Formation *in situ* of free standing PEDOT-$LiFePO_4$ composite film for lithium ion batteries

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A rapid method to prepare a conductive polymer/$LiFePO_4$ composite electrode has been developed by using dynamic three phase interline electropolymerization (D3PIE) [1-2]. This was accomplished by a biphasic aqueous/organic system, where the electrode is immerged through the interface. The aqueous and organic phase contains respectively the anion (BF_4^-) and the monomer (3,4-ethylenedioxythiophene) (EDOT), necessary for a p-type conductive polymer. $LiFePO_4$ particles was incorporated in the aqueous phase and slowly decanted to the interface. During the polymerization process, the PEDOT anchored the $LiFePO_4$ particles at the interphase to generate *in situ* a functional electrode. One advantage of this technique is the composite electrode can be used without any further modifications in a lithium ion battery

The characterization was performed by scanning electron microscopy (SEM) (Figure 1) and thermogravimetric analysis (TGA) on both PEDOT and PEDOT-$LiFEPO_4$ composite films. Electrochemical studies were performed by galvanostatic cycling in coin cell at different current rate. The electronic conductivity of the composite film was studied by electrochemical impedance spectroscopy at different potential.

Acknowlegments

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References

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[2] H. Zhu, L. Gao, M. Li, H. Yin, D. Wang, Electrochemistry Communications 13 (2011) 1479-1483

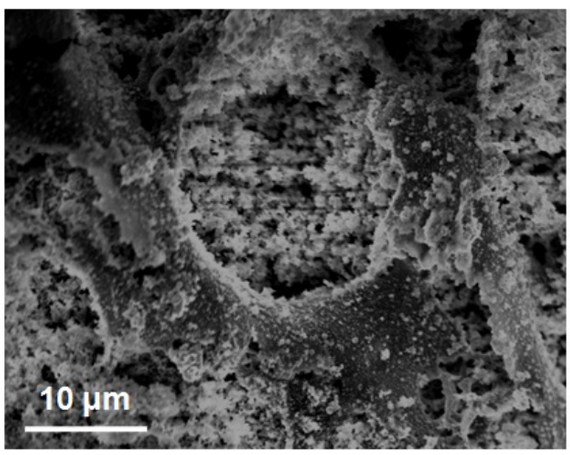

Figure 1. SEM micrograph of the side toward the aqueous phases of PEDOT-$LiFePO_4$ composite film.