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Supporting Information

Revisiting $Li_3V_2(PO_4)_3$ as Anode – An Outstanding Negative Electrode for High Power Energy Storage Devices

*Xiaofei Zhang, Ruben-Simon Kühnel, Matthias Schroeder and Andrea Balducci**

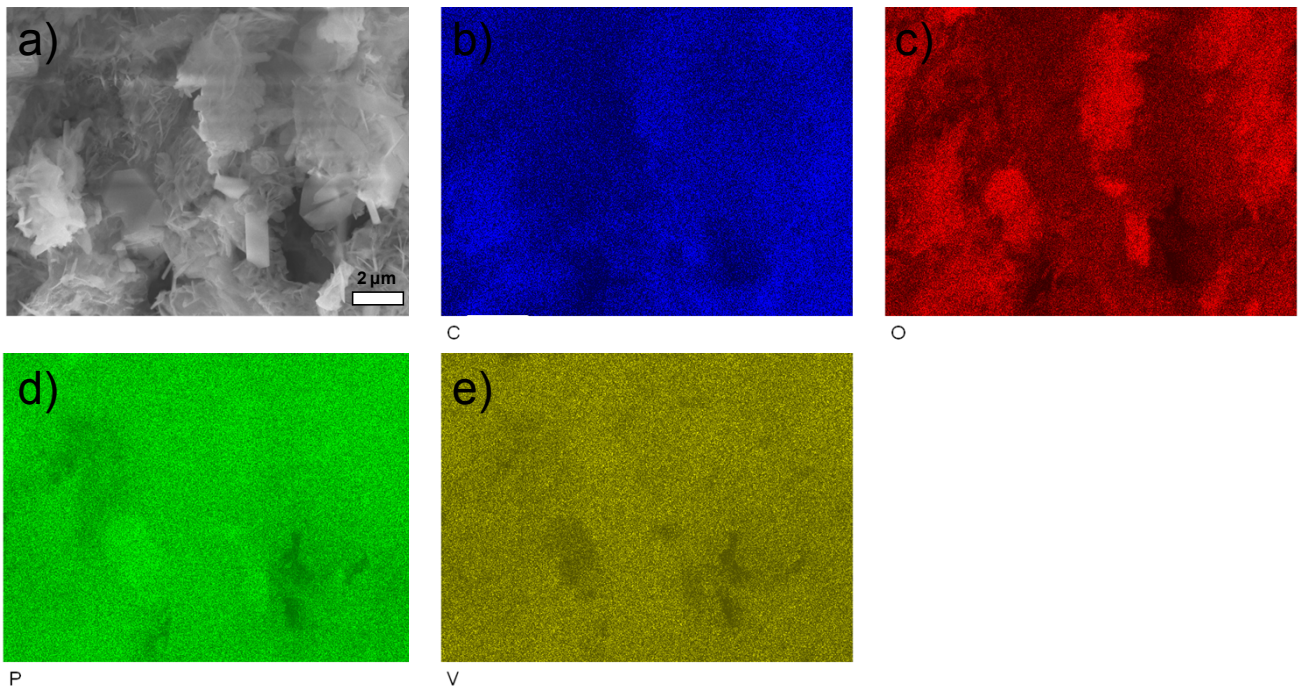

Fig. S1 a) SEM image of the investigated LVP material and b), c), d) and e) corresponding elemental mapping of carbon, oxygen, phosphorus and vanadium, respectively.

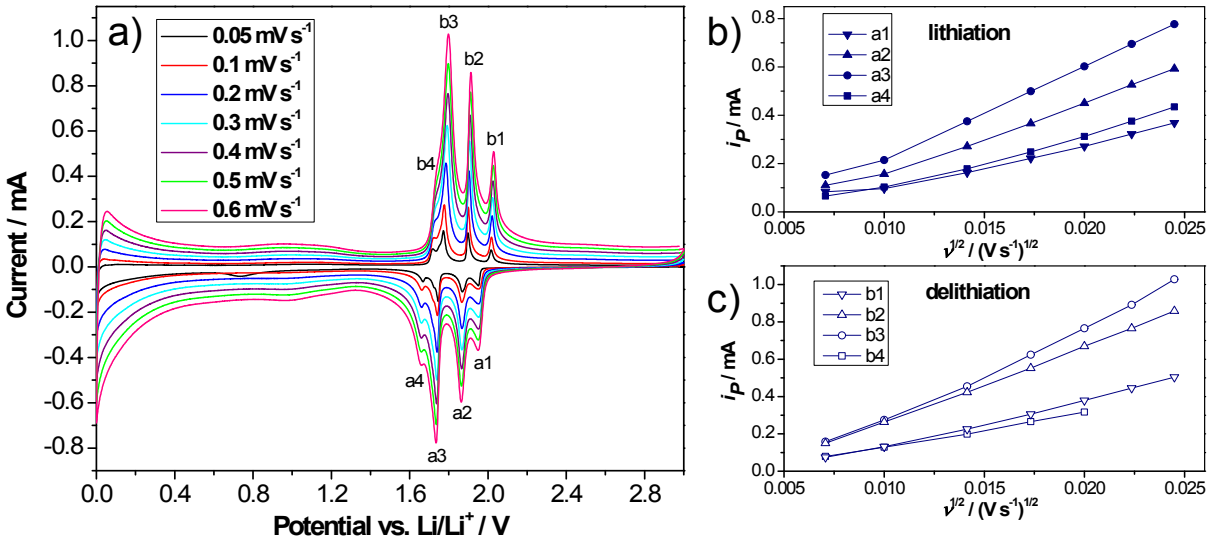

Fig. S2 a) Cyclic voltammograms and b), c) maximum peak current vs. the square root of the scan rate for the LVP electrodes in the potential range 3.0 to 0.0 V vs. Li/Li$^+$ during b) lithitation and c) delithiation.

Apparent lithium diffusion coefficients D were calculated from the peak currents with the Randles-Cevcik equation:[33-36]

$$i_P = 2.69 \cdot 10^5 C \cdot mol^{-1} \cdot V^{-1/2} n^{3/2} A \cdot D^{1/2} \nu^{1/2} C_0^* \qquad (2)$$

Here, i_P is the measured peak current, n is the number of electrons involved in each lithiation/delithiation process (0.5), A is the electroactive area (as approximation, the geometric surface area of the electrodes of 1.13 cm^2 was taken), ν is the potential sweep rate and C_0^* is the lithium concentration in the LVP material (*e.g.*, 0.024 mol cm^3 at peak a1, calculated from the unit cell volume). The diffusion coefficients were obtained from the slopes of the linear curves in i_P vs. ν^2 plots by solving the Randles-Cevcik equation for the diffusion coefficient.

Table S1 Apparent lithium diffusion coefficients (D) calculated from CV measurements (Fig. S2)

Peak	D [cm^2 s^{-1}]	Peak	D [cm^2 s^{-1}]
a1	5.2x10^{-11}	b1	9.0x10^{-11}
a2	1.0x10^{-10}	b2	1.8x10^{-10}
a3	1.3x10^{-10}	b3	2.1x10^{-10}
a4	3.6x10^{-11}	b4	2.3x10^{-11}

Table S2 The used current densities and obtained energy densities, and - efficiencies of the LIB, SC and LIC shown in the Ragone like plot (Fig. 8). Similar current densities are marked with §, $, and †

	Energy [Wh kg^{-1}]	Power [kW kg^{-1}]	Current [A g^{-1}]	Current [mA cm^{-2}]	Efficiency [%]
LIB	228	0.0742	0.0198	0.108	78
	197	0.180	0.0495	0.270	72
	166	0.348	0.0989	0.539	65
	103	0.811	0.248	1.352	48
	$38.0^{§}$	1.50	0.989	$5.39^{§}$	$25^{§}$
LIC	$45.6^{§}$	4.59	2.07	$5.59^{§}$	$74^{§}$
	$41.5^{\$}$	9.02	4.13	$11.2^{\$}$	$71^{\$}$
	$33.1^{†}$	16.2	8.26	$22.36^{†}$	$62^{†}$
SC	$22.95^{§}$	1.329	0.950	$5^{§}$	$90^{§}$
	$20.99^{\$}$	2.572	1.90	$10^{\$}$	$85^{\$}$
	$17.81^{†}$	4.788	3.80	$20^{†}$	$76^{†}$
	10.84	9.54	9.50	50	53