Abstract

Tremendous research effort has been devoted into developing wide potential window aqueous supercapacitor to resolve its low energy density concern [1]. While operational potential window is dictated by intrinsic electrochemical stability of water (1.23 V), such bottom neck may be surpassed by leveraging on additional overpotential of oxygen evolution reaction (OER) and hydrogen evolution reaction (HER). Herein, by employing an electro-reduction technique, Na$_{0.25}$MnO$_2$ was employed as positive electrode to take advantage of the extra energy (i.e. increased overpotential) required for Na$^+$ insertion process into the structure. The asymmetric supercapacitor exhibited high energy density and ultra-high power density. In addition, good capacitance retention was recorded after cycling for thousands cycles. The present success in fabricating 2.7 V asymmetric supercapacitor would open a promising research route towards achieving high energy density and high power density.