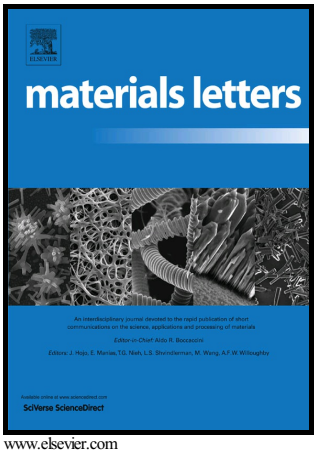

A facile hydrothermal synthesis of tungsten doped monoclinic vanadium dioxide with B phase for supercapacitor electrode with pseudocapacitance

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PII: S0167-577X(16)31101-6
DOI: http://dx.doi.org/10.1016/j.matlet.2016.07.007
Reference: MLBLUE21135

To appear in: *Materials Letters*

Received date: 27 May 2016
Revised date: 29 June 2016
Accepted date: 3 July 2016

Cite this article as: Yifu Zhang and Yuting Huang, A facile hydrothermal synthesis of tungsten doped monoclinic vanadium dioxide with B phase fo supercapacitor electrode with pseudocapacitance, *Materials Letters* http://dx.doi.org/10.1016/j.matlet.2016.07.007

A facile hydrothermal synthesis of tungsten doped monoclinic vanadium dioxide with B phase for supercapacitor electrode with pseudocapacitance

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Abstract

Tungsten doped monoclinic vanadium dioxide with B phase (W-doped VO_2(B)) was successfully synthesized by a facile hydrothermal route. The composition, structure and morphology were characterized by EDS, element mapping, XRD, XRF and TEM. The results showed that W atom was successfully doped into the crystal lattice of VO_2(B) matrix, and the homogeneous solid-solutions of W-doped VO_2(B) nanobelts were prepared. The electrochemical properties of W-doped VO_2(B) nanobelts as a supercapacitor electrode were investigated by cyclic voltammetry (CV) and galvanostatic charge-discharge (GCD) methods. W-doped VO_2(B) nanobelts displayed excellent pseudocapacitance property and their specific capacitance were 253, 239, 207, 164 and 148 $F \cdot g^{-1}$ at the current density of 1, 2, 5, 10 and 20 $A \cdot g^{-1}$, respectively. They also exhibited excellent energy densities of 323, 305, 265, 209 and 189 $W \cdot h \cdot kg^{-1}$ at power densities of 2882, 5758, 14433, 28828 and 57661 $W \cdot kg^{-1}$. The results showed the electrochemical performance of VO_2(B) can be greatly improved by W-doped VO_2(B).

Graphical Abstract