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# Ionic liquid-based fluoropolymer solid electrolytes for lithium-ion batteries

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Population growth and improved lifestyle are responsible for the increase in energy demand. The commitment to renewable energies and batteries for energy storage represent one of the solutions to support continuous energy demands. Lithium-ion batteries (LIB) have the advantage over other batteries with respect to higher energy density by mass and volume, which allows smaller and lighter batteries with high number of charge and discharge cycles. LIBs consist of two electrodes (cathode and anode) and a separator wet in electrolyte. The current electrolyte have important disadvantages, such as being toxic and dangerous for the environment, and present a risk of explosion. Solid polymer electrolytes are among the key issues in future battery technologies [1]. Polymer based solid polymer electrolytes (SPE's) can be defined as solvent-free salt solutions in a polymer host material with high mechanical stability. SPE's consist of a polymeric matrix combined with an ionic conductive filler and its main advantages are safety, long lifetime, low charge time and low internal corrosion [2].

In this work, a novel SPE is presented based on an IL ([BMIM][SCN]) in different polymeric matrix (PVDF and PVDF-HFP). The morphological (Figure 1a), physical-chemical, thermal, mechanical, and electrochemical properties of the composites were studied. Ionic conductivity value, electrochemical window stability and charge-discharge performance of the SPE in cathodic C-LiFePO4 half-cells were evaluated to demonstrate the suitability of the developed composites as SPEs for a new generation of solid-state lithium-ion batteries. It was proven that the developed SPE shows similar results than conventional batteries with liquid electrolytes, with a capacity fade of 16% over 30 cycles (Figure 1b).

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