THE MATERIALS SCIENCE AND ENGINEERING DEPARTMENT
FALL COLLOQUIUM SERIES PRESENTS:

Donald R. Sadoway

John F. Elliott Professor Emeritus of Materials Chemistry

Massachusetts Institute of Technology

Towards Profitable Sustainability via Liquid-Metal/Molten-Salt Electrochemistry

A sustainable future is axiomatically a carbon-free electric future. Emerging technologies that will usher in this new economy necessarily include electrochemical innovations in energy storage and in steelmaking. Electricity storage is critical to widespread deployment of carbon-free but intermittent renewables, solar and wind, while offering huge benefits to today's grid: improving security and reducing price volatility. Invented at MIT, the liquid metal battery provides colossal power capability on demand and long service lifetime at very low cost and without threat of fire. In 2019 worldwide steel production generated 9% of total CO2 emissions. Invented at MIT, molten oxide electrolysis represents an environmentally sound alternative to today's carbon-intensive thermochemical process. Instead of CO2 as the by-product of steel, molten oxide electrolysis makes tonnage oxygen while producing better metal at lower cost and vitiating negative environmental impacts of current technology. In the narratives of both of these emerging technologies, liquid metal battery and molten oxide electrolysis, there are lessons more broadly applicable to innovation: how to pose the right question, how to engage young minds (not experts), establishing a creative culture, and inventing inventors in parallel with inventing technology.

Donald R. Sadoway is Professor of Materials Chemistry Emeritus in the Department of Materials Science and Engineering at the Massachusetts Institute of Technology. His B.A.Sc. in Engineering Science and Ph.D. in Chemical Metallurgy are from the University of Toronto. He joined the MIT faculty in 1978. The author of over 180 scientific papers and inventor on 35 U.S. patents, his research is directed towards batteries for grid-scale storage and electric vehicles and towards environmentally sound metals extraction technologies. His accomplishments include the invention of the liquid metal battery for large-scale stationary storage and the invention of molten oxide electrolysis for carbon-free metals production. He is the founder of six companies: Ambri, Boston Metal, Lunar Resources, Avanti Battery, Pure Lithium, and Sadoway Labs. Online videos of his chemistry lectures hosted by MIT OpenCourseWare extend his impact on engineering education far beyond the lecture hall. Viewed more than 2,400,000 times, his TED talk is as much about inventing inventors as it is about inventing technology. In 2012 he was named by Time magazine as one of the 100 Most Influential People in the World.

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In person only; no Zoom

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