**Composite Electrolytes to Stabilize Metallic Lithium Anodes**

**PI/Co-PI:** Nancy Dudney (ORNL)/Xi Chen (ORNL)/Frank Delnick (ORNL)

**Objective:**
- Prepare composite electrolytes to meet the challenging combination of physical, chemical and manufacturing requirements to protect and stabilize the lithium metal anode

**Impact:**
- Design rules developed for this study will guide formation of composites with alternative and improved component phases as they become available.
- A thin, yet robust solid electrolyte membrane will enable use of metallic Li anodes for improved energy density.

**Accomplishments:**
- Verified that spray coating gives good dense membranes (pycnometer measurements).
- Acid base treatment on Ohara particles: surface chemistry change observed, but effect on ion conductivity was limited.
- A transference number of 0.79 of the composite electrolyte was determined.
- Method and experimental protocol for calculating interface resistance between Ohara and PEO+LiTF was identified.
- A full cell was fabricated by spray coating the electrolyte onto the cathode.

**FY 18 Milestones:**
- Minimize the interface ASR by chemical and mechanical treatment with a goal of < 100 ohm.
- Confirm the effect of DMC plasticizer on polymer structure, Li ion mobility, interface resistance.
- Move beyond model materials like Ohara and PEO. Identify promising polymer ceramic systems with interfacial ASR less than 10 ohm.

**FY18 Deliverables:** Demonstrate cycleability of full battery incorporating spray coated composite electrolyte and Li anode, optimize battery performance.

**Funding:** FY18: $400,000  FY17: $400,000,  FY16: $400,000