Composite Ag-$LiFePO_4$ Cathode for Polymeric Lithium Batteries

F. Croce[2], A. D'Epifanio[1], J. Hassoun, L. Settimi[1] and B.Scrosati[1]

[1]Department of Chemistry, University of Rome "La Sapienza", (Italy)
[2]Dipartimento di Scienze del Farmaco, Università "G.D'Annunzio", 66013 Chieti, (Italy)

$LiFePO_4$, a 'welcome old friend' electrode material[1,2,3,4] , has recently been rediscovered[5] as a 'new hope land' in the perennial race toward a cheap, environmentally friend, high-energy density lithium-based battery. The major drawback of $LiFePO_4$ cathode is the poor electronic conductivity of its oxidised counter part, $FePO_4$, which forms during the charge step of the cell. Many interesting routes have been pursued in the literature in order to cope with the poor electronic mobility in this system. Worth to note are those based on the synthesis of composite samples formed by the active material and nanosize particles of conductive powders[2,6] .

In this presentation we report on the synthesis of a new Ag-$LiFePO_4$ composite material, on its physical-chemistry and electrochemical characterization and, finally, on its use in all solid-state, polymeric-electrolyte, lithium cells. To this respect we have utilized both PVdF-based gel electrolyte and PEO-based electrolyte.

Moreover, some characteristics of these polymeric electrolytes will be illustrated and discussed by arguing about their advantages and disadvantages. Finally, performances of metallic lithium-based complete cells will be shown.

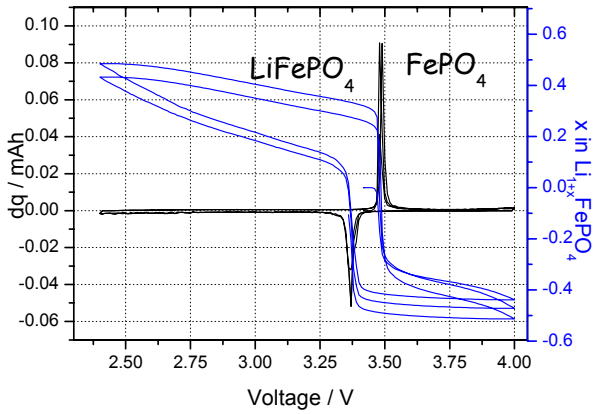

Fig. 1 Oxidation/reduction of Ag-$LiFePO_4$ composite

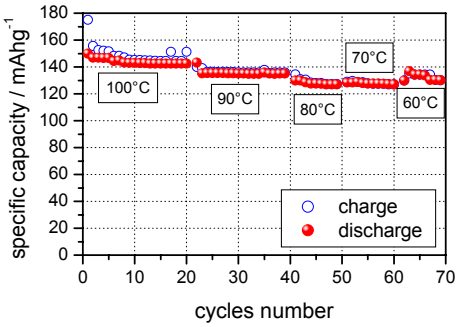

Fig. 2 Charge/discharge cycles of Ag-$LiFePO_4$ composite in $P(EO)_{20}LiCF_3SO_3$ + 10% ZrO_2 composite electrolyte

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