

Supporting Information

Graphene Nanosheet–Titanium Nitride Nanocomposite for High Performance Electrochemical Capacitors without Extra Conductive Agent Addition

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The content of the graphene in the G/TiN nanocomposite is about 64.6 wt%.

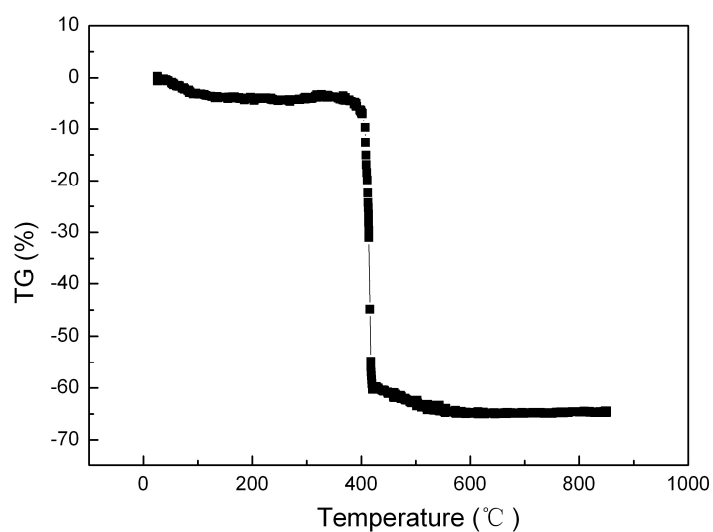


Fig. S1 TG analysis of G/TiN nanocomposite

It can be seen from Fig. S2, i.e., the cross-section SEM image of G/TiN nanocomposite electrode, that the graphene sheets are composed of the stack of graphene layer by layer along the c-axis. Between the layers, TiN nanoparticles play an integral role in supporting bridge. Moreover, apart from pores between 20~40 nm, there also exists pores below 20 nm.

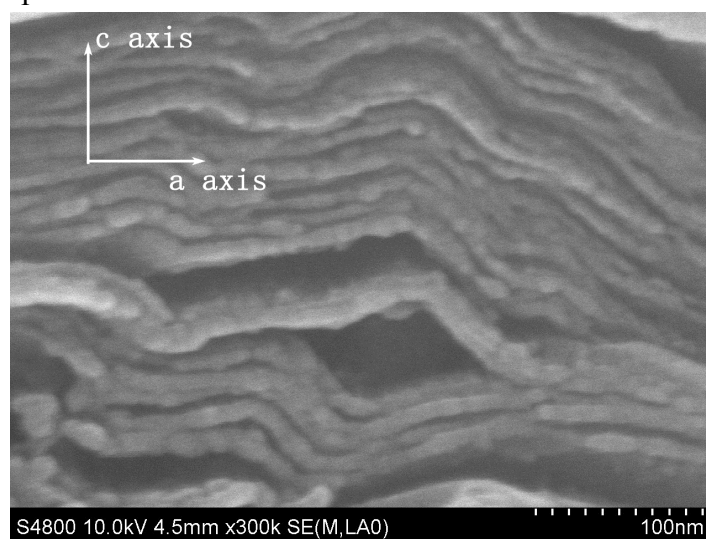


Fig. S2 Cross-section SEM image of the electrode.

In order to clarify the ratio effect of G in G/TiN nanocomposite on the performance of the ECs, further studies were carried out. When current density is 0.1 A g^{-1} , G/TiN nanocomposite with 82.3% and 45.7% of G delivers specific capacitances of 268 F g^{-1} and 378 F g^{-1} (Fig. S3), respectively. The sample with 82.3% of G shows a relatively lower reversible capacitance, which maybe ascribe to the insufficient cover of TiN on G (Fig. S4a), thus leading to produce large amount of SEI on the surface of the electrode. As for the sample with 45.7% of G, the excess inactive TiN on G decreased the reversible capacitance (Fig. S4b) [1].

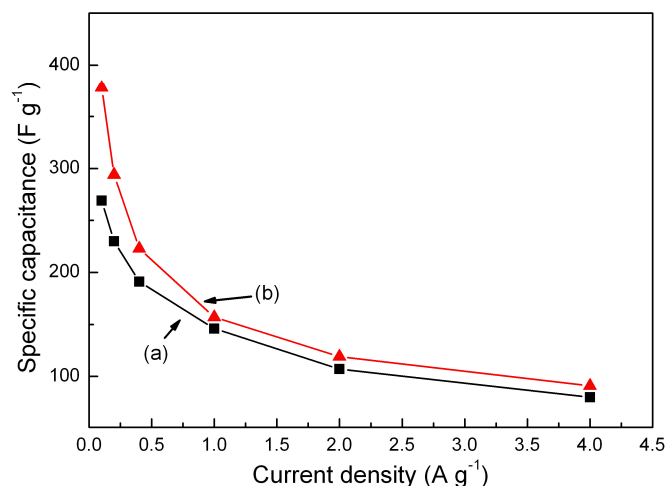


Fig. S3 The specific capacitances as function of the current densities of G/TiN nanocomposite with different ratio of G: (a) 82.3%; (b) 45.7%.

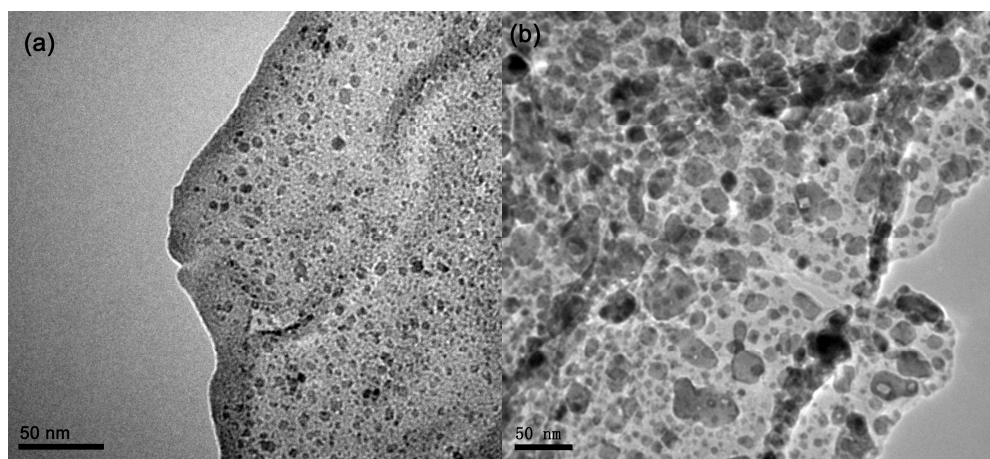


Fig. S4 TEM images of G/TiN nanocomposite with different ratio of G: (a) 82.3%; (b) 45.7%.

Reference

- [1] Y. Yue, P. Han, X. He, K. Zhang, Z. Liu, C. Zhang, S. Dong, L. Gu, G. Cui. In situ synthesis of a graphene/titanium nitride hybrid material with highly improved performance for lithium storage. *J. Mater. Chem.*, 2012, **22**, 4938.