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Hong Zhong Chi*, Yong Qiang Wu, Yu Kang Shen, Chunxiao Zhang, Qinqin Xiong, Haiying Qin

College of Materials and Environmental Engineering, Hangzhou Dianzi University, Hangzhou 310018, People's Republic of China

Abstract

Asymmetric supercapacitors possess advantages of elevated capacitance, extended output voltage, and then improved power-energy characteristic. Here we report on a composite electrode prepared by electrodepositing manganese oxide into a graphene hydrogel and its capacitive performance in an asymmetric supercapacitor. The manganese oxide/graphene hydrogel exhibits a specific capacitance of 352.9 F g^{-1} at 1 A g^{-1}. The aqueous asymmetric supercapacitor composed of an active carbon as a negative electrode and the manganese oxide/graphene hydrogel as a positive electrode possesses good cycle stability (91.5% of capacitance retention after 5000 cycles) and is able to deliver an energy density of 41.8 Wh kg^{-1} at a power density of 0.2 kW kg^{-1}. Its possibility to serve as a power supply for a practical application was verified by lighting up a blue light-emitting diode. These results demonstrate the electrodeposition process has promising prospect in the preparation of high-performance composite electrodes for advanced electrochemical energy storage devices.

Key words: Graphene hydrogel; Manganese oxide; Electrodeposition; Asymmetric supercapacitor

Corresponding authors: H. Z. Chi

College of Materials and Environmental Engineering,

Hangzhou Dianzi University, Hangzhou 310018, China

E-mail: hzchi @ hdu.edu.cn (H. Z. Chi)