Electronic Supplementary Information

Carbon-Coated Graphene/Antimony Composite with a Sandwich-Like Structure for Enhanced Sodium Storage

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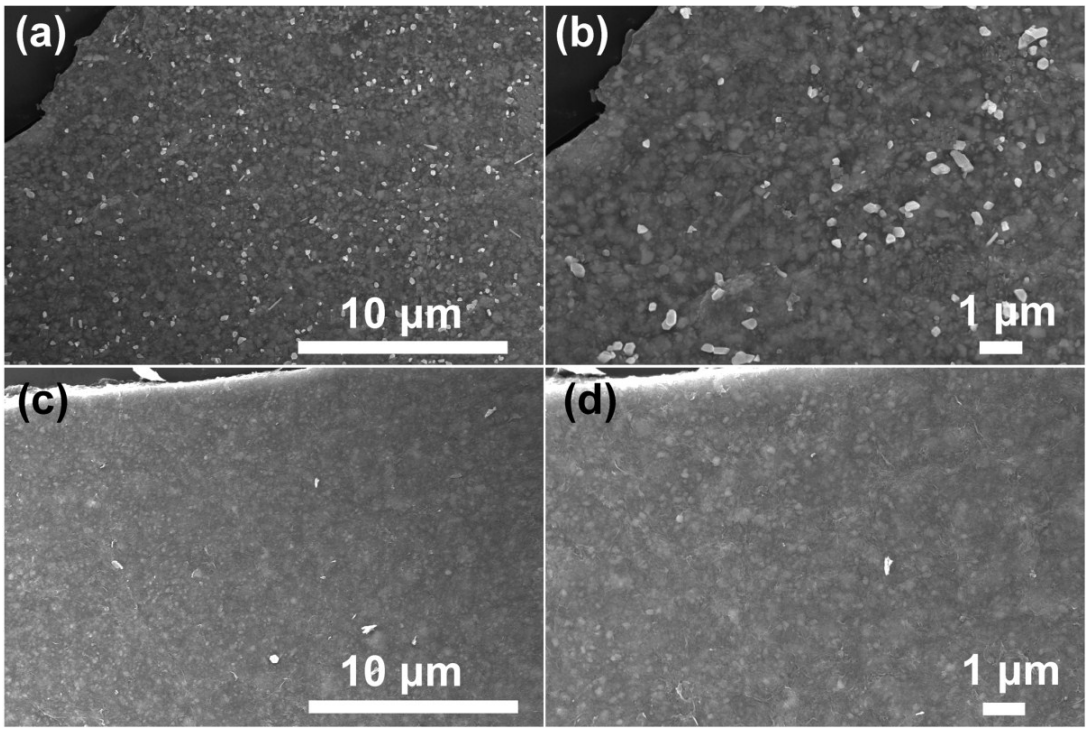

Fig. S1. SEM images of G@SbO_x (a, b) and G@SbO_x@PF (c, d) composites.

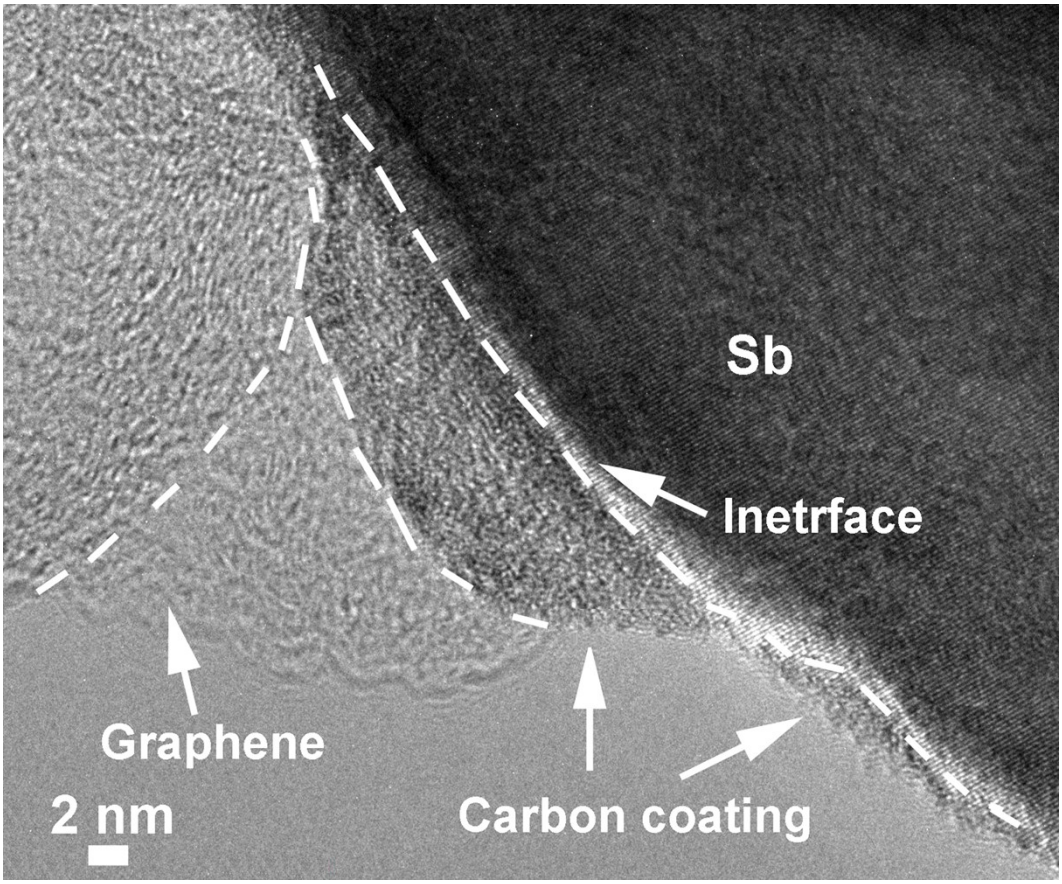

Fig. S2. HRTEM image of the G@Sb@C composite.

Synthesis and Electrochemical Characterizations of Graphene and Graphene@C

The graphene@C composite was fabricated using the same synthesized procedures without adding $SbCl_3$. The GO was freeze-dried and then thermally reduced to get graphene. For electrochemical characterizations, the electrodes were also fabricated and tested using the same method.

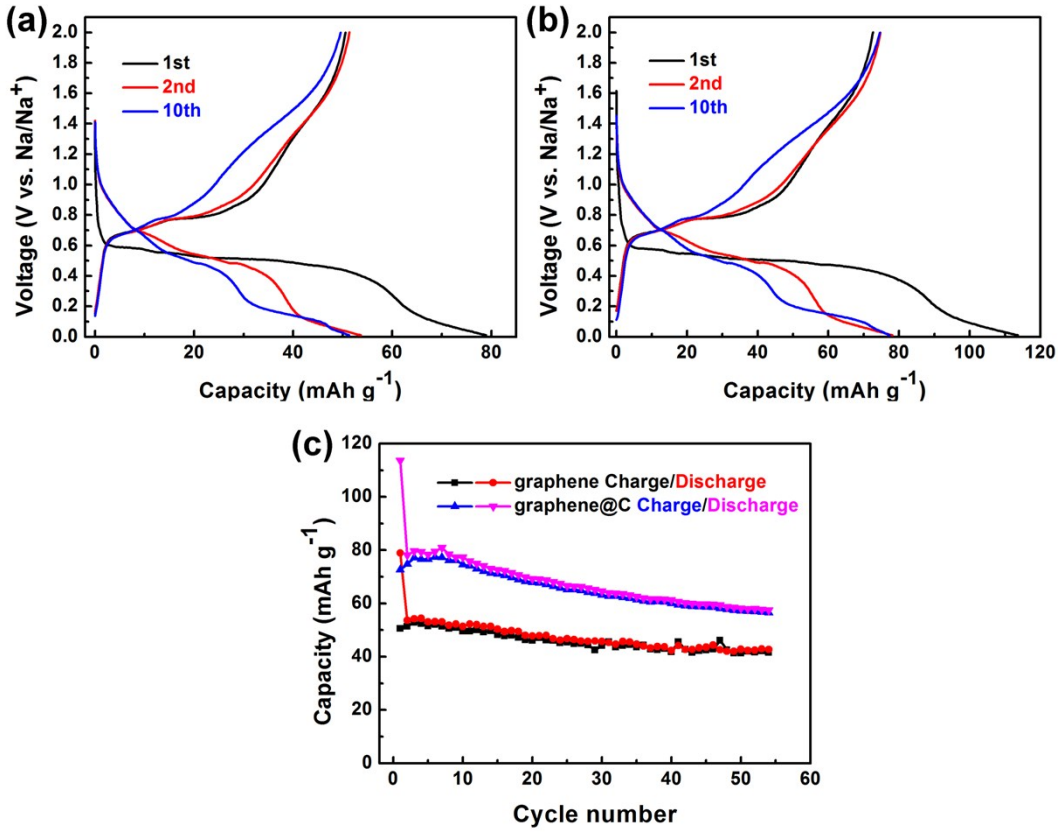

Fig. S3. Charge/discharge profiles of graphene (a) and graphene@C (b) electrodes at a current rate of 0.1 A g^{-1} between 2.0 and 0.01 V for the 1st, 2nd and 10th cycles; (c) Cycling performances of graphene and graphene@C electrodes at a current rate of 0.1 A g^{-1}.

$$\mathbf{C}_{G@Sb@C} = \mathbf{C}_{Sb} * \mathbf{W}_{Sb} + \mathbf{C}_{carbon} * \mathbf{W}_{carbon}$$

Equation S1. The theoretical capacity of G@Sb@C could be calculated basing on the above equation. The composition of carbon derives from graphene@C. C_{Sb} and C_{carbon} are 660 mA h g^{-1} and 58.7 mA h g^{-1}, respectively. W_{Sb} and W_{carbon} are the weight percents of Sb (59.1 wt%) and carbon (40.9 wt%), respectively. Thus, the theoretical capacity of G@Sb@C is calculated as 414.1 mA h g^{-1}.

Table S1. The first cycle Coulombic efficiencies of G@Sb@C, G@Sb and Sb electrodes

Sample identification	Coulombic efficiency (%)
G@Sb@C	81.7
G@Sb	74.7
Sb	81.3

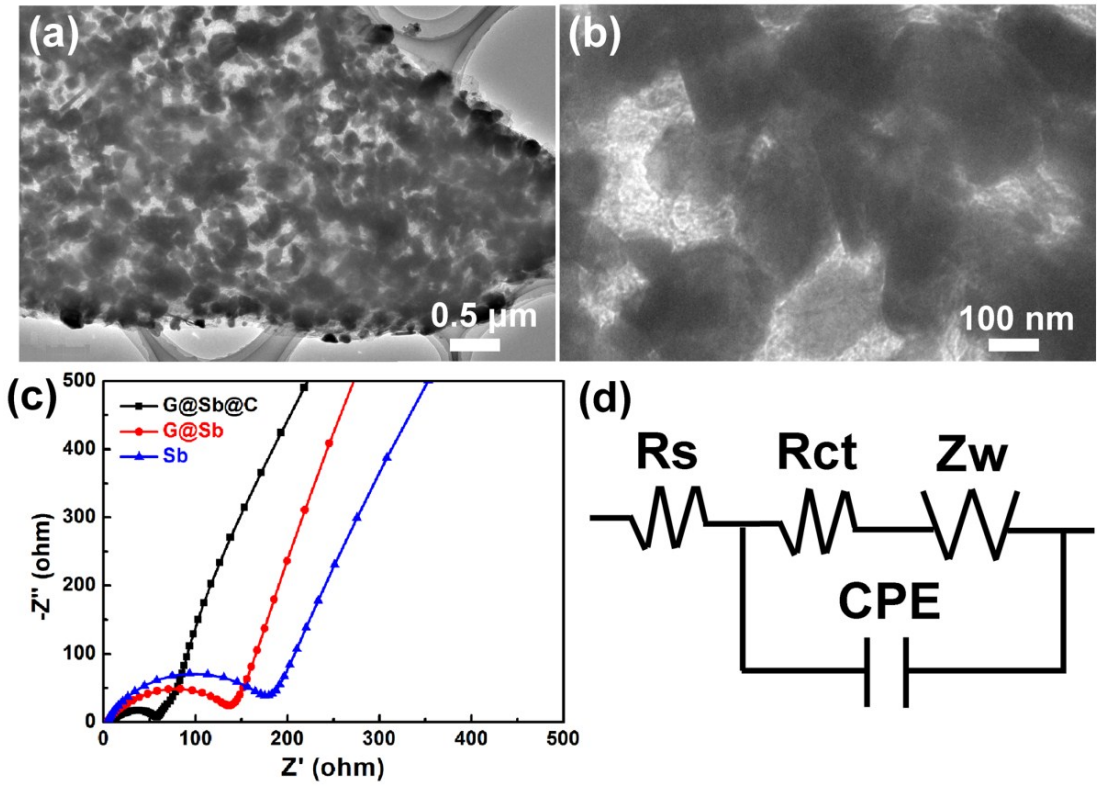

Fig. S4. (a and b) TEM images of the G@Sb@C composite after 50 cycles at a current rate of 0.1 A g^{-1}; (c) Nyquist plots of the G@Sb@C, G@Sb and Sb electrodes after 50 cycles obtained by applying a sine wave with an amplitude of 5.0 mV over the frequency range 100 kHz to 0.01 Hz; (d) Equivalent circuit model of the studied system.