

## Supplementary Information

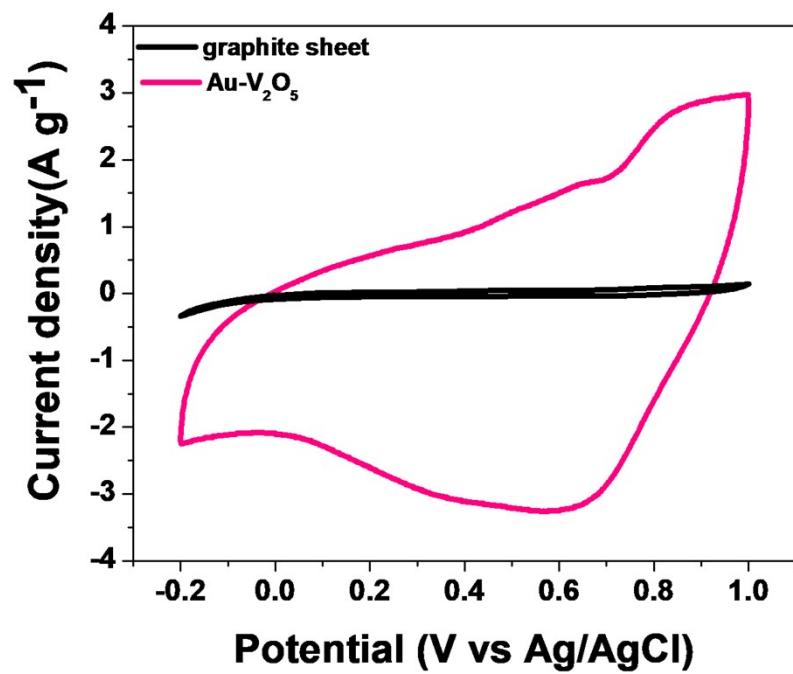
### Synthesis of Au-V<sub>2</sub>O<sub>5</sub> Composite Nanowire through Shape Transformation of Vanadium(III) Metal Complex for High-Performance Solid-State Supercapacitor

Siddheswar Rudra,<sup>a</sup> Arpan Kumar Nayak,<sup>b</sup> Rishika Chakraborty<sup>a</sup> Pradip K. Maji<sup>c</sup> and Mukul Pradhan<sup>a\*</sup>

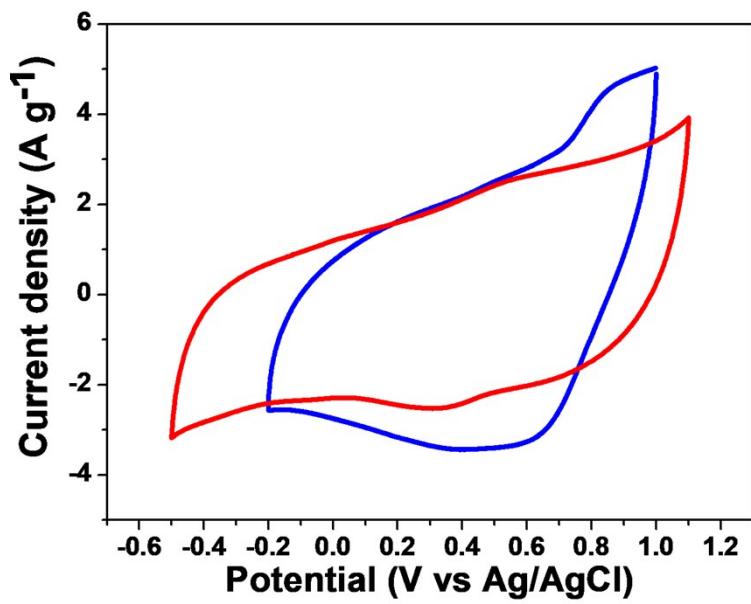
<sup>a</sup> Department of Chemistry, National Institute of Technology Meghalaya, Shillong, Meghalaya, India, 793003.

<sup>b</sup> Department of Materials Science, Indian Institute of Technology Kharagpur, Kharagpur, West Bengal, India, 721302.

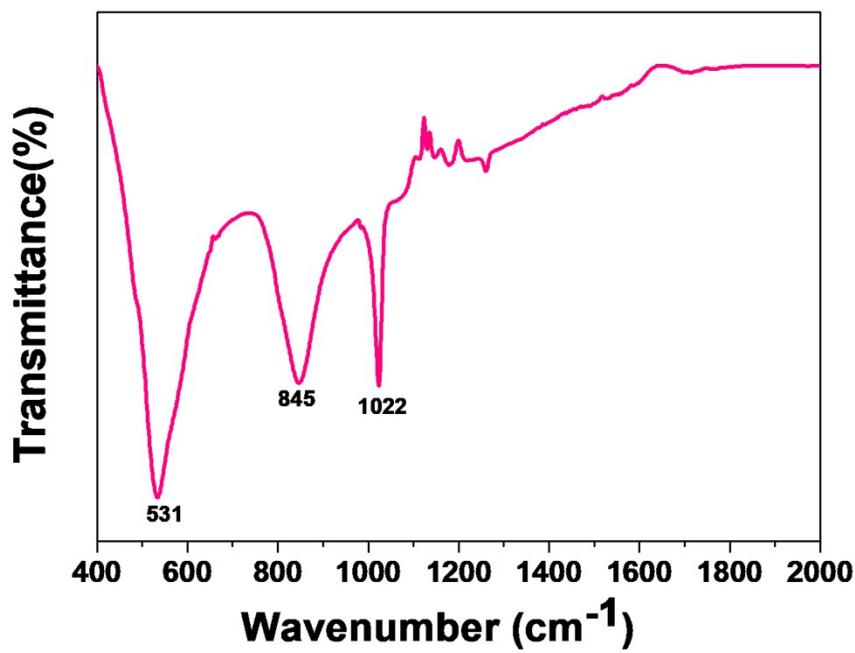
<sup>c</sup> Department of Polymer & Process Engineering, Indian Institute of Technology Roorkee, Saharanpur Campus, Saharanpur, Uttar Pradesh, India, 247001.



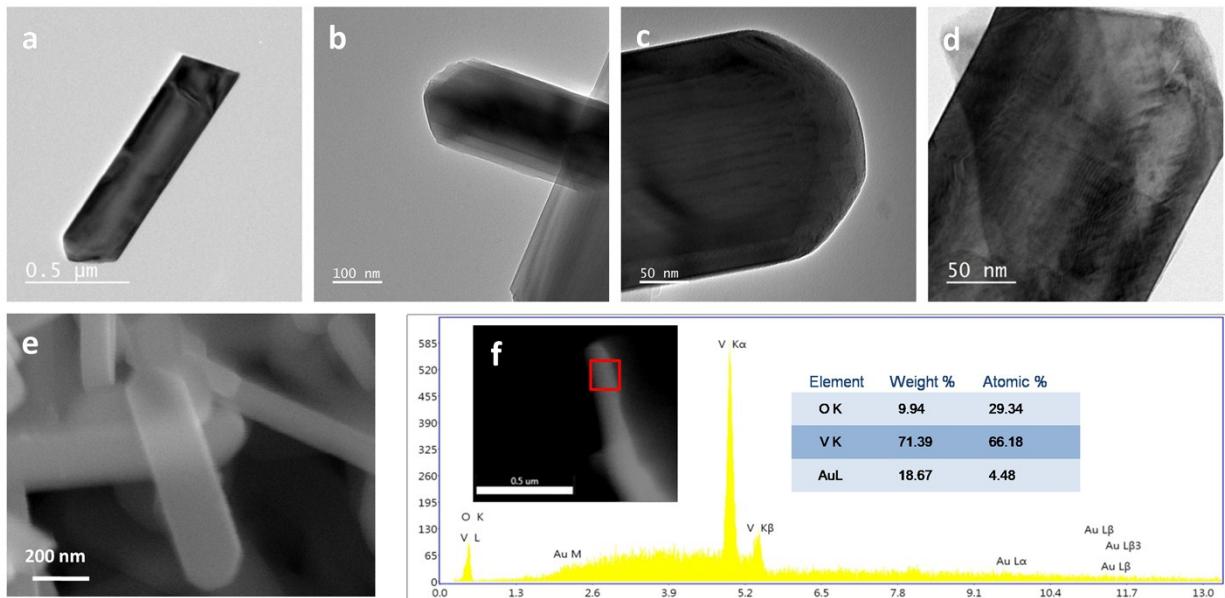
**Figure S1.** Comparative CV plot of the graphite sheet and synthesized Au-V<sub>2</sub>O<sub>5</sub> in 0.5 M H<sub>2</sub>SO<sub>4</sub> electrolyte at 5 mV sec<sup>-1</sup> scan rate.



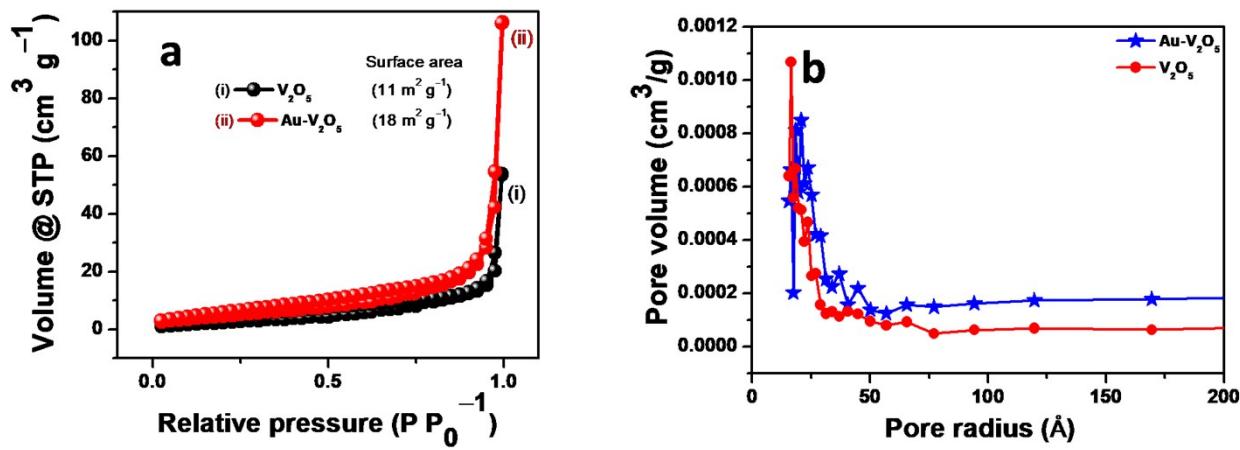
**Figure S2.** Cyclic voltammograms of Au-V<sub>2</sub>O<sub>5</sub> composite nanowires (blue coloured) and activated carbon (red coloured) using three electrode system in 0.5 M H<sub>2</sub>SO<sub>4</sub> electrolyte at 10 mV s<sup>-1</sup> scan rate.



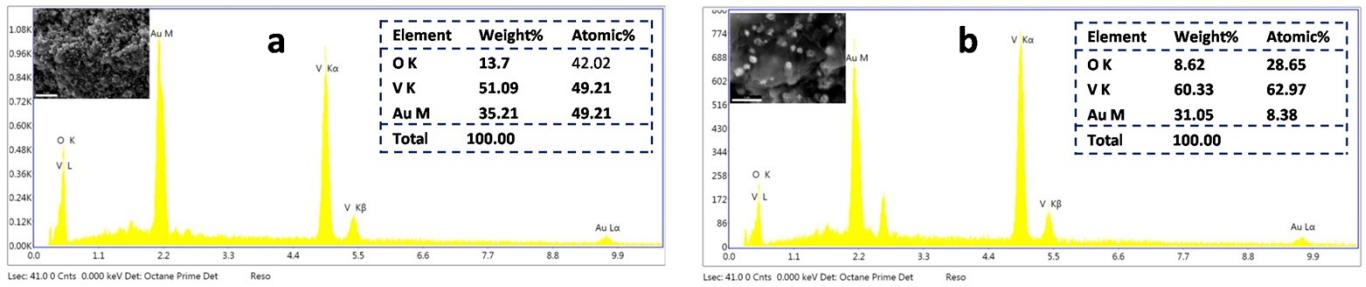
**Figure S3.** FT-IR spectrum of the synthesized Au-V<sub>2</sub>O<sub>5</sub> composite nanowire.



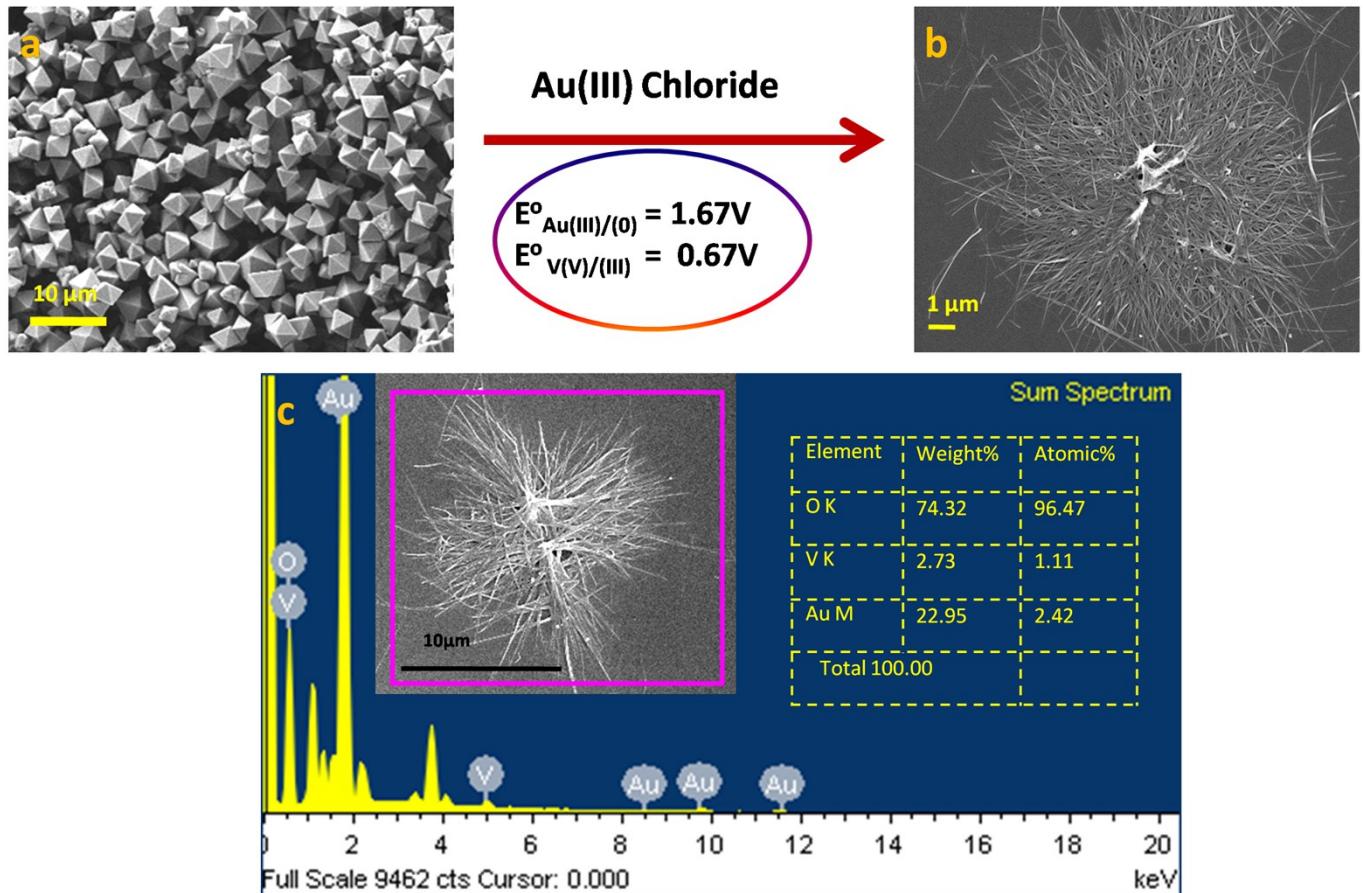
**Figure S4.** (a-d) TEM, (e) SEM images of the composite nanowires show smooth surface morphology, (f) EDX analysis on a single composite nanowire.



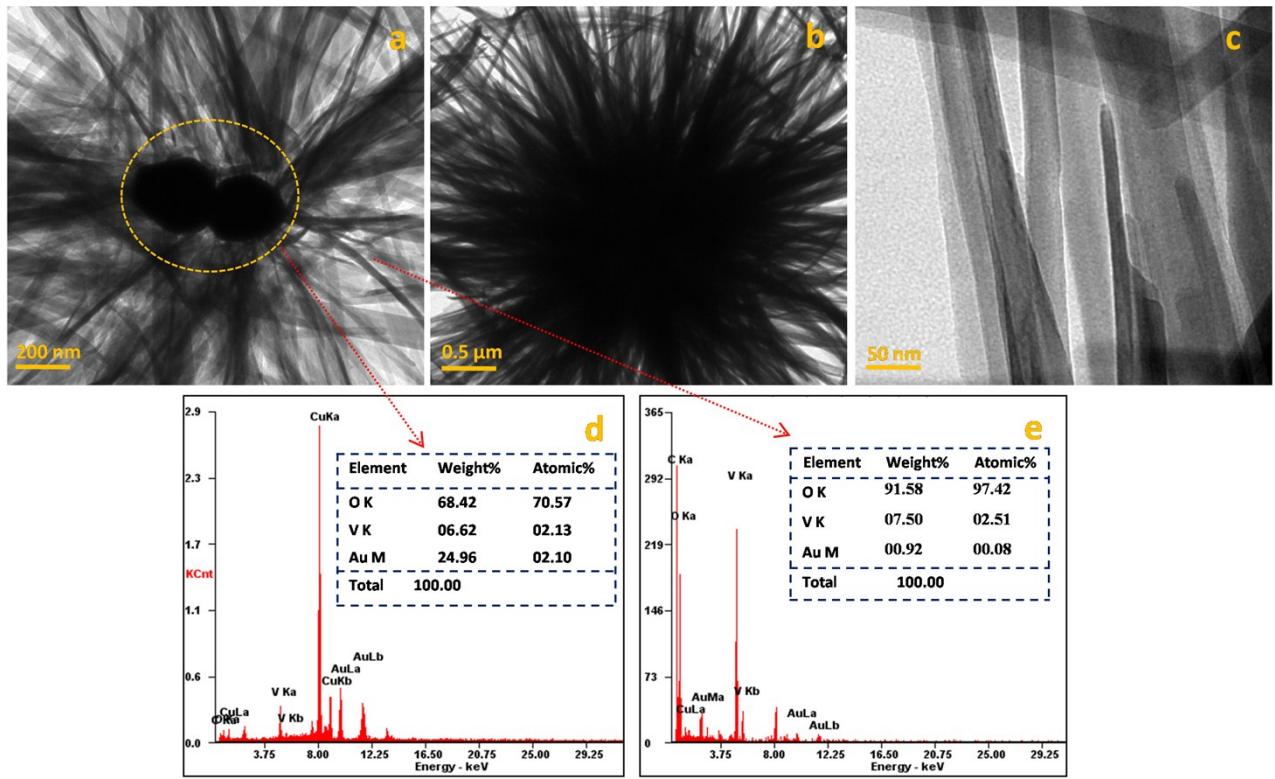
**Figure S5.** (a) BET surface area plot of the synthesized Au-V<sub>2</sub>O<sub>5</sub> and commercial V<sub>2</sub>O<sub>5</sub>. (b) BJH pore size distribution plot for the Au-V<sub>2</sub>O<sub>5</sub> composite nanowire and bare V<sub>2</sub>O<sub>5</sub>.



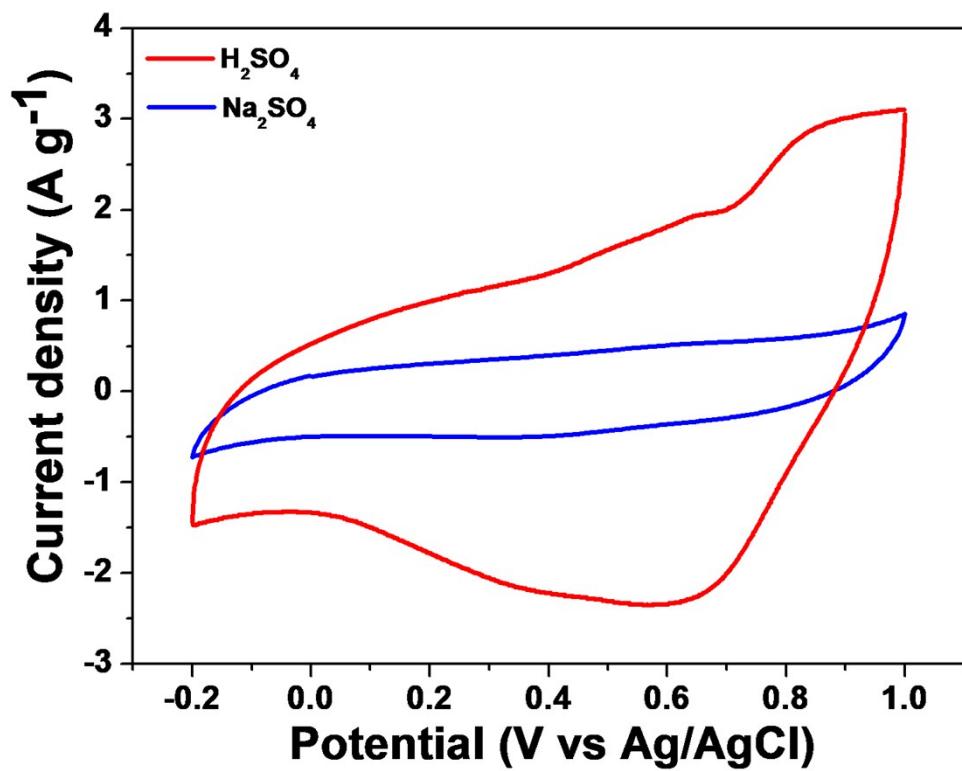
**Figure S6.** EDX analysis of the intermediates isolated at different reaction intervals, (a) 10 min, (b) 30 min during the synthesis of the Au-V<sub>2</sub>O<sub>5</sub> composite nanowire.



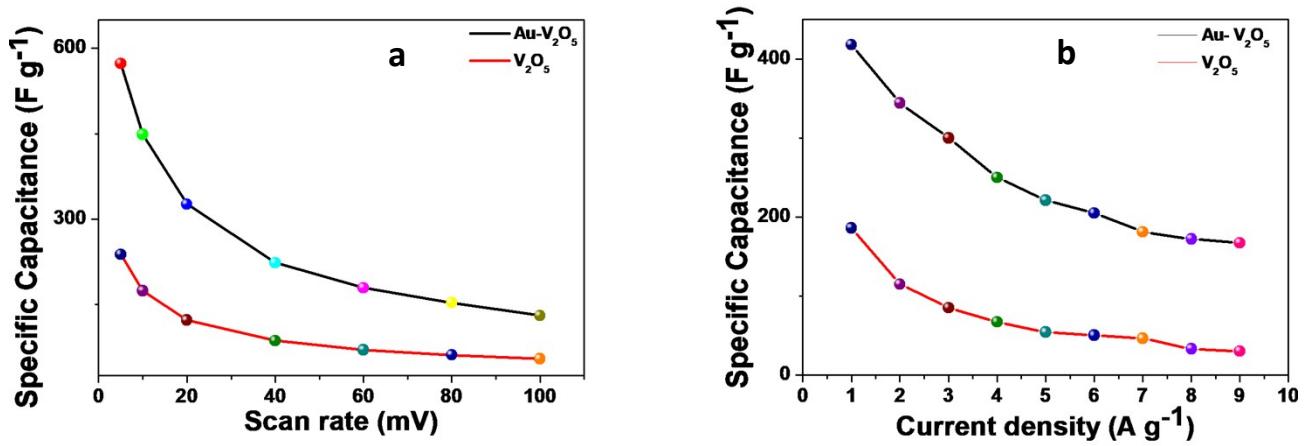
**Figure S7.** Redox guided shape transformation of the (a) octahedral VMC to (b) Au-V<sub>2</sub>O<sub>5</sub> composite nanoflower through dissolution-nucleation-recrystallisation mechanism. (c) EDX analysis of the Au-V<sub>2</sub>O<sub>5</sub> composite nanoflower.



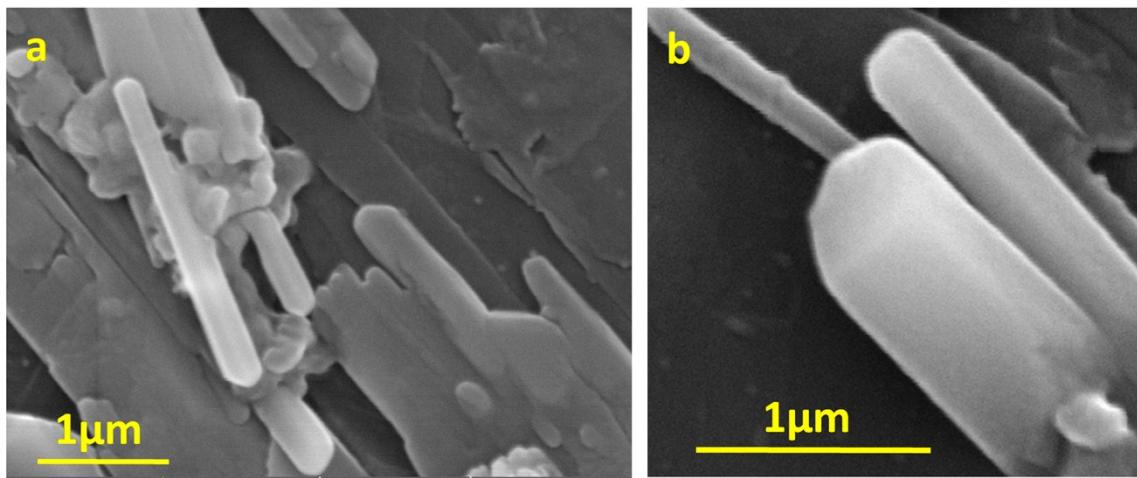
**Figure S8.** TEM images of the (a, b, c) Au-V<sub>2</sub>O<sub>5</sub> composite nanoflower; Elemental mapping on the (d) center and (e) tip of a petal of the composite nanoflower.



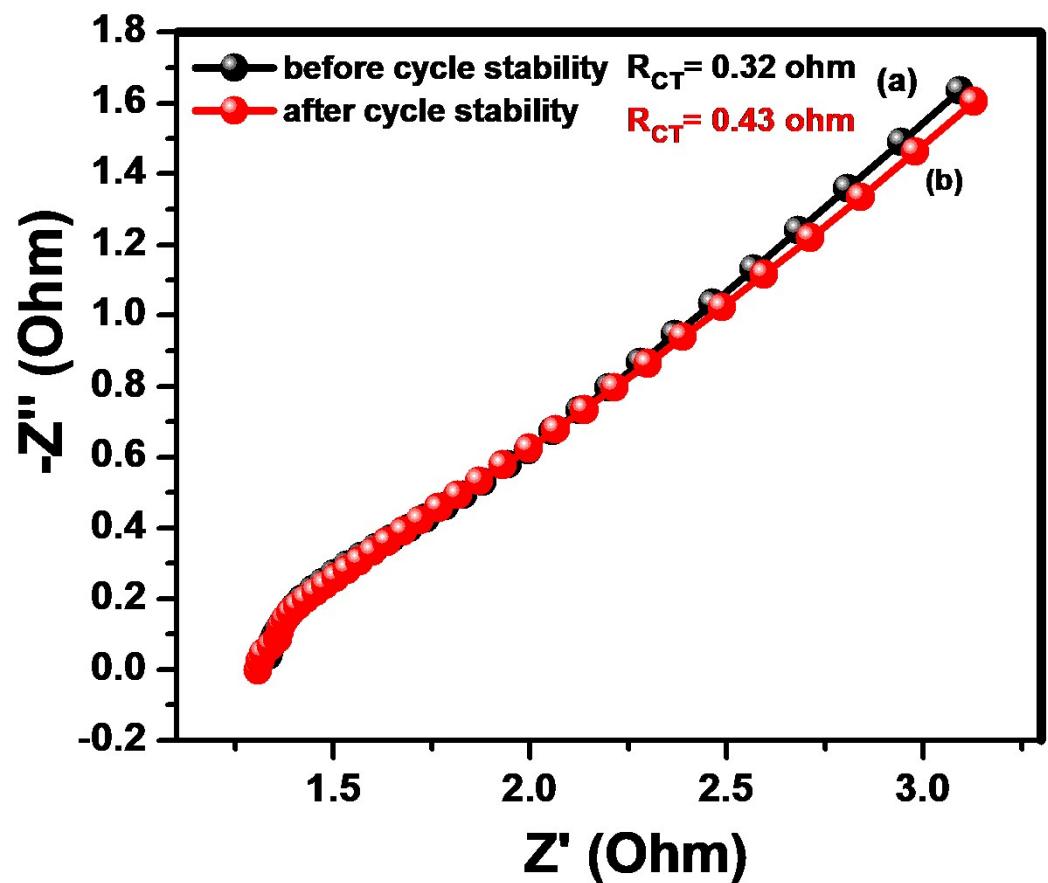
**Figure S9.** Comparative CV curves of the synthesized Au-V<sub>2</sub>O<sub>5</sub> composite nanowire at 5 mV sec<sup>-1</sup> sweep rates in different electrolyte.



**Figure S10.** (a) Plot of specific capacitance ( $\text{F g}^{-1}$ ) vs. scan rate (mV sec $^{-1}$ ) & (b) plot of specific capacitance ( $\text{F g}^{-1}$ ) vs. current densities ( $\text{A g}^{-1}$ ) of the synthesized  $\text{Au-V}_2\text{O}_5$  composite and  $\text{V}_2\text{O}_5$ .



**Figure S11.** (a, b) SEM images of the composite nanowire Au-V<sub>2</sub>O<sub>5</sub> after 5000 consecutive CD cycle.



**Figure S12.** Nyquist plots of the Au-V<sub>2</sub>O<sub>5</sub> composite nanowires (a) before and (b) after 5000 cycles.

Serial No	Title	Specific Capacitance	Electrolyte	Cell type	Cycling performances		Reference
					Three electrode	Two electrode	
1	V <sub>2</sub> O <sub>5</sub> nanowires	351	1 mol LiNO <sub>3</sub>	Three electrode	50 CD cycle (85%)	-	1
2	V <sub>2</sub> O <sub>5</sub> nanomaterials with rough surface	423	1 M LiNO <sub>3</sub>	Three electrode	100 CD cycle (74%)	-	2
3	V <sub>2</sub> O <sub>5</sub> · 0.6H <sub>2</sub> O nanoribbons	181	0.5 M K <sub>2</sub> SO <sub>4</sub>	Three electrode	100 CD cycle (98%)	-	3
4	β-V <sub>2</sub> O <sub>5</sub> thin films	346	1 M LiClO <sub>4</sub> in PC	Three electrode	100 CV cycle (76%)	-	4
5	Hollow spherical V <sub>2</sub> O <sub>5</sub>	479	5 M LiNO <sub>3</sub>	Three electrode	100 CV cycle (70%)	-	5
6	Interconnected V <sub>2</sub> O <sub>5</sub> nanoporous network	304	0.5 M K <sub>2</sub> SO <sub>4</sub>	Three electrode	600 CD cycle (76%)	-	6
7	V <sub>2</sub> O <sub>5</sub> powders	262	2 M KCl	Three electrode	-	-	7
8	Electrospun V <sub>2</sub> O <sub>5</sub> nanofibres	190	2 M KCl	Three electrode	-	-	8
9	V <sub>2</sub> O <sub>5</sub> nanobelts, nanoparticles, microspheres	140, 276, 308	1 M LiNO <sub>3</sub>	Three electrode	80 CD cycle (39, 24, and 23 %)	-	9
10	carbon coated V <sub>2</sub> O <sub>5</sub> nanorods	321	0.5M K <sub>2</sub> SO <sub>4</sub>	Three electrode	1000 CD cycle (76%)	-	10
11	rGO supported V <sub>2</sub> O <sub>5</sub> networks	518	0.5 M K <sub>2</sub> SO <sub>4</sub>	Three electrode	-	1000 CD cycle (83%)	11
12	Au-V <sub>2</sub> O <sub>5</sub> nanowire	570	0.5 M H <sub>2</sub> SO <sub>4</sub>	Three electrode	-	5000 CD cycle (89 %) (solid state asymmetric device)	This work

**Table S1.** Comparison of specific capacitance of V<sub>2</sub>O<sub>5</sub> nanomaterials from reported literature with the synthesized Au-V<sub>2</sub>O<sub>5</sub> composite nanowire.

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