

## Supporting Information for

### Graphene oxide templated growth and superior lithium storage performance of novel hierarchical $\text{Co}_2\text{V}_2\text{O}_7$ nanosheets

Yanzhu Luo,<sup>a,§</sup> Xu Xu,<sup>a,b,§</sup> Yuxiang Zhang,<sup>c</sup> Chih-Yen Chen,<sup>b</sup> Liang Zhou,<sup>a</sup> Mengyu Yan,<sup>a</sup> Qiulong Wei,<sup>a</sup> Xiaocong Tian,<sup>a</sup> and Liqiang Mai<sup>\*,a</sup>

<sup>a</sup> State Key Laboratory of Advanced Technology for Materials Synthesis and Processing, Wuhan University of Technology, Wuhan 430070, P. R. China

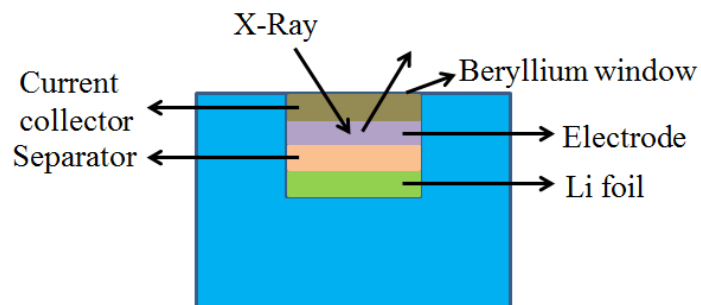
<sup>b</sup> Department of Chemistry and Biochemistry, University of California, Los Angeles, California 90095, United States

<sup>c</sup> WUT Powerful Energy Co., Ltd., Wuhan 430223, P. R. China

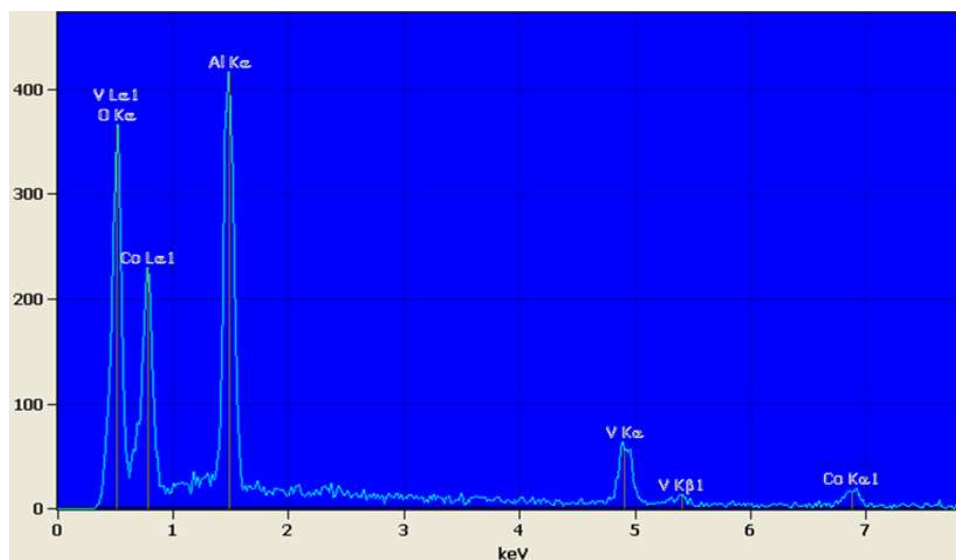
§ These authors contributed equally to this work.

#### Corresponding Author

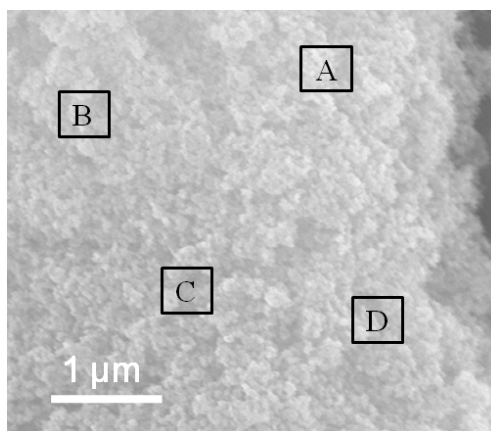
\*E-mail: mlq518@whut.edu.cn



**Figure S1.** The schematic diagram of the *in-situ* cell.



**Figure S2.** Energy-dispersive X-ray spectroscopy (EDS) results of CoVO-1.



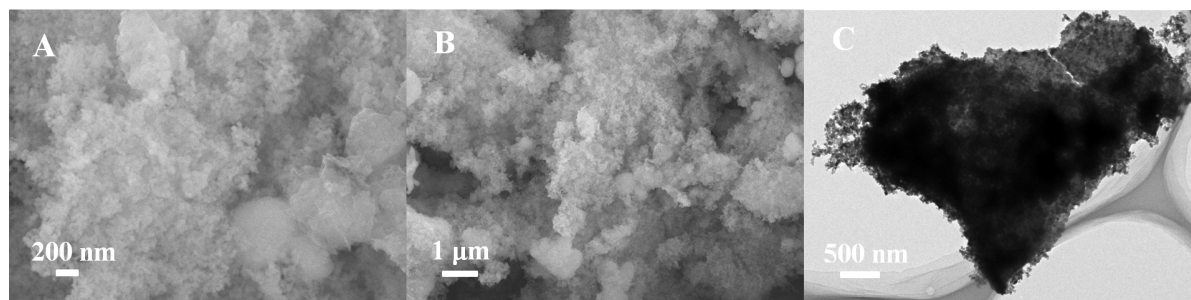
**Figure S3.** Energy-dispersive X-ray spectroscopy (EDS) test region of CoVO-1.

**Table S1.** EDS results of CoVO-1.

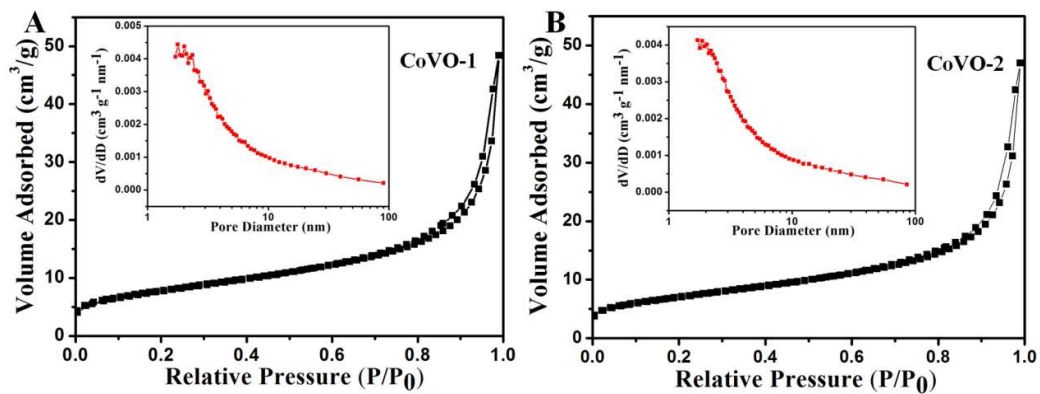
Region	A	B	C	D
Co:V	1.14	1.15	1.14	1.13
Average	1.14			

**Table S2.** Elemental analysis results of CoVO-1.

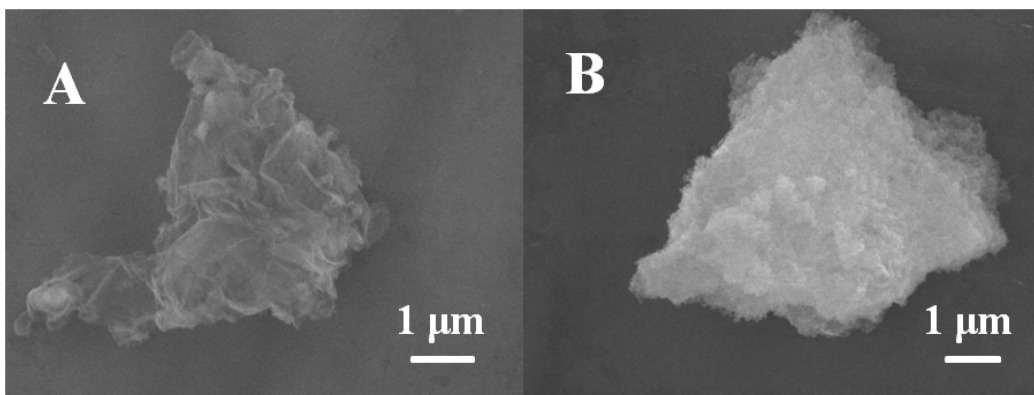
Sample mass (mg)	N(%)	C(%)	H(%)	S(%)
5.0540	0.00	0.04	0.000	0.000
4.9880	0.00	0.03	0.000	0.000
Average	0.00	0.035	0.000	0.000



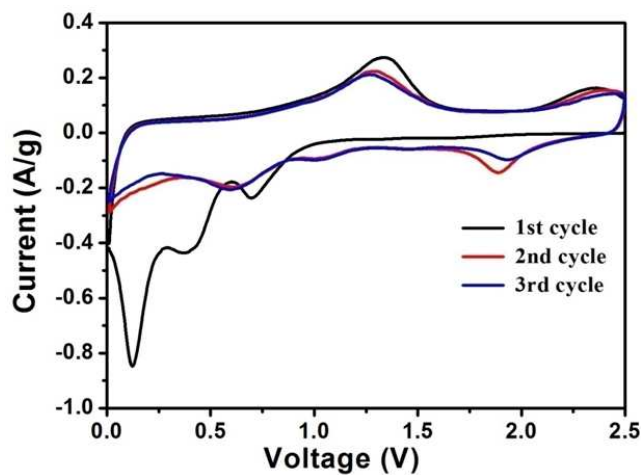
**Figure S4.** (A, B) SEM images of CoVO-2. (C) TEM image of CoVO-2.



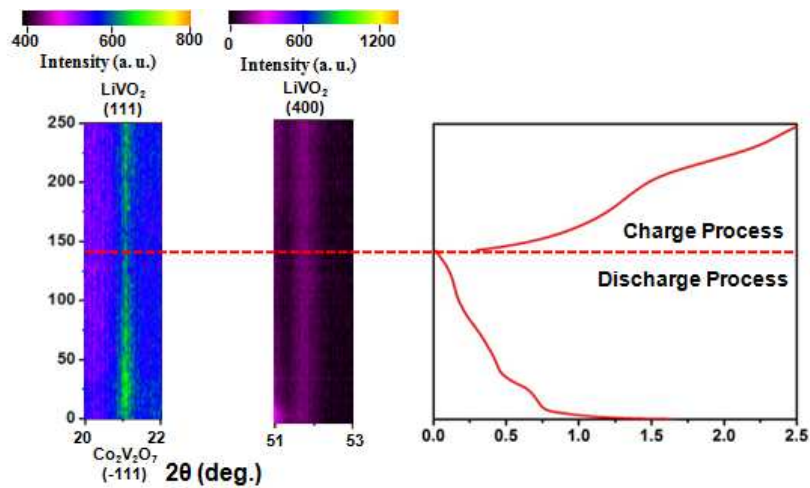
**Figure S5.** The N<sub>2</sub> adsorption-desorption isotherms of CoVO-1 (A) and CoVO-2 (B); The inset shows the corresponding pore size distribution curve determined using the BJH method.



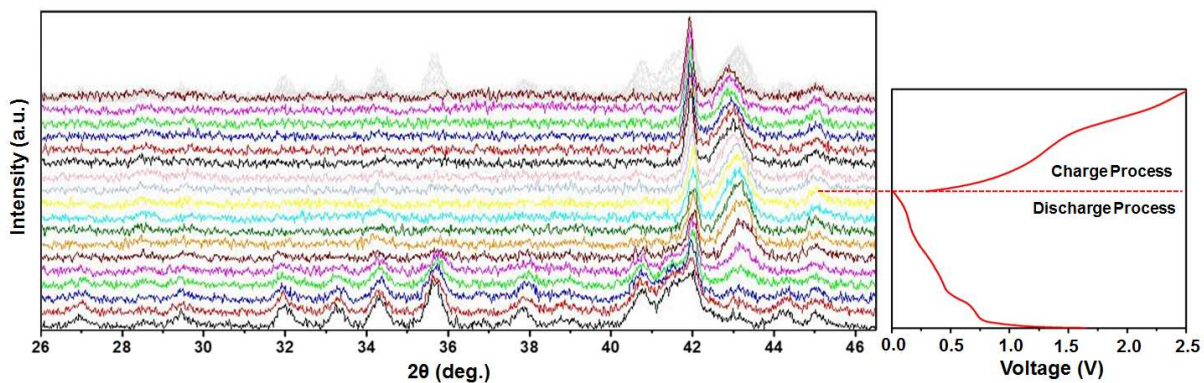
**Figure S6.** SEM images of graphene (A) and precursor before calcinations (B).



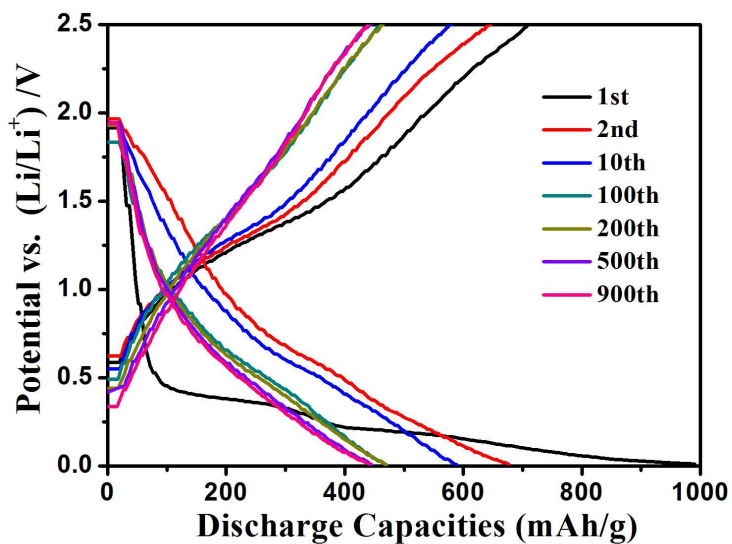
**Figure S7.** Cyclic voltammograms of CoVO-2 at a sweep rate of 0.1 mV/s in the potential range from 0.01 to 2.5 V vs Li/Li<sup>+</sup> at different cycles.



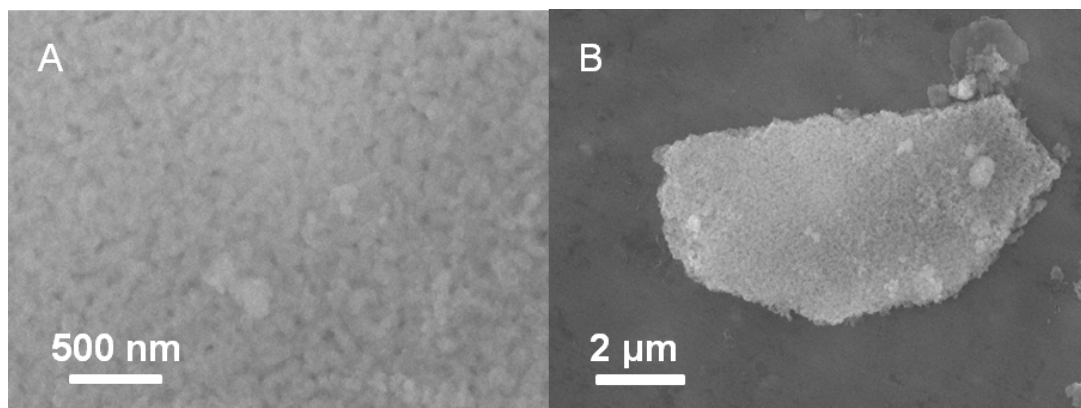
**Figure S8.** *In-situ* X-ray diffraction patterns of CoVO-1



**Figure S9.** Conventional *In-situ* X-ray diffraction patterns of CoVO-1 (left) and corresponding discharge/charge curve (right).



**Figure S10.** The voltage capacity profiles at different cycles at the rate of 5.0 A/g.



**Figure S11.** High-magnification (A) and low-magnification (B) *ex-situ* SEM images of CoVO-1 after 100 cycles.

**Table S3.** The data of EIS test of CoVO-1 at different cycles.

Cycle Numbers	1 <sup>st</sup>	10 <sup>th</sup>	50 <sup>th</sup>	100 <sup>th</sup>	150 <sup>th</sup>
$R_e$ ( $\Omega$ )	3.16	2.37	3.51	4.08	4.66
$R_f$ ( $\Omega$ )	0.28	0.31	0.48	1.00	0.94
$R_{ct}$ ( $\Omega$ )	9.62	8.37	10.92	13.3	15.17