Contribution ID: **2** Type: **Regular talk**

Solid polymer electrolytes for solid-state lithium-ion batteries: Challenges and opportunities for the next generation of energy storage

Friday, 24 September 2021 11:30 (10 minutes)

The modern world is facing a growing number of interconnected electronic devices in the scope of the Industry 4.0 and Internet of things concepts. As the technology develops and the devices get smaller, lighter and portable, the need for more efficient storage systems capable of powering these devices arises as a critical challenge. Despite their widespread use and strong position as leader in this market, lithium-ion batteries face significant issues when it comes to safety, performance and environmental impacts, that must be addressed to as soon as possible. Several possibilities, as self-healing and shutdown functions, the implementation of additive manufacturing techniques, beyond lithium technologies and solid-sate batteries are being intensively studied in order to address these issues.

Solid polymer electrolytes (SPEs) are expected to represent a solution for the issues present in conventional lithium-ion batteries, as they have the potential to be more durable and safer than the commonly used separator/electrolyte systems. However, there are still relevant scientific challenges to be addressed in order to meet the performance requirements needed for application, in particular at the level of room temperature ionic conductivity.

This presentation will present a brief overview on the recent advances in solid-state lithium-ion batteries with particular focus on the three-component approach for SPEs development. This approach allows a fine tuning of the SPE properties through the use of two distinct and complementary fillers. In particular, the application of micro and mesoporous materials (MOF-808, clinoptilolite, MFI, ETS-4) as passive fillers, complemented with ionic liquids ([BMIM][SCN], [EMIM][TFSI], [BMIM][N(CN2)]) for improving the ionic conductivity shows promising results, with suitable room temperature ionic conductivity (1.9×10-4 S.cm-1) and excellent battery performance (160.3 mAh.g-1 at C/15) over prolonged charge/discharge cycles.

Primary author: Mr BARBOSA, João (Centro de Física das Universidades do Minho e do Porto (CF-UM-UP))

Co-authors: Dr COSTA, Carlos (Centro de Física das Universidades do Minho e do Porto (CF-UM-UP)); Prof. LANCEROS-MÉNDEZ, Senentxu Lanceros-Méndez (Centro de Física das Universidades do Minho e do Porto (CF-UM-UP); BCMaterials, Basque Center for Materials, Applications and Nanostructures; Ikerbasque, Basque Foundation for Science)

Presenter: Mr BARBOSA, João (Centro de Física das Universidades do Minho e do Porto (CF-UM-UP))

Session Classification: Advanced materials and processes for Energy

Track Classification: Advanced Materials and Processes for Energy