



High capacity SnO₂ based anode materials for Li-ion battery and new cathode interlayer for Li-Sulfur batteries

The past 30 years have shown rapid growth in the diffusion and in the use of lithium ion battery in comparison to all the others rechargeable battery systems. Automotive companies and governments are asking for battery with increased capacity and energy, combined with lower cost, to reduce the emission of greenhouse gas through the implementation of electric vehicles and energy storage systems. To increase the energy and consequently the performance of a battery two main approaches are possible: the first possibility is to increase the voltage of the cell, using high voltage electrode materials, while on the other side, the second possibility, is to increase the energy, using materials with high specific capacity, or using different electrochemical technologies, called post Li-Ion technologies, like Lithium-Sulfur battery technology. Considering the improvement of the LIBs energy density SnO₂ is actually investigated as one of the most interesting high capacity material to replace the standard graphite anode. Unfortunately some open questions concerning the reaction mechanism of this anode material in the lithium-ion system remain unresolved, for example the origin of the extra specific capacity that exceeds the theoretical value during the first cycles.

On the other hand Lithium-Sulfur technology seems to be closer to market, but the low cycle life, connected to the shuttling effect due to polysulfides, is one of the most important issues of this type of system. For these reasons to limit the shuttling effect different approaches have been proposed. Recently one new facile method of coating a film directly onto sulfur cathode have been adopted, opening a new way to mitigate the polysulfide migration.