Accepted Manuscript

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PII: S0378-7753(15)00366-3

DOI: 10.1016/j.jpowsour.2015.02.120

Reference: POWER 20749

To appear in: *Journal of Power Sources*

Received Date: 9 October 2014

Revised Date: 18 February 2015

Accepted Date: 22 February 2015

Please cite this article as: F.-J. Chen, F. Tao, C.-M. Wang, W.-L. Zhang, L. Chen, The influence of improved carbon coating layer with nanometer-sized CeO_2 interconnector on the enhanced electrochemical performance of $LiMnPO_4$, Journal of Power Sources (2015), doi: 10.1016/j.jpowsour.2015.02.120.

The influence of improved carbon coating layer with nanometer-sized CeO_2 interconnector on the enhanced electrochemical performance of $LiMnPO_4$

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Abstract

The CeO_2/C hybrid coated $LiMnPO_4$ composites are prepared via a simple and effective wet chemical process followed by heat treatment at 550 °C. The nanometer-sized CeO_2 acts as an interconnector in carbon network, and its influence on the electrochemical performance is investigated in detail. The 0.25 wt.% CeO_2-modified $LiMnPO_4$/C (sample-0.25) exhibits the highest discharge capacity and the best cycle life, which can deliver an initial capacity of 139.9 mAh g^{-1} at 0.1 C and still retain a reversible capacity of 120.4 mAh g^{-1} after 50 cycles (capacity retention of 86.1 %). While for pristine $LiMnPO_4$/C (sample-0), only 94.4 mAh g^{-1} can be obtained at the 50th cycle, corresponding to 72.9 % of its initial discharge capacity (129.5 mAh g^{-1}). Scanning electron microscopy (SEM), transmission electron microscopy (TEM) and X-ray diffraction (XRD) results confirm that an integrated and hybrid CeO_2/C coating layer is formed on $LiMnPO_4$ surface and its existence has no influence on the

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