Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A

Porous Polyaniline Nanofiber/Vanadium Pentoxide Layer-by-Layer Electrodes for Energy Storage

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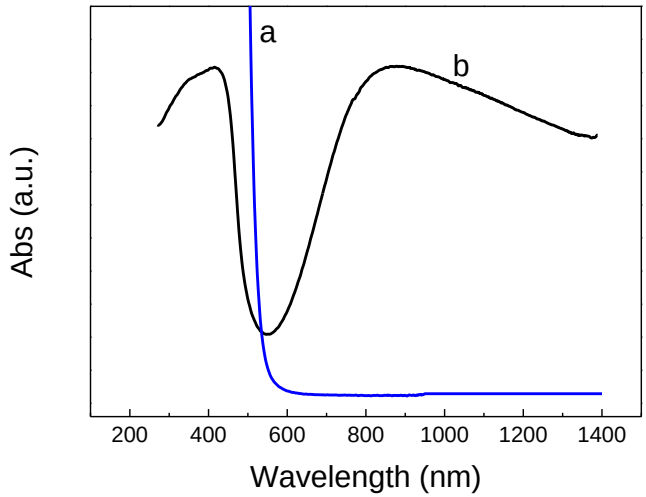

Figure S1. UV-Vis spectra of (a) V_2O_5 solution at pH 2.5 and (b) PANI nanofibers in dispersion at pH 2.5.

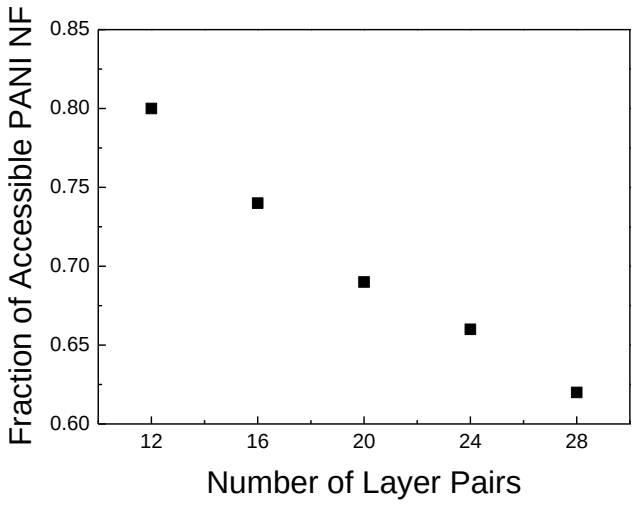

Figure S2. Fraction of electrochemically accessible PANI in (PANI NF/V_2O_5)$_n$ LbL films as determined via UV-Vis spectroscopy. The fraction was calculated as ($A_{3.5}$-$A_{2.0}$)/$A_{2.0}$ at λ=825 nm.

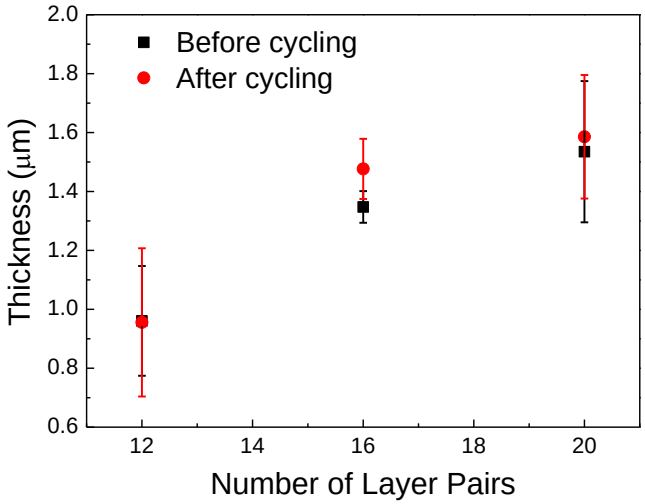

Figure S3. Thickness comparison for (PANI NF/V_2O_5)$_n$ LbL films before and after cycling 500 times.

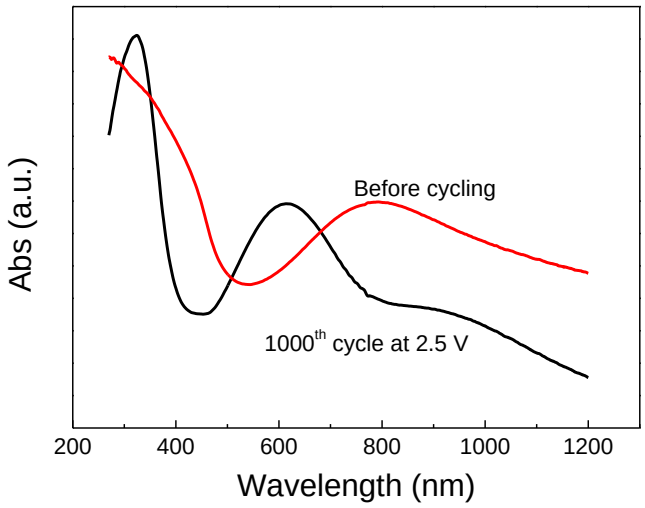

Figure S4. UV-Vis spectra of $(PANI\ NF/V_2O_5)_{16}$ LbL films before and after 1,000 charge-discharge cycles.

Table S1. Charge-storage contributions as a function of scan rate for sample with 16 layer pairs.

Scan Rate (mV/s)	NonDiffusion-Limited Fraction	Ideal Diffusion-Limited Fraction
1	0.35	0.65
3	0.49	0.51
5	0.55	0.45
10	0.63	0.37
30	0.75	0.25
50	0.79	0.21

Calculation for the number of Li^+ moles inserted per mole of V_2O_5 for $(PANI\ NF/V_2O_5)_{16}$

Electrochemically accessible fraction of PANI NF: 0.74;

Composition from XPS: 40.6 wt% PANI NF and 59.4 wt% V_2O_5;

Theoretical capacity of PANI NF: 148 mAh/g;

Theoretical capacity of V_2O_5 under the assumption of 1 mole electron insertion for per mole of V_2O_5: 147.26 mAh/g;

Factor used for the conversion between units of mAh and C: 3.6, namely 1 C=1/3.6 mAh;

The number of electron inserted for per mole of V_2O_5: Y;

Therefore, based on the equation:

Faradaic charge transferred for PANI + Faradaic charge transferred for V_2O_5 = Total Faradaic charge transferred Eqn. S1

$0.74*0.406*148+0.594*147.26*Y=418/3.6$ Eqn. S2

Y= 0.82.