

Experimental report

15/09/2023

Proposal: 9-11-2081

Council: 10/2022

Title: Understanding the role of Li in PEO based batteries with selective Liisotope labeling

Research area: Soft condensed matter

This proposal is a continuation of TEST-3109

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Experimental team: Antonio FARAONE

Local contacts: Peter FALUS

Samples: P(EO)7.5 6LiTFSI
P(EO)7.5LiTFSI
deuterated P(EO)7.5 LiTFSI
deuterated P(EO)7.5 6LiTFSI
d P(EO)

Instrument	Requested days	Allocated days	From	To
WASP	6	4	09/09/2023	13/09/2023

Abstract:

The need to improve the sustainability, performance, and safety of lithium batteries urges the scientific community in the search for alternatives to currently employed electrolytes based on organic solvents. One of the possible families of alternative candidates are solid polymer electrolytes, which, being non-flammable and not dispersive, would significantly reduce safety concerns. The system most intensively studied is Poly(Ethylene Oxide) (PEO) which is able to dissolve large amounts of lithium ions and, in the melt phase, afford conductivities of the order of 10⁻³ S/cm. In PEO, lithium ions are coordinated with the oxygens of the polymer chains in cages and the conduction mechanism proceeds through jumps from cage to cage. Using the spectrometer WASP and isotopic substitution methods, we aim to measure the timescale of the escape of lithium ions from the oxygen cage surrounding it in the model polymer electrolyte PolyEthylene Oxide (PEO)/ lithium bis(trifluoromethanesulfonyl)imide (LiTFSI). We will access lithium dynamics with selective substitution ⁷Li to ⁶Li.

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Unfortunately the experiment could not be carried out as planned due to some technical issues.

The main point was that we lost most of the time due to a malfunction of the fan. Therefore we were not able to run the samples.