Electronic Supplementary Information

Uniform V_2O_5 nanosheet-assembled hollow microflowers with excellent lithium storage properties

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Experimental details

Materials Synthesis: In a typical synthesis, 0.2 mL of vanadium oxytriisopropoxide (VOT) was added into 30 mL of isopropanol alcohol (IPA) under vigorous stirring for 30 min. The mixture solution was then transferred into a 40 mL Teflon-lined autoclave, which was sealed and heated in an electronic oven at 200 ^{o}C for 12 h. After cooling down naturally, the precipitate was collected by centrifugation and washed with pure ethanol for three times, then dried in air at 80 ^{o}C overnight. The dried solid was then annealed in air at 350 ^{o}C for 2 h to obtain V_2O_5 hollow microflowers. Different amounts (from 0.5 to 2 mL) of VOT were added into 30 mL of IPA while keeping other parameters unchanged to study the effect of VOT:IPA volume ratio on the morphology of the products.

Materials Characterization: Crystallographic phases of all the products were investigated by powder X-ray diffraction (Bruker, D8-Advance XRD, Cu Kα, λ = 1.5406 Å). The morphology of samples was examined by field-emission scanning electron microscope (FESEM; JEOL, JSM-6700F, 5 kV) and

transmission electron microscope (TEM; JEOL, JEM-2010, 200 kV). Energy-dispersive X-ray (EDX) analysis and elemental mapping were performed using the energy-dispersive X-ray spectroscopy attached to the JSM-6700F. N_2 adsorption-desorption isotherms were measured at 77 K with a Quantachrome Autosorb AS-6B system.

Electrochemical Measurement: The working electrode slurry was prepared by dispersing V_2O_5 sample, carbon black (Super P-Li) and poly(vinylidene fluoride) (PVDF) binder in *N*-methylpyrrolidone at a weight ratio of 70 : 20 : 10. The slurry was spread on aluminum foil disks and dried in a vacuum oven at 120 ^oC overnight prior to Swagelok-type cells assembly. Lithium foil was used as the counter and reference electrode, and 1.0 M $LiPF_6$ in ethyl carbonate/dimethyl carbonate (1:1 v/v ratio) was used as the electrolyte. Cyclic voltammetry (CV; 2.0 – 4.0 V, 0.2 mV s^{-1}) measurements were performed on a CHI660C electrochemical workstation. Galvanostatic charging/discharging was conducted with a battery tester (NEWARE).

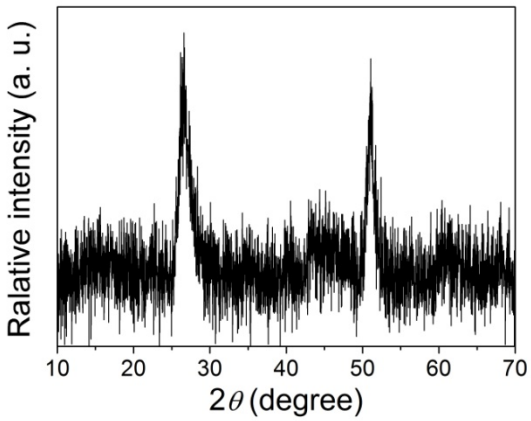

Figure S1. XRD pattern for the precursor hierarchical hollow microflowers solvothermally prepared from the solution of 0.2 mL of VOT in 30 mL of IPA at 200 ^{o}C for 12 h.

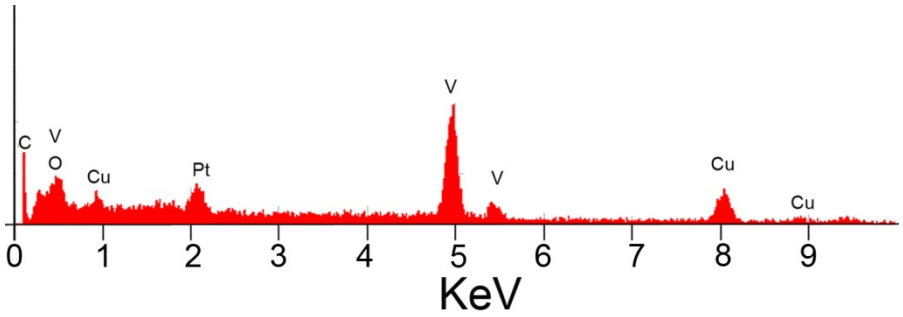

Figure S2. The EDX spectrum of the precursor hollow microflowers. Cu and Pt signals are from the substrate and Pt sputtering for FESEM observation, respectively.

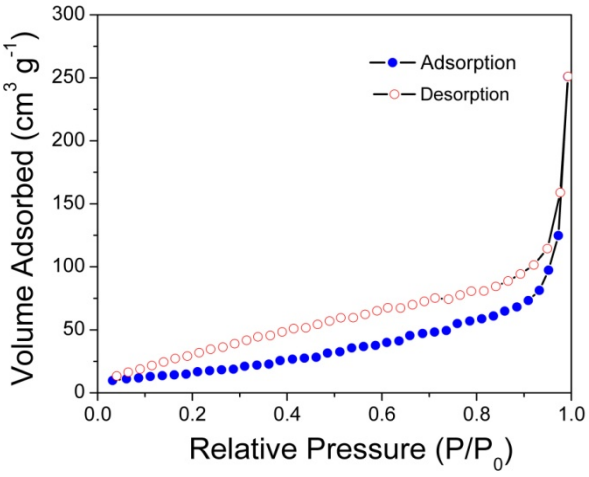

Figure S3. Nitrogen adsorption-desorption isotherm of V_2O_5 nanosheet-assembled hollow microflowers.

Table S1. Comparison of electrochemical performance of different V_2O_5 electrode materials.

Electrode material	Specific capacity (mA h g^{-1})	Capacity after cycling (mA h g^{-1})	Reference
V_2O_5 hollow microflowers	4−2 V: ~280 at 300 mA g^{-1}	211 after 100 cycles	this work
	4−2.5 V: ~140 at 300 mA g^{-1}	120 after 100 cycles	
V_2O_5 nanosheets	4−2 V: ~260 at 300 mA g^{-1}	180 after 50 cycles	Ref [1]
hierarchical V_2O_5 nanowires	4−2 V: 275 at 30 mA g^{-1}	187 after 50 cycles	Ref [2]
3D porous V_2O_5	4−2 V: ~230	~140 after 50 cycles	Ref [3]
	4−2.5 V: 142 at 0.5 C[a]	~130 after 100 cycles	
yolk–shell V_2O_5 microspheres	4−2 V: 280 at 0.2 C[b]	221 after 20 cycles	Ref [4]
monodisperse V_2O_5 microspheres	4−2.05 V: 276 at 0.2 C[a]	245 after 20 cycles	Ref [5]
	4−2.5 V: 143 at 0.2 C[a]	132 after 110 cycles	

a: 1 C = 147 mA g^{-1} *b*: 1 C = 290 mA g^{-1}

References

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