

Supporting Information for

A Novel Hierarchical Porous 3 D Structure Vanadium Nitride/Carbon Membrane for high performance Supercapacitor Negative Electrodes

Yage Wu¹, Yunlong Yang¹, Xiaoning Zhao¹, Yongtao Tan¹, Ying Liu¹, Zhen Wang¹,

Fen Ran^{1,2}.

¹State Key Laboratory of Advanced Processing and Recycling of Non-ferrous Metals, Lanzhou University of Technology, Lanzhou 730050, People's Republic of China

²School of Material Science and Engineering, Lanzhou University of Technology, Lanzhou 730050, Gansu, People's Republic of China

*Corresponding author. E-mail: ranfen@163.com; or ranfen@lut.cn (Fen Ran)

Supplementary Figures and Tables

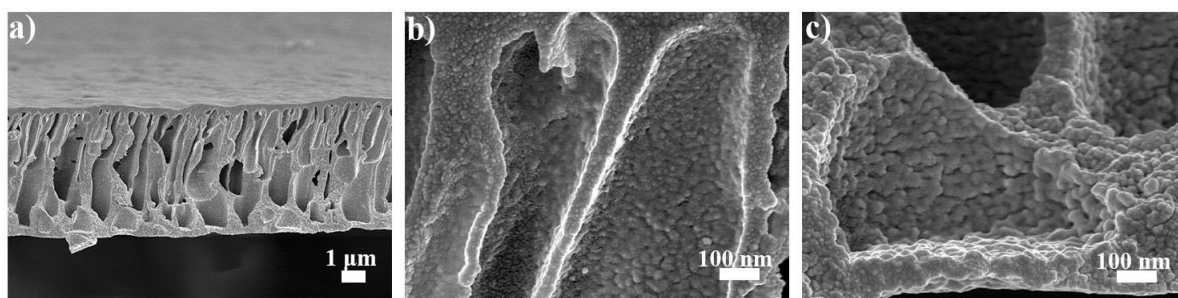


Fig. S1 SEM images: **a-c** the cross-section views of VN/C (II)



Fig. S2 The surface SEM view of VN/C (II)

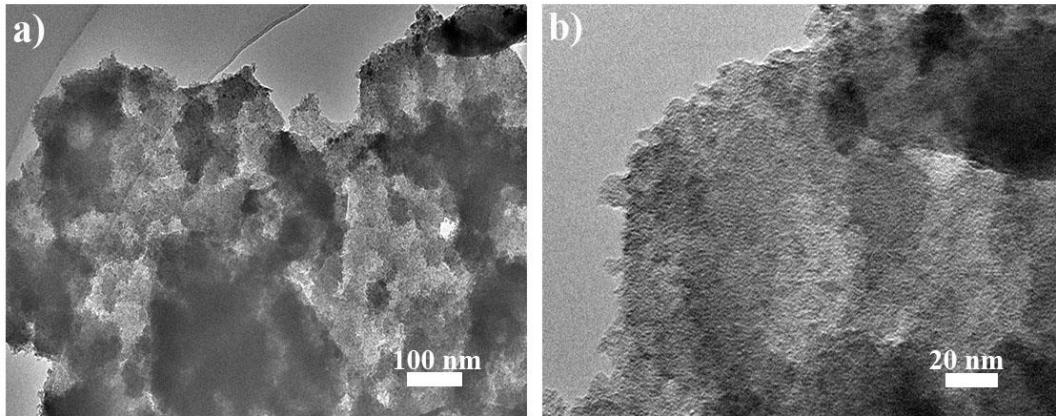


Fig. S3 The TEM images in different magnification multiples of VN/C (II)

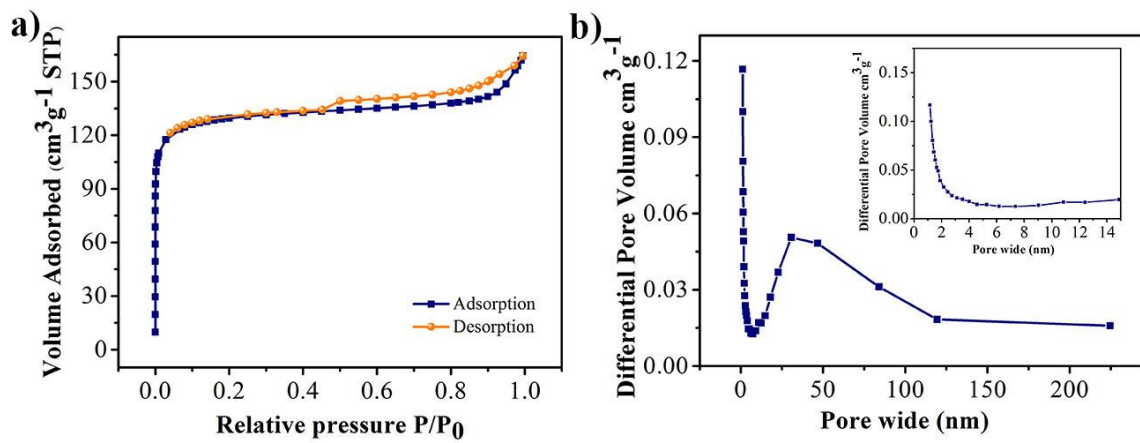


Fig. S4 a N_2 adsorption-desorption isotherms, and **b** pore size distribution of VN/C (II)

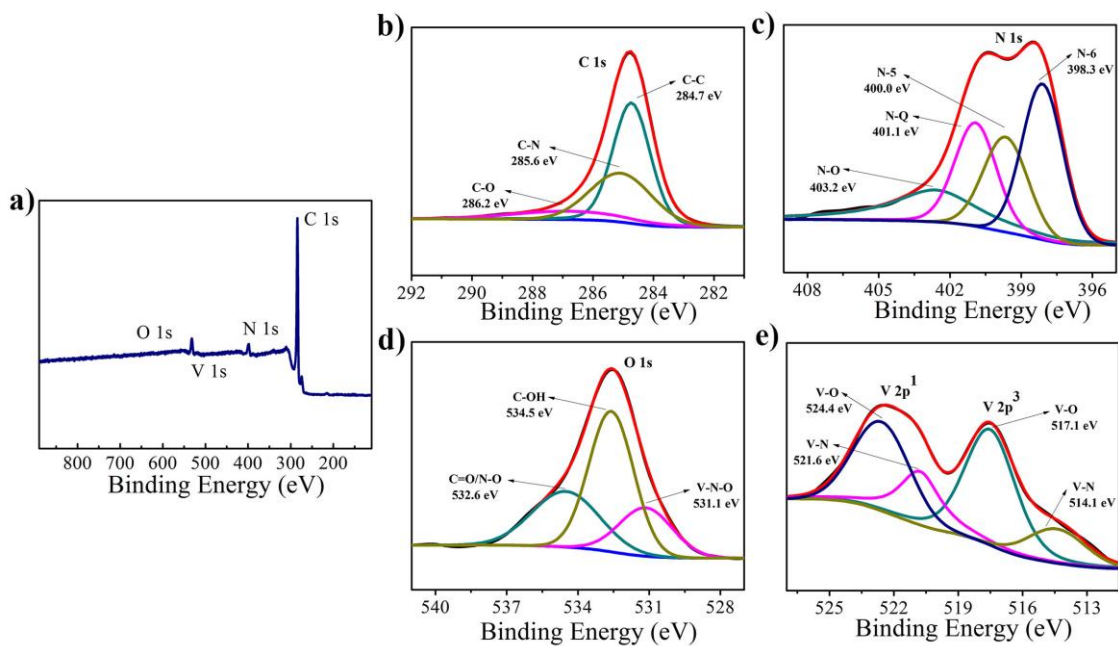


Fig. S5 X-ray photoelectron spectra of VN/C (II)

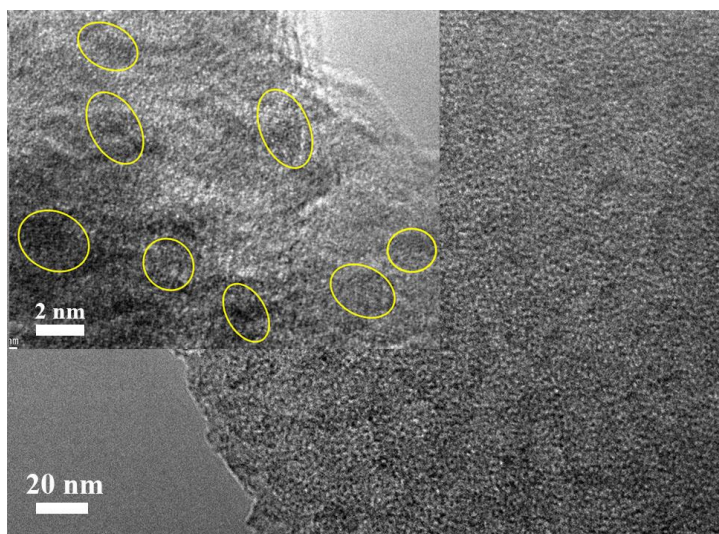


Fig. S6 TEM images of VN/C (I) after cycling

Table S1 BET surface areas and pore volumes of the samples

Samples	BET Surface Area (m ² g ⁻¹)	t-Plot Micropore Area (m ² g ⁻¹)	Total Pore Volume (cm ³ g ⁻¹)	Micropore Volume (cm ³ g ⁻¹)	Micropore Area Ratio
VN/C (II)	504.2	485.9	0.25	0.19	76.0 %
VN/C (I)	523.5	501.8	0.24	0.10	83.5 %

Table S2 Elemental analysis and XPS surface characterization of the VN/C (I) and VN/C (II)

Sample	C at%	N at%	O at%	V at%	C-O at%	N-O at%	C-OH at%
VN/C (I)	88.0	3.6	6.1	2.3	20.0	20.9	29.7
VN/C (II)	87.8	4.2	5.3	2.7	17.1	12.3	16.9

Table S3 The electrochemical performance of various VN-based electrodes reported in literature

Negative materials	Supercapacitors (SCs)	Electrolyte Solution	Specific capacitance of SCs	E_{\max} (Wh kg^{-1})	P_{\max} (W kg^{-1})	Voltage Window	References (year)
VN	VN//VN Symmetric SCs	aqueous 2 M KOH	17.5 F g^{-1} at 1 A	2.7	4800	0~1 V	[1] (2014)
VNQDs/PC	VNQDs/PC//VNQDs/PC Symmetric SCs	aqueous 6 M KOH	53.75 F g^{-1} at 0.5 A	10.7	3000	0~1.2 V	[2] (2016)
VN/CNTs	VN/CNTs//VN/CNTs Symmetric SCs	aqueous 6 M KOH	—	4	1000	0~1 V	[3] (2011)
AC	AC//V ₂ O ₅ ·0.6H ₂ O Asymmetric SCs	aqueous 0.5 M K ₂ SO ₄	64.4 F g^{-1} at current rate of 2C	29.0	2000	0~1.8 V	[4] (2009)
VN-MWCNT	VN-MWCNT//MnO ₂ -MWCNT Asymmetric SCs	aqueous 0.5 M Na ₂ SO ₄	86 F g^{-1} at 0.25 mA cm^{-2}	38.7	316	0~1.8 V	[5] (2014)
PCNS@VN NP	PCNS@VNNP//NiO Asymmetric SCs	aqueous 2 M KOH	75 F g^{-1} at 1 A	16	800	0~1.6 V	[6] (2016)
VNQD/CNF	VNQD/CNF//Ni(OH) ₂ Asymmetric SCs	aqueous 6 M KOH	93.5 F g^{-1} at 1 A	31.2	3875	0~1.55 V	[7] (2017)
VN/C (I)	VN/C-M // Ni(OH)₂ Asymmetric SCs	aqueous 6 M KOH	122 F g^{-1} at 1 A	43.0	4000	0~1.6 V	our work

References

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