

Solid State Electrolytes for next generation of batteries : Materials and Processes

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In the context of the reduction of greenhouse gas emissions, the energy transition we are currently undergoing has led to the emergence of energy storage needs, particularly in relation to the development of intermittent and non-controllable renewable energies. To achieve this, the development of future generations of batteries is expected to require increased safety and performance. However, batteries, which are key elements in the promotion of energy storage, still face many challenges for massive use, particularly for electrified vehicles. These challenges include increasing energy and power densities and high cyclability, controlling the cost and recyclability of battery packs, and ensuring safer use of batteries. These challenges can be overcome thanks to the development of new generations of Li-ion batteries called post-Li-ion (Li-sulfur and all-solid state batteries). At CEA LITEN, major player in European research entirely dedicated to new energy technologies, the Materials Laboratory of the Battery Technology Department for transport applications aims at developing the synthesis till the pre-industrial scale and their fine physical, chemical and electrochemical characterisations of active materials and electrolytes in order to study electrochemical storage cells across the entire value chain. The objective of this presentation is to highlight the recent developments around new generations of solid electrolytes carried out at CEA LITEN for the development of solid-state batteries. After an overview of the different solid electrolyte chemistries under study (oxides, sulfides and polymers) and of industrial press releases available on solid-state batteries, a focus will be made on some materials in order to put them in perspective with each other in terms of performance, conductivity, stability, maturity. In addition to the synthesis, processing aspects of such solid batteries will also be reviewed.