

Supplementary Materials: Article Synergetic Hybrid Aerogels of Vanadia and Graphene as Electrode Materials of Supercapacitors

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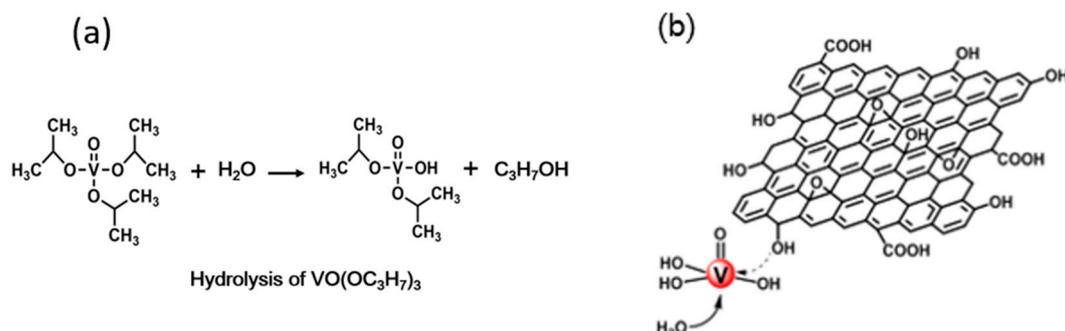


Figure S1. (a) Hydrolysis of vanadium tri-isopropoxide; and (b) complexation of vanadium hydroxide with graphene oxide.

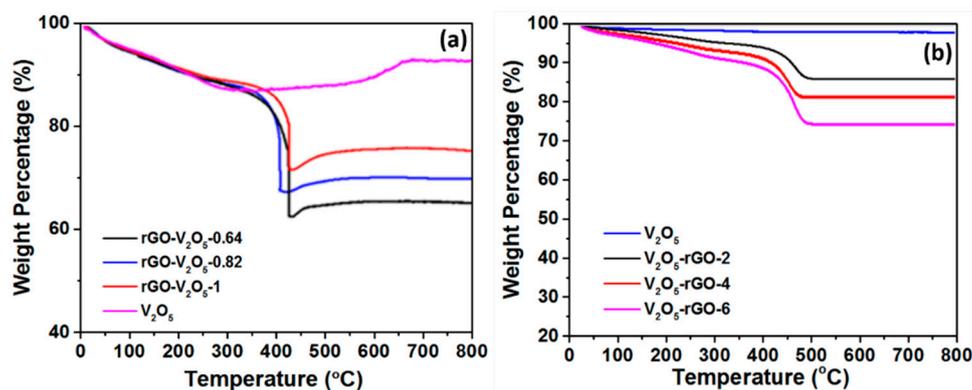


Figure S2. TGA curves conducted in an air atmosphere of (a) V_2O_5 aerogel and a series of $\text{rGO-V}_2\text{O}_5$ composite aerogels prepared by Method I and (b) thermally treated V_2O_5 aerogel and V_2O_5 - rGO composite aerogels prepared by Method II.

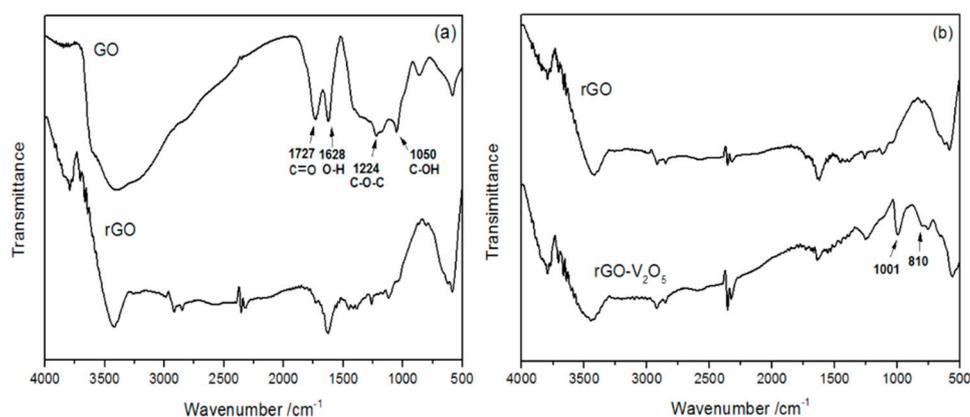


Figure S3. FTIR spectra of (a) GO and rGO; and (b) $\text{rGO-V}_2\text{O}_5$ hybrid aerogel.

The absorption peaks at 1050 cm^{-1} (C-OH), 1224 cm^{-1} (C-O-C), and 1727 cm^{-1} (C=O) suggest that graphite was chemically oxidized into GO [1]. The strong peak at 1628 cm^{-1} belongs to moisture absorbed by GO. The evidence of reduction of GO into graphene by L-ascorbic acid are gleaned easily from the FTIR spectra. For example, the intensity of the characteristic peaks of C-OH and C-O-C are greatly reduced and the C=O peak at 1727 cm^{-1} even disappeared. In view of this, it can be inferred that reduction of GO was complete. The FTIR spectra of rGO- V_2O_5 -0.82 hybrid aerogel are compared with that of graphene aerogel as in Figure S3b. The FTIR spectrum of rGO- V_2O_5 -0.82 hybrid aerogel exhibits two clear peaks at 810 cm^{-1} and 1001 cm^{-1} corresponding to doubly coordinated oxygen (bridge oxygen) bonds and stretching vibration of terminal oxygen bonds (V=O), respectively [2]. The results further confirm the presence of V_2O_5 in the hybrid aerogel.

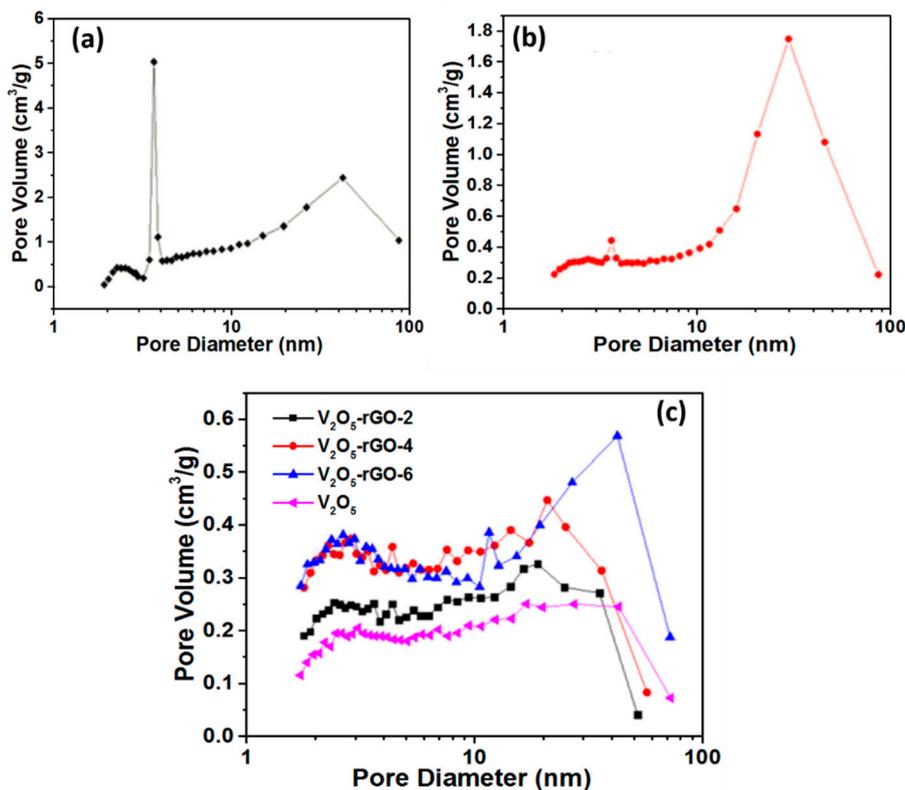


Figure S4. (a,b) BJH pore distribution of rGO aerogel and rGO- V_2O_5 -0.82 composite aerogel prepared by Method I; and (c) BJH pore distribution of V_2O_5 -rGO composite aerogels and thermally-treated V_2O_5 aerogel prepared by Method II.

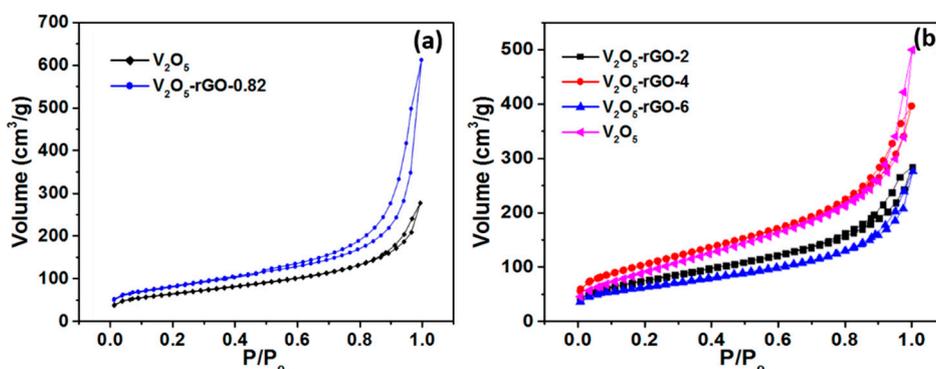


Figure S5. (a) Nitrogen adsorption-desorption isotherms of V_2O_5 aerogel and rGO- V_2O_5 hybrid aerogel prepared by Method I; and (b) nitrogen adsorption-desorption isotherms of heat-treated V_2O_5 aerogel and V_2O_5 -rGO hybrid aerogels with varying weight compositions prepared by Method II.

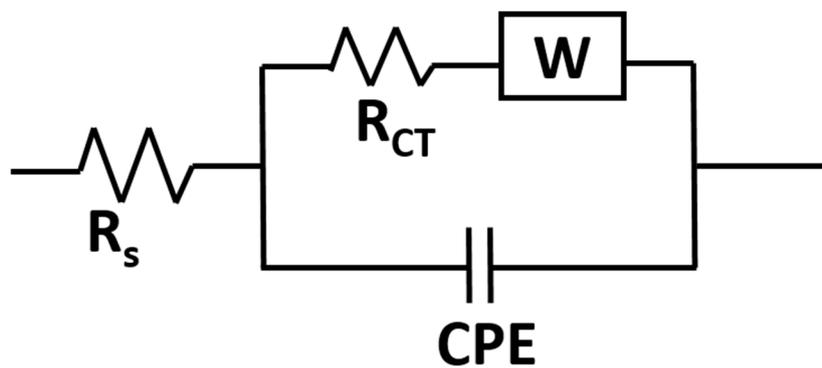


Figure S6. Equivalent circuit of the EIS of measured aerogel samples.

References

1. Jeong, H.K.; Jin, M.H.; An, K.H.; Lee, Y.H. Structural stability and variable dielectric constant in poly sodium 4-styrenesulfonate intercalated graphite oxide. *J. Phys. Chem. C* **2009**, *113*, 13060–13064.
2. Zhou, X.W.; Wu, G.M.; Wu, J.D.; Yang, H.Y.; Wang, J.C.; Gao, G.H.; Cai, R.; Yan, Q.Y. Multiwalled carbon nanotubes– V_2O_5 integrated composite with nanosized architecture as a cathode material for high performance lithium ion batteries. *J. Mater. Chem. A* **2013**, *1*, 15459–15468.