Fabrication of Graphene-Based Composites for Wearable Supercapacitors

Yangshuai Liu [a], Lathankan Rasenthiram [a], Aiping Yu *[a]

[a] Department of Chemical Engineering, University of Waterloo
200 University Avenue West, Waterloo, Ontario, N2L 3G1, Canada
Contact email: aipingyu@uwaterloo.ca

Abstract

Graphene fiber (GF) has arisen as a widely used material in both academia and industry due to its mechanical flexibility. GF has significant value because it permits the integration of rich functionalities and high performances. Many efforts were made to apply graphene fibers (GFs) to wearable energy storage devices such as supercapacitors. However, the utilization of 2-D graphene sheets presents difficulties in assembling GF with strong mechanical strength. Moreover, current methods of fabricating supercapacitor device by twisting two individual GF together could easily result in short circuit or high solution resistance. Thus a more integrated GF supercapacitor that does not compromise electrochemical performance is strongly required [1-3].

Herein we propose a novel all-in-one GF supercapacitor device based on spun graphene fibers.The proposed GF supercapacitor has strong mechanical strength and improved capacitive performance due to the utilization of giant graphene sheets and introduction of Ppy. This novel method also overcomes the high solution resistance of the conventional closely-packed GO sheets. Therefore the proposed novel all-in-one GF method holds great technological promise as an improved mean for constructing super capacitor devices.

References

[1] Y. Hu, H. H. Cheng, F. Zhao, N. Chen, L. Jiang, Z. H. Feng, L. T. Qu, *Nanoscale*, **6** (2014), 6448-6451.

[2] Y. N. Meng, Y. Zhao, C. G. Hu, H. H. Cheng, Y. Hu, Z. P. Zhang, G. G. Shi, L. T. Qu, *Adv. Mater*., **16** (2013) 2326-2331

[3] F. C. Meng, W. B. Lu, Q. W. Li, J. H. Byun, Y. S. Oh, T. W. Chou, *Adv. Mater*., **35** (2015) 5113-5131