

Accepted Manuscript

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PII: S0167-577X(17)31846-3
DOI: <https://doi.org/10.1016/j.matlet.2017.12.088>
Reference: MLBLUE 23586

To appear in: *Materials Letters*

Received Date: 1 September 2017
Revised Date: 15 December 2017
Accepted Date: 19 December 2017



Please cite this article as: H. Mao, A. Rasheed, Facile Synthesis of Porous $\text{Mn}_2\text{TiO}_4/\text{TiO}_2$ Composites for High Performance Supercapacitors, *Materials Letters* (2017), doi: <https://doi.org/10.1016/j.matlet.2017.12.088>

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Facile Synthesis of Porous Mn₂TiO₄/TiO₂ Composites for High Performance Supercapacitors

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ABSTRACT:

Herein, porous Mn₂TiO₄/TiO₂ composites were successfully fabricated via a facile sol-gel approach. Scanning and transmission electron microscopy results demonstrated that Mn₂TiO₄/TiO₂ composites have pore structure, which not only improves the surface area of the sample but also provide more surface reaction sites. The electrochemical measurements show that such composites electrode possesses a specific capacitance of 98.2 F g⁻¹ at a current density of 0.5 A g⁻¹. Moreover, the capacity retention of the fabricated material is 92.3% after 10000 cycles in 3M KOH aqueous electrolyte with a current density of 0.5 A g⁻¹ at room temperature. These excellent results demonstrated that the porous Mn₂TiO₄/TiO₂ composites are promising for high-performance supercapacitors.

Keywords: sol-gel, porous structure, energy storage and conversion; microstructure, supercapacitors

1. Introduction:

Supercapacitors have attracted much attention due to their excellent properties such as rapid rechargeability, good recyclability and great power density [1-3]. In general, supercapacitors can be classified as electrical double-layer capacitors (EDLCs) and pseudo-capacitors on the basis of their mechanism of energy storage [4,5]. As compared to the EDLCs, the pseudocapacitors exhibit higher specific capacitance because of its fast and reversible redox reaction [6]. Thus, many of the researchers focus on fabrication of pseudocapacitors to obtain high-performance energy storage

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