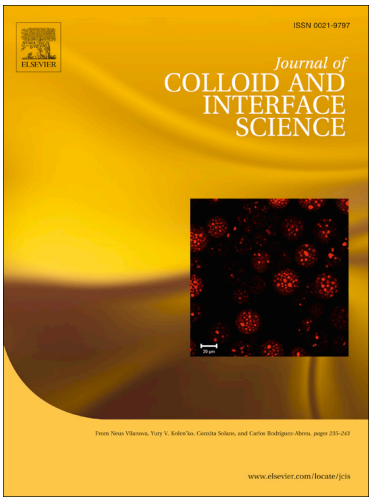

Self-assembled $Ti_3C_2T_x$/SCNT composite electrode with improved electrochemical performance for supercapacitor

Qishan Fu, Xinyu Wang, Na Zhang, Jing Wen, Lu Li, Hong Gao, Xitian Zhang

PII: S0021-9797(17)31144-X
DOI: https://doi.org/10.1016/j.jcis.2017.09.104
Reference: YJCIS 22856

To appear in: *Journal of Colloid and Interface Science*

Received Date: 8 August 2017
Revised Date: 21 September 2017
Accepted Date: 28 September 2017

Please cite this article as: Q. Fu, X. Wang, N. Zhang, J. Wen, L. Li, H. Gao, X. Zhang, Self-assembled $Ti_3C_2T_x$/SCNT composite electrode with improved electrochemical performance for supercapacitor, *Journal of Colloid and Interface Science* (2017), doi: https://doi.org/10.1016/j.jcis.2017.09.104

Self-assembled $Ti_3C_2T_x$/SCNT composite electrode with improved electrochemical performance for supercapacitor

Qishan Fu[a], Xinyu Wang[a], Na Zhang[b], Jing Wen[a], Lu Li[a], Hong Gao[a], Xitian Zhang[*,a]

[a] *Key Laboratory for Photonic and Electronic Bandgap Materials, Ministry of Education, School of Physics and Electronic Engineering, Harbin Normal University, Harbin 150025, P. R. China.*

[b] *Department of Chemistry and Chemical Biology, Cornell University, Ithaca, New York 14853, United States.*

* Corresponding authors. Xitian Zhang. (Email: xtzhangzhang@hotmail.com).

Abstract

Two-dimensional titanium carbide has gained considerable attention in recent years as an electrode material for supercapacitors due to its high melting point, good electrical conductivity, hydrophilicity and large electrochemically active surfaces. However, the irreversible restacking during synthesis restricts its development and practical applications. Here, $Ti_3C_2T_x$/SCNT self-assembled composite electrodes were rationally designed and successfully synthesized by introducing single-walled carbon nanotubes (SCNTs) as interlayer spacers to decrease the restacking of the $Ti_3C_2T_x$ sheets during the synthesis process. SCNTs can not only increase the specific surface area as well as the interlayer space of the $Ti_3C_2T_x$ electrode, but also increase the accessible capability of electrolyte ions, and thus it improved the electrochemical performance of the electrode. The as-prepared $Ti_3C_2T_x$/SCNT self-assembled composite electrode achieved a high areal capacitance of 220 mF/cm^2 (314 F/cm^3) and a remarkable capacitance retention of 95% after 10000 cycles.