

Next-Generation Lithium-Metal Batteries for a More Sustainable Energy Future

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High-capacity, powerful, affordable batteries are key to accelerating the adoption of zero-emission electric vehicles (EVs) and renewable energy. While much of the storage demand in the energy sector, particularly in the EVs, is currently satisfied by lithium-ion batteries (LIBs), the gradual saturation in achievable battery capacity, high cost, environmental impacts of the extraction of critical raw materials (ex. cobalt and nickel), and increasing safety concerns have spurred growing interest in new battery materials and chemistries. At IBM Research, our research has focused on developing more sustainable materials and unique battery chemistries to address the challenges LIBs face by leveraging our expertise in materials science and advanced computing technologies. Our solid-state electrolyte derived from a flexible single-particle thick membrane (SPTM) demonstrated excellent cycling behaviors in a Li-Li symmetric cell, implying its potential application for all solid-state lithium metal batteries. We have recently developed a new class of cobalt- and nickel-free battery that demonstrates an ability to surpass conventional lithium-ion batteries in a number of individual categories including faster charging time and higher power density. In this seminar, our materials design strategies toward enhancing battery performance, safety, and sustainability will be thoroughly discussed.