

Seminar

Solid Electrolyte Interface Evolution and Stabilisation in Lithium Metal Batteries

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Lithium metal batteries (LMBs) offer exceptional energy density but are limited by unstable solid electrolyte interphases (SEIs), which lead to dendrite growth, electrolyte degradation, and poor cycling stability. This work addresses these challenges through interfacial engineering and operando characterisation. LiF/C-rich and phosphorus-based interphase modification strategies are developed to enable uniform lithium deposition, suppress parasitic reactions, and improve cycling stability in both liquid and solid-state battery systems. These engineered interfaces demonstrate long-term cycling at high current densities and enhanced full-cell performance. To understand the underlying mechanisms, operando and virtual-electrode plating X-ray photoelectron spectroscopy (XPS), combined with electrochemical analysis and kinetic modelling, are employed to probe the real-time evolution of the SEI. The studies reveal the sequence of electrolyte decomposition, LiF-rich interphase formation, and lithium nucleation, providing insights into the design of stable and high-performance lithium metal batteries.

Monday, Oct 26th 2026

14:30 Hrs (Tea / Coffee 14:15 Hrs)

Auditorium, TIFRH