is electrochemistry in nonaqueous media. Specific topics in applied research are environmentally sound electrochemical extraction and recycling of metals; rechargeable batteries for stationary storage or mobile applications; synthesis of thin films or of nanoparticles in cryogenic media.

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10:45am - 11:20am

Redox Flow Batteries for Grid Energy Storage: Exploring an Emerging Design Space
Fikile Brushett

Cecil and Ida Green Career Development Chair, Associate Professor of Chemical Engineering
MIT Department of Chemical Engineering

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Fikile Brushett is an associate professor of chemical engineering at MIT, where he holds the Cecil and Ida Green Career Development Chair. His research focuses on advancing electrochemical technologies for a sustainable energy economy, with a particular fascination around the fundamental processes that define the performance, cost, and lifetime of present day and future electrochemical systems. Brushett holds a BSE in chemical and biomolecular engineering from the University of Pennsylvania and a PhD in chemical engineering from the University of Illinois at Urbana-Champaign. He was a postdoctoral fellow in the Electrochemical Energy Storage group at Argonne National Laboratory.

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11:20am - 11:55am

Drivers for Storage Adoption in Deeply Decarbonized Grids – Insights from Systems Modeling
Dharik Mallapragada
Research Scientist
MIT Energy Initiative
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Research Scientist
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Dharik Mallapragada joined the MIT Energy Initiative in May 2018. Prior to MIT, Dharik worked at ExxonMobil Corporate Strategic Research, where he contributed to research on power systems modeling, life cycle assessment and also led a research program to study energy trends in developing countries. Through his Ph.D. and nearly five years of research experience in the chemicals and energy industry, Dharik has worked on a range of sustainability-focused research topics such as designing light-weight composite materials and carbon-efficient biofuel pathways, as well as developing novel tools for energy systems analysis. His research interests include the design of novel energy conversion processes and their integration into the energy system. At MIT, Dharik is working on advancing power systems modeling tools to study questions around renewables integration and economy-wide electrification.

Dharik holds a M.S. and Ph.D. in Chemical Engineering from Purdue University. He received a B.Sc. in Chemical Engineering from the Indian Institute of Technology, Madras.

11:55am - 12:00pm

Closing Remarks