

Physical Study of LiTFSI in Adiponitrile as High Voltage Electrolyte

Name: Chris Franko

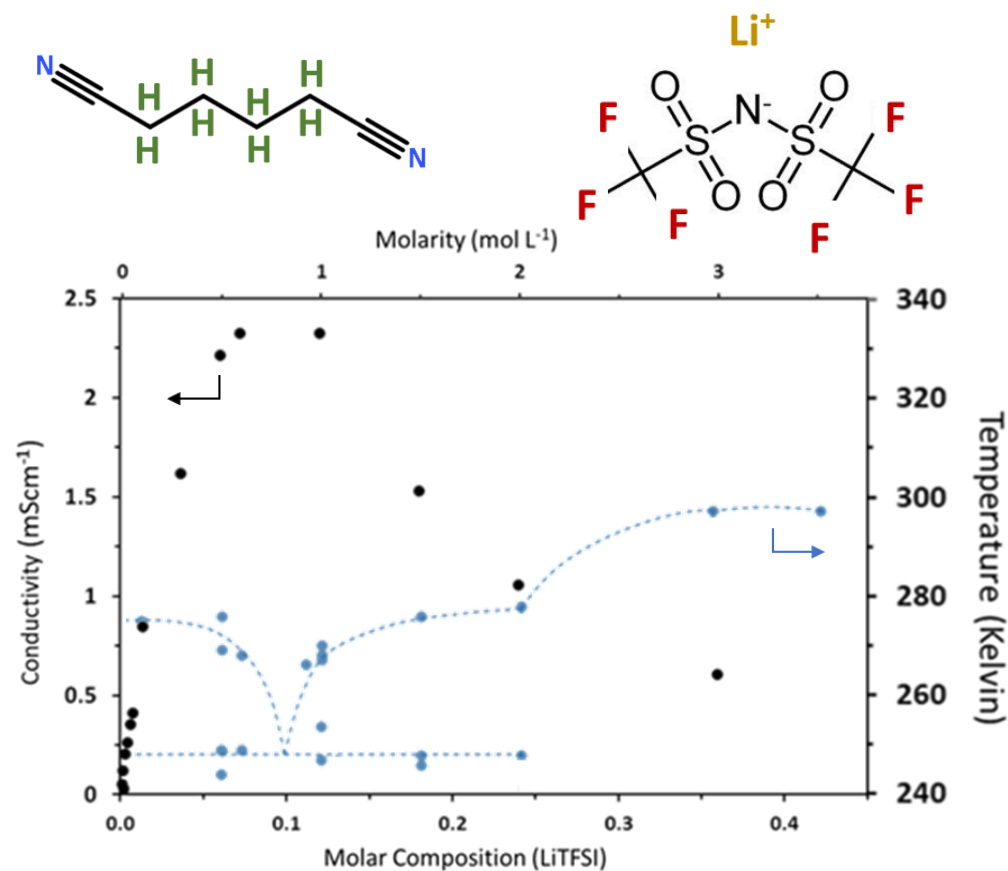
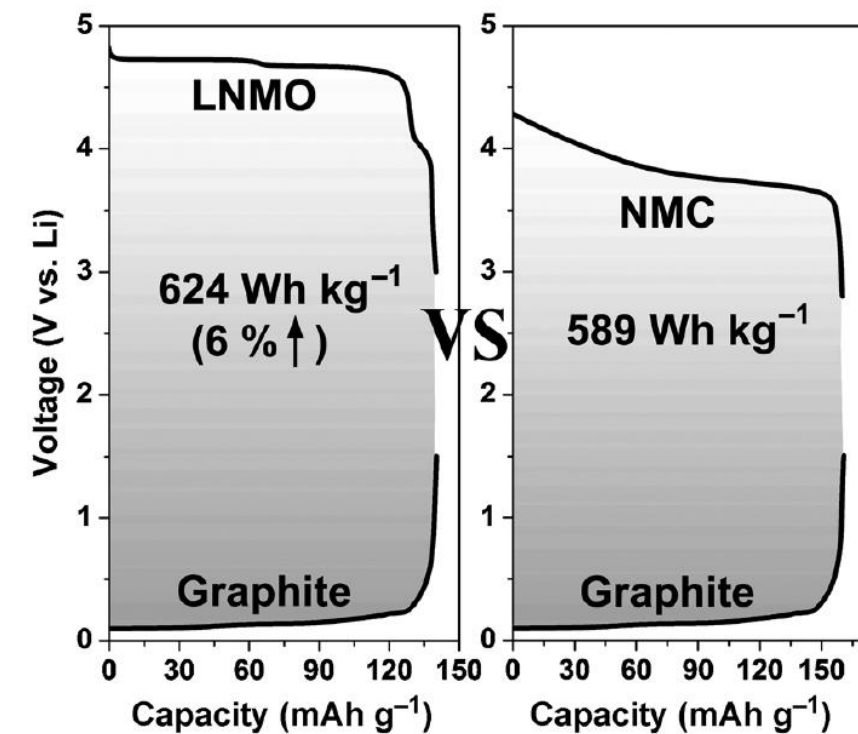
Supervisor: Dr. Gillian Goward

Program: Chemistry

Level of studies: Ph.D

Project Description

- Electrolytes with high oxidative stability allow for use of higher voltage cathode materials such as LNMO → higher energy density
- LiTFSI in Adiponitrile is a possible candidate, little is known about its physical properties
- Physical study of the transport mechanism of Li^+ in Adiponitrile at varying concentrations
- Use ^7Li , ^{19}F , and ^1H Diffusion NMR to track transport of **cation**, **anion**, and **solvent** independently



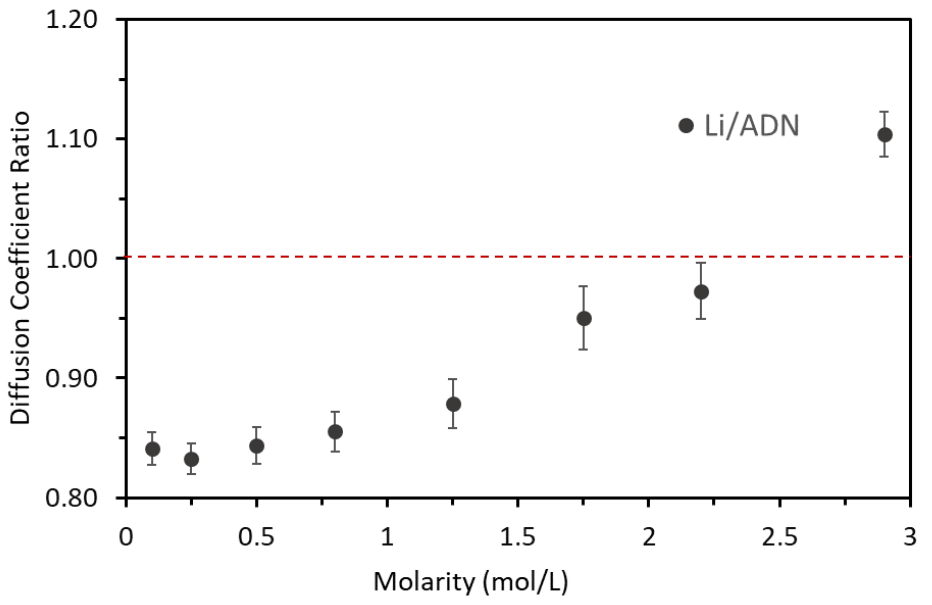
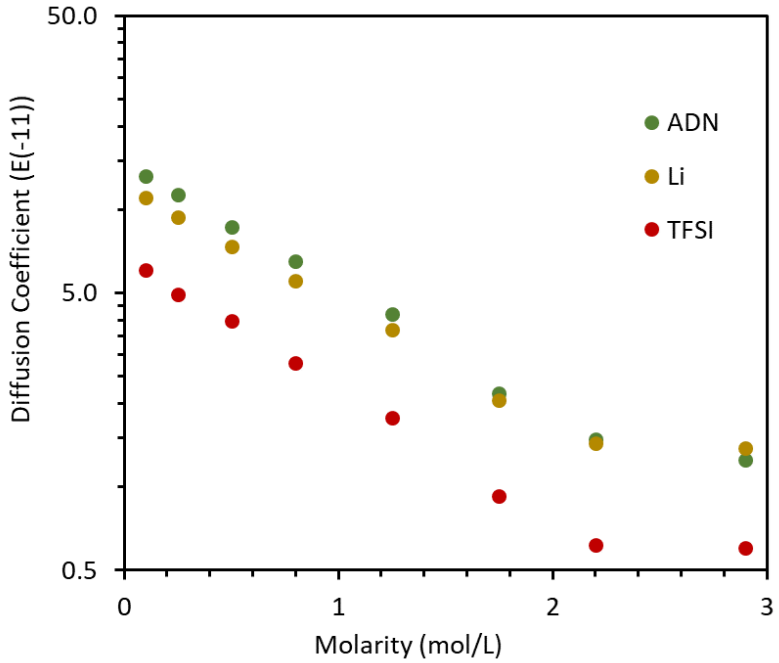
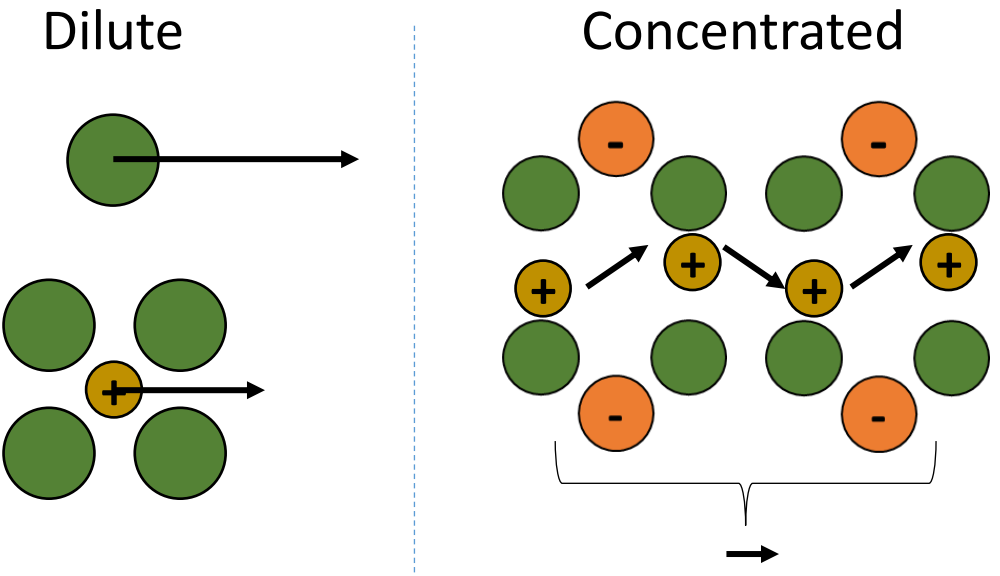
Progress Report

Diffusion coefficients of solvent, cation, and anion decreasing with concentration

Decrease is not uniform, Li/ADN and Li/TFSI ratios are increasing with concentration

Signifies change in structure and transport mechanism

Li/ADN > 1 represent Li-ion hopping transport



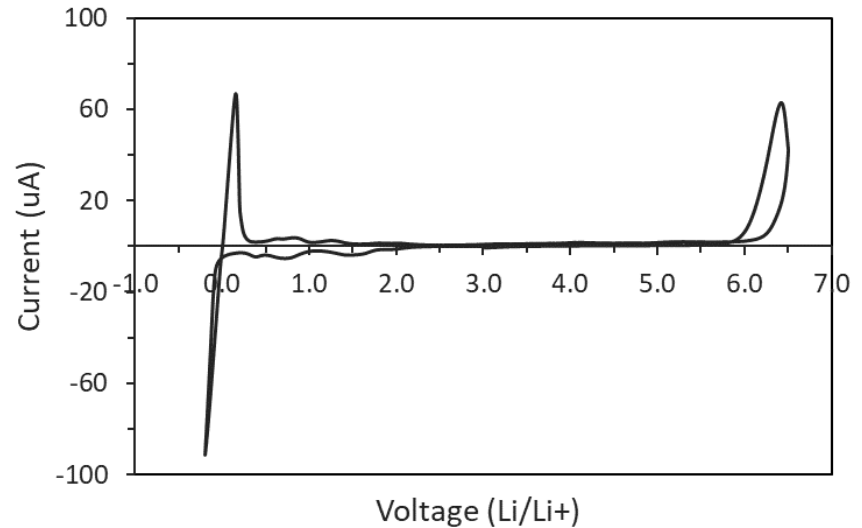
Objectives

- Study the physical properties of LiTFSI in Adiponitrile as a possible high voltage electrolyte in Li batteries

Results/Deliverables

- Electrolyte transport mechanism evolves with concentration
- LiTFSI in adiponitrile has a wide voltage window, and may be used in Metal – Oxygen batteries as it is active to oxygen reduction and evolution
- Writing paper for publication in journal during this self isolation period

Cyclic Voltammetry in Ar



Cyclic Voltammetry in O₂

