

SEMINAR SERIES

HIGHLIGHTS IN ENERGY RESEARCH

03. 05. 2018, 10:30 - 11:30, ENERGYPOLIS Sion, 4th floor, Zeuzier room

Ceramic-Polymer solid electrolytes: a multiscale view of ion transport and electrodeposition in Li metal batteries

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Solid-state Li metal batteries hold the promise to boost the performance of conventional Li-ion battery technologies; being capable of storing more energy as well as being safe from combustion. However, replacing the ubiquitous liquid electrolyte in a Li-ion battery, by a solid electrolyte is great scientific challenge. The poor contact and the highly resistive interfaces between the solid electrolyte and the solid electrodes are a major limitation for practical application.

This presentation will report on the development and prospective solutions of solid-state Li metal batteries. First, I will focus on $\text{Li}_7\text{La}_3\text{Zr}_2\text{O}_{12}$ (LLZO) garnet electrolyte [1], discussing the interfacial limits with Li metal anode leading to unexpected short-circuit and cell failure [2]. Then, a promising alternative to full ceramic electrolytes will be proposed based on elastic polymer-ceramic composite membranes. This combination of hard-soft electrolyte materials is found to greatly enhance the interfacial stability and electrodeposition properties with Li metal anode, offering new opportunities for application in solid-state batteries.

[1] L. Buannic, B. Orayech, J. M. Lopez del Amo, J. Carrasco, N. A. Katcho, F. Aguesse, W. Manalastas, J. Kilner and A. Llordés. *Chemistry of Materials*, 29, 1769–1778 (2017).

[2] F. Aguesse, W. Manalastas, L. Buannic, J. M. Lopez del Amo, G. Singh, A. Llordés, and J. Kilner. *ACS Applied Materials & Interfaces*, 9 (4), 3808–3816, (2017).

CV: Dr. Anna Llordés

Anna Llordés is a staff scientist at CIC Energigune, where she leads the Solid Electrolyte research line. Currently, she is doing a research stay at the LNCE (EPFL). Anna obtained her PhD in Chemistry in 2010, at the Barcelona Institute of Materials Science (ICMAB) working on superconducting nanocomposite films. Then, she did her Postdoc at the Lawrence Berkeley National Laboratory (US), in Delia Milliron's group (The Molecular Foundry), focusing on electrochromic films for energy-saving window applications. In 2013, her work received the R&D 100 Award, and resulted in the creation of a start-up company (Heliotrope Tech.). In December 2014 she joined CIC Energigune, a research center focused on Energy Storage. Her work focuses on the development of solid electrolyte materials with tailored ion transport and interfacial properties. By controlling structure and composition at multiple length scales, she aims to tackle fundamental limitations in current solid electrolytes for successful application in solid-state Li battery technology.

