Supporting information

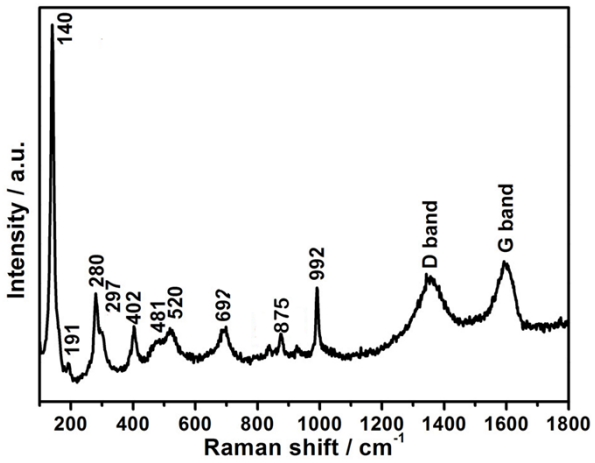

Figure S1. Raman spectrum of the as-obtained nanocomposite

The Raman spectrum was carried out to further investigate the chemical composition of the sample. As shown in Figure S1, the well resolved peaks at 140, 191, 280, 297, 402, 481, 520, 692 and 992 cm^{-1} were assigned to the $V_2O_5 \cdot H_2O$/graphene.[1] While the bands at 1350 and 1590 cm^{-1} were assigned to the D and G peaks of graphene,[2] which revealed that the sample was the $V_2O_5 \cdot H_2O$/graphene composite.

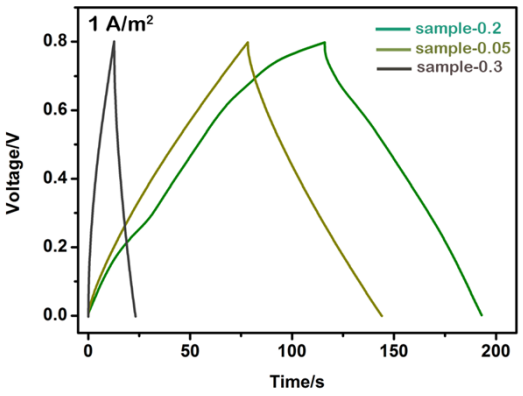

Figure S2. Galvanostatic charge–discharge curves at 1 A/m^2 for different samples

Galvanostatic charge–discharge curves for the $V_2O_5 \cdot H_2O$/graphene composite with the different addition amount of $VO(ipr)_3$ at 1 A/m^2 is shown in Figure S2. The composites was named as sample-xx, in which xx means the addition amount of $VO(ipr)_3$. The capacitance of 7560 $\mu F/cm^2$ for sample-0.05 and 1250 $\mu F/cm^2$ for sample-0.3 are both lower than the value of about 9662.5 $\mu F/cm^2$ for the optimized product (sample-0.2).

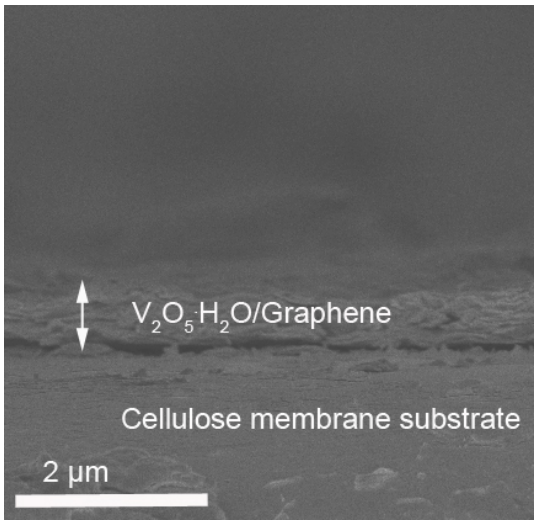

Figure S3. The cross-section SEM image of the $V_2O_5{\cdot}H_2O$/graphene film, indicating the thickness of the film is about 800 nm.

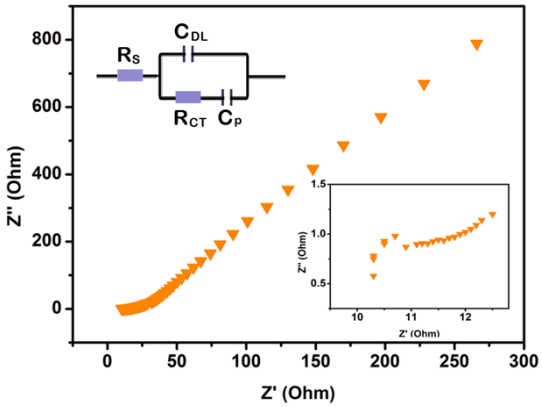

Figure S4. Nyquist plots of the supercapacitor with the frequency ranging from 100 kHz to 0.01 Hz by applying a sine wave with amplitude of 5.0 mV (magnified figure at the high frequency, inset)

The electrochemical impedance spectroscopy (EIS) was carried out over a frequency range from 100 kHz to 0.01 Hz. As shown in Figure S4, the curve shows a small diameter of semicircle (inset in Figure S4) and is further investigated via the common R-C equivalent circuit which reveals that the charge-transfer resistance is only 4.36 Ω, clearly demonstrating the high conductivity of the nanocomposites during the electrochemical process.

References

1. T. Zhai, H. Liu, H. Li, X. Fang, M. Liao, L. Li, H. Zhou, Y. Koide, Y. Bando and D. Golberg, *Adv.Mater.*, 2010, **22**, 2547-2552.
2. D. C. Marcano, D. V. Kosynkin, J. M. Berlin, A. Sinitskii, Z. Sun, A. Slesarev, L. B. Alemany, W. Lu and J. M. Tour, *ACS Nano*, 2010, **4**, 4806-4814.