Int. J. Electrochem. Sci., 13 **(2018)** 1376 – 1389

International Journal of
ELECTROCHEMICAL
SCIENCE
www.electrochemsci.org

Hierarchically Structured $LiFePO_4$/C with Enhanced Electrochemical Performance for Lithium-Ion Batteries

Xiaojuan Ma, Ligang Gai[*] *and Yan Tian*

Institute of Advanced Energy Materials and Chemistry, School of Chemistry and Pharmaceutical Engineering, Qilu University of Technology, Jinan 250353, People's Republic of China
[*]E-mail: liganggai@qlu.edu.cn

doi: 10.20964/2018.02.36

Received: 14 October 2017 / *Accepted:* 8 December 2017 / *Published:* 28 December 2017

Carbon-coated $LiFePO_4$ (LFP/C) has been subjected to extensive research due to its enhanced electronic conductivity, excellent cycling stability, and low cost for application in lithium-ion batteries (LIBs). In this paper, we report on preparation of LFP/C featured with crystalline LFP particles encapsulated into carbon matrix and its electrochemical properties. Hydroxyethyl cellulose (HEC) was employed as an in situ carbon source and structure-directing agent. Controlled anneal treatment of freezing-dried HEC-containing precursor offered the target LFP/C with superior electrochemical performance for LIBs. After 100 cycles at 0.1 and 1 C, the discharge specific capacity of the target sample retains 151.9 and 124.6 mA h g^{-1}, presenting capacity retention of 93.4% and 97.9%, respectively. This result is attributed to crystalline LFP well encapsulated into carbon matrix with enhanced degree of graphitization.

Keywords: $LiFePO_4$/C; Hydroxyethyl cellulose; Electrochemical performance; Lithium-ion batteries

FULL TEXT