

Forming Interphases: From Non-aqueous, Aqueous to Hybrid Electrolytes

Kang Xu
Electrochemistry Branch,
2800 Powder Mill Rd., Adelphi, MD 20783
U. S. Army Research Laboratory

Email: conrad.k.xu.civ@mail.mil; kang_xu@hotmail.com

Electrolyte/electrode interphase is the key component that enables reversible battery chemistries to operate at potentials far from the thermodynamic equilibria. Although interphases should exist universally in any advanced electrochemical devices with cell voltage >3 V, we only started to understand it on the Li-based anode surfaces in non-aqueous electrolytes. The knowledge about interphasial chemistry and formation mechanism accumulated in the past 2 decades allows us to modify, control and even tailor-design new interphases for various battery chemistries with unprecedented freedom. We have departed from solely dependence on electrolyte solvent as interphasial building-blocks, while recent adventures have even taken us far beyond the demarcation separating non-aqueous and aqueous regimes. In this talk, I will summarize these recent efforts and try to shed light on the future attempts of designing interphases for new chemistries.