

Lithium-Ion Batteries Based on Non-Stoichiometric
LiMn₂O₄ / Poly(3,4-ethylenedioxythiophene)

Catia Arbizzani², Andrea Balducci¹, Marina
Mastragostino¹, Mauro Rossi¹ and Francesca Soavi¹

¹Università di Bologna, UCI-Scienze Chimiche,
via San Donato 15, 40127 Bologna, Italy

²Università di Bologna, Dip. di Chimica "G. Ciamician",
via Selmi 2, 40126 Bologna, Italy

LiMn₂O₄ spinel has been recognized as a suitable alternative cathode to LiCoO₂ in Li-ion batteries for its non-toxicity, abundance and low-cost for applications requiring large rechargeable batteries such as non-polluting electric transportation. However, the capacity fade throughout charge/discharge cycling, particularly in ethylene carbonate: dimethyl carbonate (EC:DMC)-LiPF₆ electrolyte, is the main drawback which limits its use in commercial lithium ion batteries with graphite as negative electrode [1-4].

We recently prepared a non-stoichiometric LiMn₂O₄/poly(3,4-ethylenedioxythiophene) (pEDOT) composite operating at 4 V in which the polymer serves as conducting agent and, given its electroactivity in the same potential range of lithium manganese oxide, contributes to composite capacity [5, 6]. The oxidative properties of lithium manganese oxides in acidic medium makes feasible the *in situ* growth of conducting polymers on LiMn₂O₄ and we found that this is the best procedure among those tested for the preparation of composite electrodes with pEDOT. In fact, it assures a good electric contact between the inorganic particulate and the organic conductor, thereby enabling the electronic charge transfer to lithium manganese oxide [5].

The present paper deals with home-made non-stoichiometric LiMn₂O₄ spinel covered by pEDOT chemically grown on the oxide particle surface to protect manganese oxide from direct contact with the electrolyte. The results of the electrochemical characterization by galvanostatic charge/discharge cycles on electrodes based on the spinel covered by pEDOT, are reported and compared to those of electrodes based on spinel without polymer covering in view of their use in lithium-ion batteries. Tests on batteries with graphite as negative electrode are reported and discussed.

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