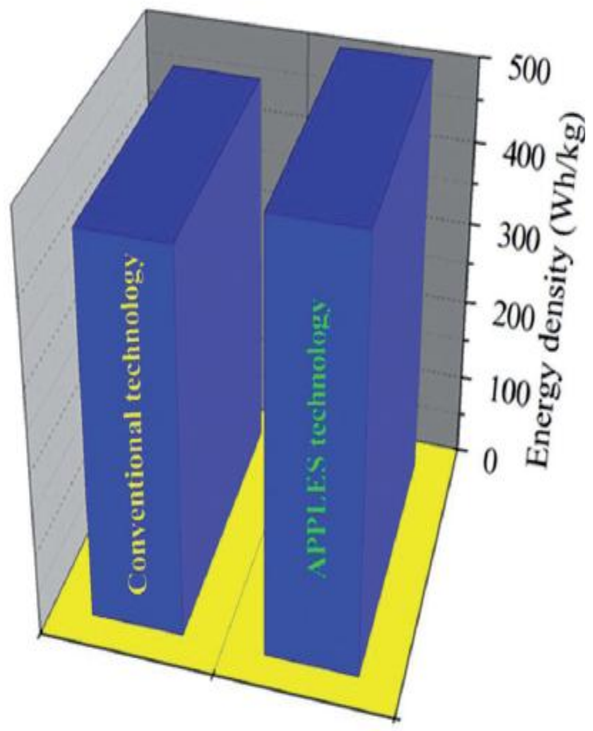
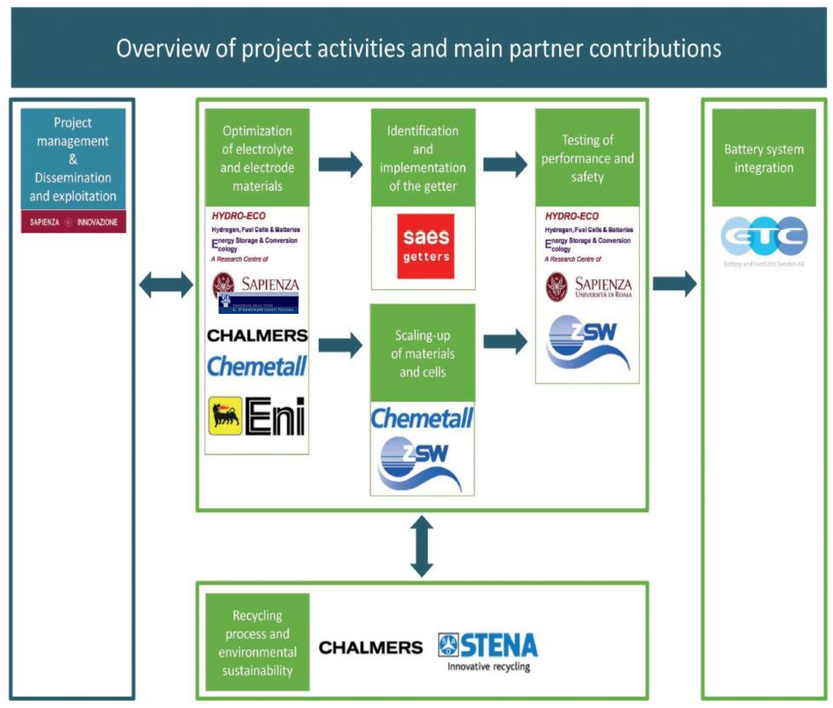
Advanced, high Performance, Polymer Lithium batteries for Electrochemical Storage

The main goal of this project is to develop a new type of lithium-ion battery having characteristics of energy, safety and cost improved respect to the state of art.

APPLES aims to optimize and scale a novel lithium ion polymer battery which combines a nanocomposites, tin-carbon, Sn-C, anode with a nanostructured , lithium nickel manganese spinel $LiNi_{0.5}Mn_{1.5}O_4$, cathode, separeted by a gel-type lithium conducting membrane. The battery was originally developed at Sapienza University of Rome and the results confirm excellent electrochemical behavior in terms of cycling life, rate capability and energy density.

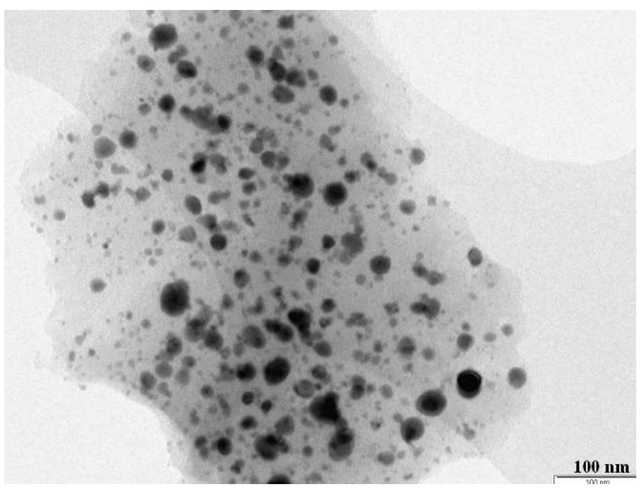




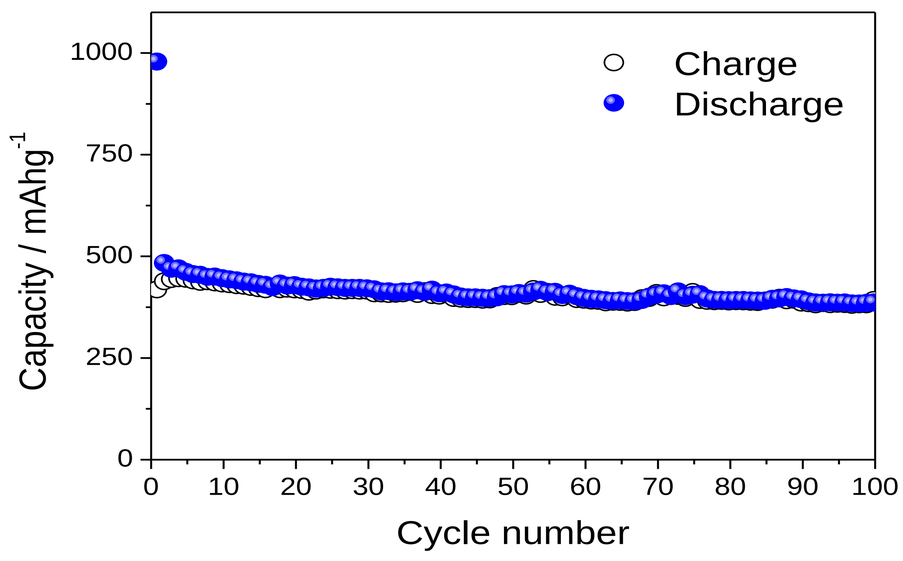
www.applesproject.eu

The APPLES battery

Anode : Tin carbon nanocomposite

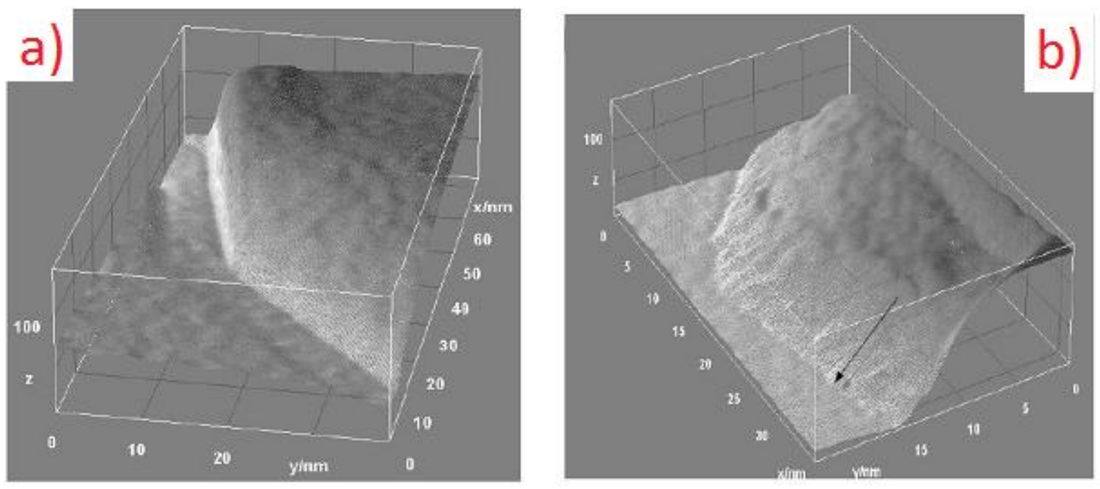


HRTEM image of Sn-C composite

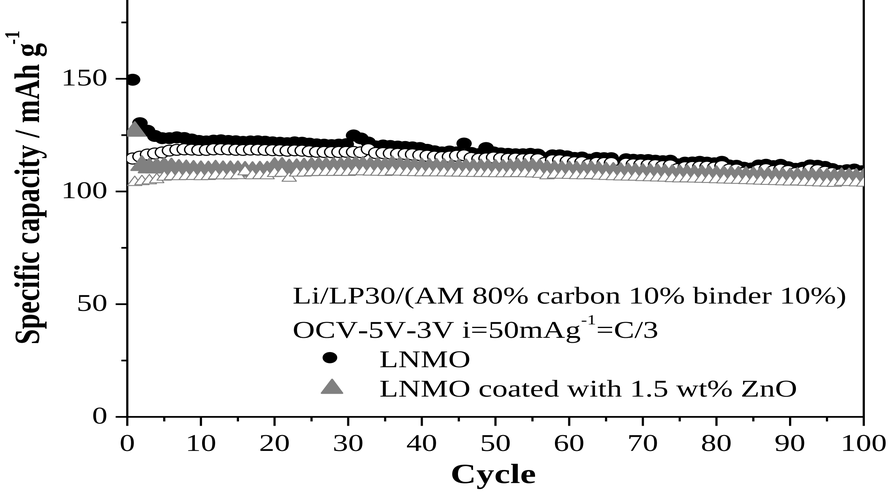


Performances in galvanostatic test of Sn-C electrode at 100 mA/g , room T

Cathode : $LiNi_{0.5}Mn_{1.5}O_4$

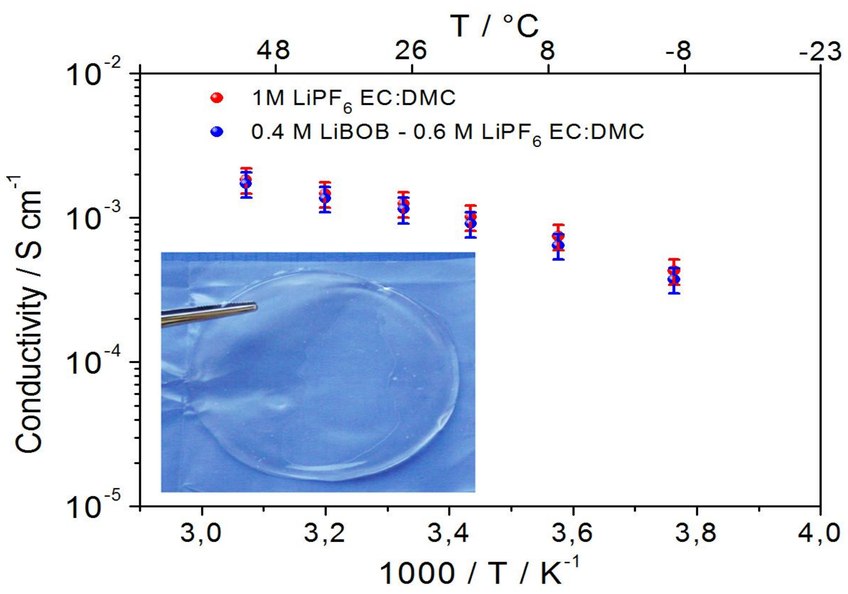


Three dimensional HRTEM imagines of the $LiNi_{0.5}Mn_{1.5}O_4$ (LNMO) spinel (a) and of ZnO coated LNMO (b)



Performances in galvanostatic tests of the bare and the ZnO coated LNMO materials at room temperature

Electrolyte



Gel polymer electrolyte image (GPE), Pvdf / EC:DMC gelled membranes swollen in the selected electrolyte