Solid-state Potassium-Ion batteRIes for safe and susTainable energy storage

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Developing safer, more sustainable and cost competitive next generation batteries is needed to enable a widespread use of electromobility as well as to maximize the efficiency of the use of renewable energy sources. SPIRIT tackles this challenging focusing K-ion batteries based on sustainable electrode materials along with solid state polymer electrolytes.

Within SPIRIT we have optimized the synthesis of Prussian White (PW) cathodes, have produced a new MOF type cathode with competitive performance in KIBs and have developed several anode materials, from different carbon to Ti-based compounds. We have also produced novel fluorine-based and fluorine-free potassium salts which are compatible with PEO for polymer electrolytes as well as ionic liquids which added to PEO based polymer electrolytes results in mechanically robust quasi-solid state polymer electrolyte (QSPE) membranes. The highest ionic conductivity (10^{-3} S/cm) QSPE, competitive with liquid based electrolytes, also results in the best compatibility with the high voltage optimized PW cathodes. We rationalize the improved performance based on XPS and ssNMR studies. These results will be presented in the talk.

SPIRIT still aims to get stable performance with our developed polymer electrolytes on the optimised cathode and anode materials, which could result in a safer, more sustainable quasi solid state battery.

References:

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