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AVVISO DI SEMINARIO

Martedì 21 Marzo alle ore 11:00
Aula Seminari

Prof. Fikile R. Brushett

Department of Chemical Engineering
Massachusetts Institute of Technology

Terrà un seminario dal titolo:

Redox flow batteries for large-scale energy storage

Proponente: Prof. Silvia Licoccia

Abstract:

Electrochemical energy storage has emerged as a critical technology to enable sustainable electricity generation by alleviating intermittency from renewable sources, reducing transmission congestion, enhancing grid resiliency, and decoupling generation from demand. Redox flow batteries (RFBs) are rechargeable electrochemical devices that store energy via the reduction and oxidation of soluble active species, which are housed in external tanks and pumped to a power-generating reactor. As compared to enclosed batteries (e.g., lithium ion), RFBs offer an attractive alternative due to decoupled power and energy, long service life, and simple manufacturing, but have not yet achieved widespread adoption because of high prices. Recent research has focused on the discovery and development of new chemistries. Of particular interest are low cost organic molecules and nonaqueous electrolytes with wide electrochemical windows, since decreasing materials cost and increasing cell potential offer credible pathways to lowering battery prices. Though exciting, most of these emerging concepts only consider new materials in isolation rather than as part of a battery system. Understanding the critical relationships between material properties and overall battery price is key to enabling systematic improvements in RFBs. In this presentation, I will discuss chemistry-agnostic design principles for economically-viable RFBs realized through the combination of techno-economic modeling, reactor optimization, and materials analysis. This approach emphasizes the fundamental differences in cost reduction strategies for aqueous and nonaqueous RFBs, specifies design criteria for next-generation materials, and highlights new research avenues for the energy storage community.