Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C

Supporting Information

High Performance Flexible Solid-State Asymmetric Supercapacitors of MnO_2/ZnO Core/Shell Nanorods // Specially Reduced Graphene Oxide

Wang Zilong,[a] Zonglong Zhu,[a] Jianhang Qiu[a,b] and Shihe Yang*[a]

[a]*Department of Chemistry, The Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong, China. E-mail: chsyang@ust.hk*

Contact information for corresponding authors:

Shihe Yang. Department of Chemistry, Hong Kong University of Science and Technology, Hong Kong, China. E-mail: chsyang@ust.hk

[b]*Present address: Division of Functional Film and Interface, Shenyang National Laboratory for Materials Science (SYNL), Chinese Academy of Sciences , Shenyang, China.*

Electrochemistry data analysis

The areal power density (P) and energy density (E) were calculated by using the following equations:

$$P = E/t \quad (1)$$

$$E = 0.5CV^2 \quad (2)$$

In these equations V stands for the applied voltage, t means the discharge time, and C means the areal capacitance from equation (3):

$$C = (\int IdV) / (S v V) \quad (3)$$

Here I means the applied current, V means potential, v is the potential scan speed, S means the area of active electrode materials.

As for the calculation of ASC device, the area (S) should be replaced by volume (V).

For ASC, the charge balance will follow the relationship $q^+ = q^-$:

$$q = C \times \Delta E \times S \quad (5)$$

Here C stands for areal capacitance, and ΔE means the potential range for the charge/discharge process of each electrode. So that in order to get $q^+ = q^-$, the area balancing will follow the Equation (6):

$$S^+/S^- = C^- \Delta E^- / C^+ \Delta E^+ \quad (6)$$

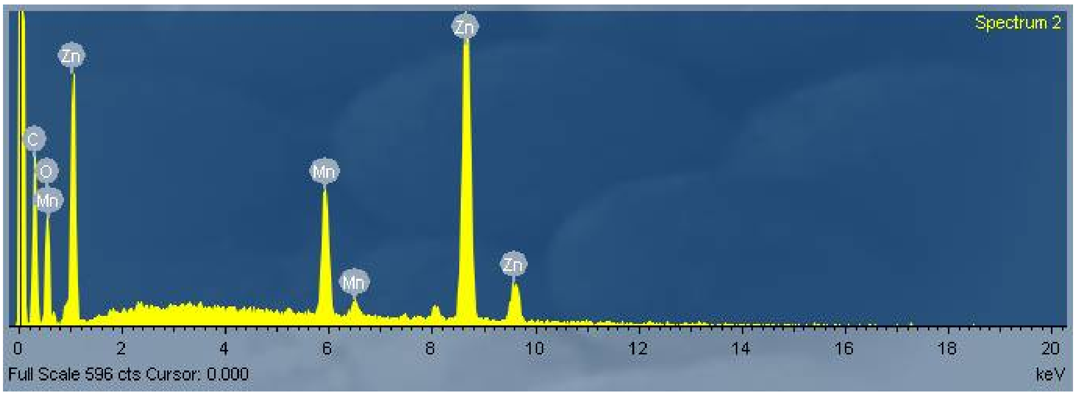

Figure S1. EDS profile of the MnO_2/ZnO core/shell nanorod array.

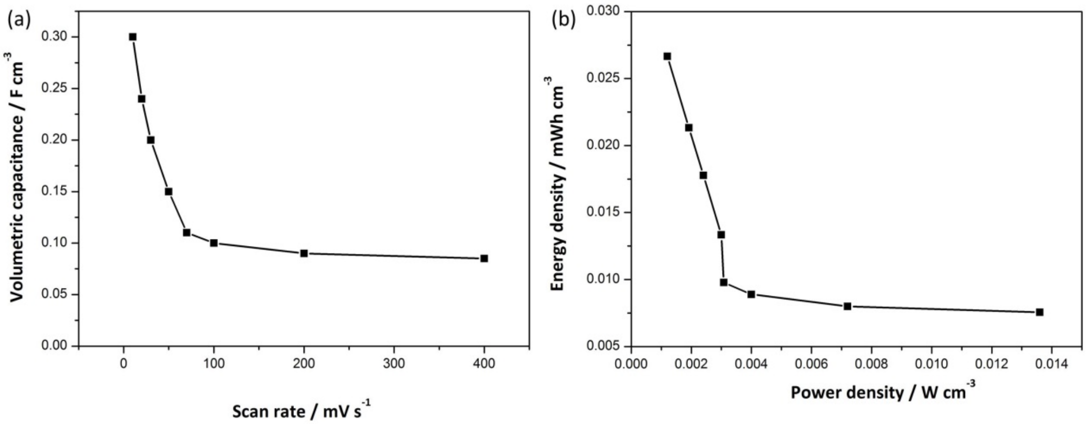

Figure S2. a) Volumetric capacitance of SSC as a function of scan rate in LiCl/PVA gel electrolyte.

b) Energy density vs. power density for SSC in LiCl/PVA solid electrolyte.

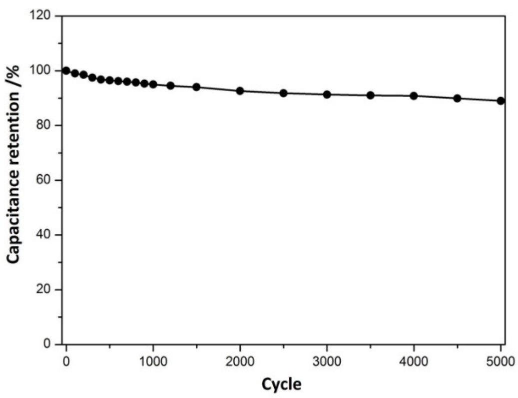

Figure S3. Cycling performance of SSC device measured at a scan rate of 50 mV s^{-1} for 5000 cycles in gel (LiCl/PVA) electrolytes.

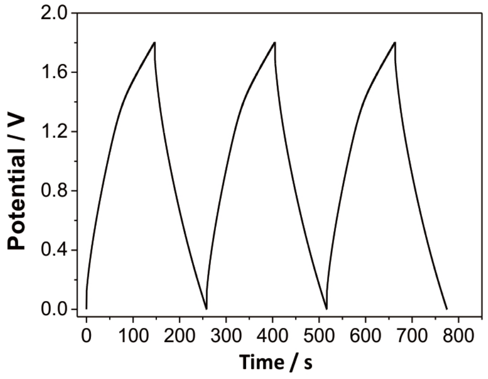

Figure S4. Galvanostatic charge and discharge curves collected at a current density of 0.5 mA/cm^2 for ASC device operated within a voltage window of 1.8 V.

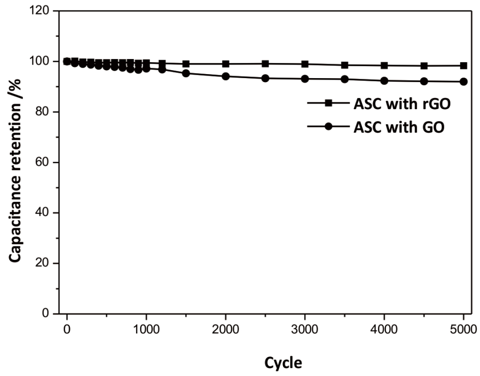

Figure S5. Capacity retention of the ASC devices at a constant charge/discharge cycling rate of 0.5 mA/cm^2.