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

New insights in the characterization of the electrode/electrolyte interfaces within $LiMn_2O_4/Li_4Ti_5O_{12}$ cells, by X-ray Photoelectron Spectroscopy, Scanning Auger Microscopy and Time-of-Flight Secondary Ions Mass Spectrometry

Electronic Supplementary Information

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Evolution after ten cycles

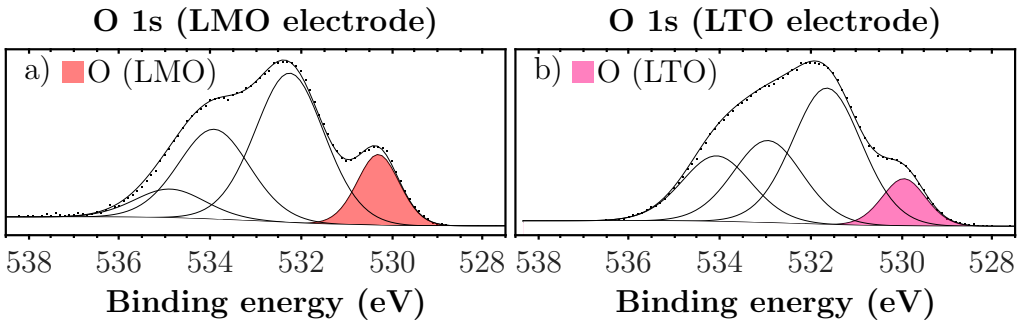

Figure 1: O 1s XPS spectra of a) the positive electrode and b) the negative electrode after the tenth charge

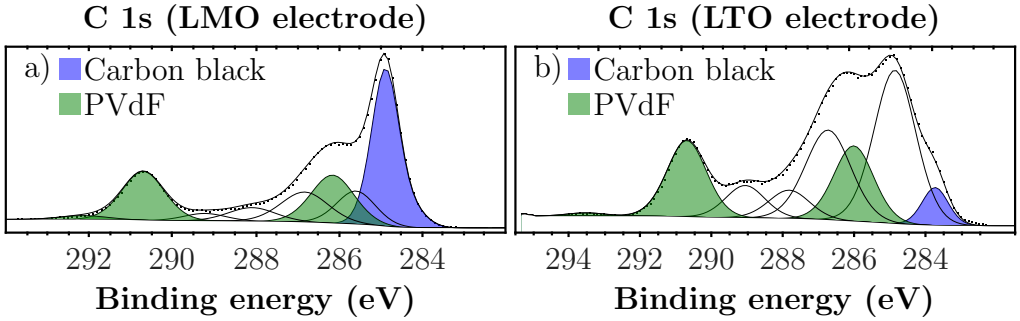

Figure 2: C 1s XPS spectra of a) the positive electrode and b) the negative electrode after the tenth charge

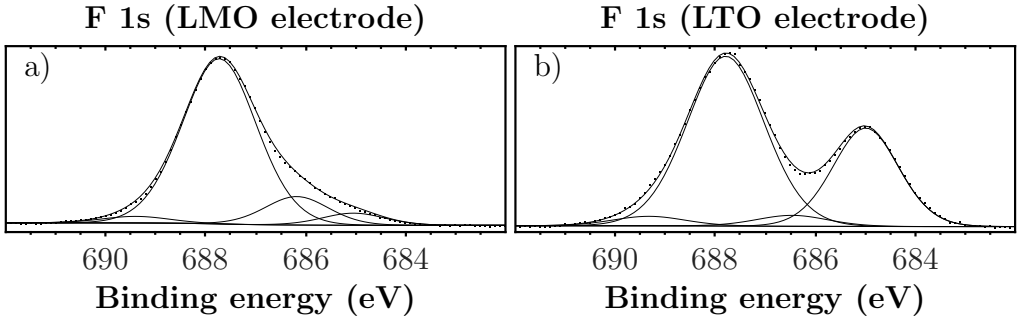

Figure 3: F 1s XPS spectra of a) the positive electrode and b) the negative electrode after the tenth charge

Table 1: Binding energies (BE) and atomic concentrations (at.%) of the different chemical environments identified by XPS at the surface of LMO electrodes cycled in full cell, at the end of the 10^{th} charge and at the end of the 10^{th} discharge (only P $2p_{3/2}$ and maxima of Mn 2p envelopes binding energies are specified)

	10^{th} charge		
orbital	BE (eV)	%at.	**assignment**
Li 1s	54.4	1.1	Li (LMO)
	56.0	1.4	lithiated species
		2.5	
P 2p	134.1	0.2	phosph.
	135.3	0.5	fluorophosph.
	136.8	0.4	$LiPF_6$
		1.1	
C 1s	284.9	22.3	CB
	285.6	7.9	C-C/**C**-H
	286.2	10.0	**C**H_2 PVdF
	286.9	5.8	**C**-O
	288.1	3.2	**C**=O
	289.2	1.6	O-**C**=O
	290.7	10.0	**C**F_2 PVdF
	292.1	0.9	**C**F_3 PVdF
		61.7	
O 1s	530.3	1.3	O (LMO)
	532.2	4.0	**O**=C/C-**O**-Li
	533.7	1.9	C-**O**-C
	534.7	1.5	**O**-P/C-**O**-C
		8.6	
Mn 2p	642.2	0.6	Mn^{3+}
	643.0	0.3	Mn^{4+}
		0.9	
F 1s	685.0	1.3	Li**F**
	686.2	3.0	fluorophosph.
	687.7	20.3	C**F**$_2$ PVdF
	689.4	0.7	C**F**$_3$ PVdF
		25.2	
Mn 3s	ΔMn 3s		
	5.1 eV		

Table 2: Binding energies (BE) and atomic concentrations (at.%) of the different chemical environments identified by XPS at the surface of LTO electrodes cycled in full cell, at the end of the 10^{th} charge and at the end of the 10^{th} discharge (only P $2p_{3/2}$, Ti $2p_{3/2}$ and maxima of Mn 2p envelopes binding energies are specified)

	10^{th} charge		
orbital	BE (eV)	%at.	**assignment**
Li 1s	54.6	2.4	Li (LTO)
	55.7	6.6	
		9.1	
P 2p	133.5	0.7	phosphates
	134.4	0.6	fluorophosph.
	136.0	0.1	$LiPF_6$
		1.4	
C 1s	283.7	2.2	CB
	284.9	14.1	C-C/C-H
	286.0	6.6	CH_2 PVdF
	286.7	9.0	C-O
	287.8	2.6	C=O
	289.1	2.8	O-C=O
	290.7	6.6	CF_2 PVdF
	293.5	0.3	CF_3 PVdF
		44.2	
Ti 2p	458.7	1.0	Ti^{4+}
O 1s	530.0	2.0	O (LTO)
	531.6	9.2	C-O-Li
	532.9	5.6	C-O/P-O
	534.1	4.4	C-O
		21.3	
Mn 2p	641.5	1.0	MnF_2
	ΔMn 3s = 6.1 eV		
F 1s	685.0	6.8	LiF/MnF_2
	686.5	0.8	fluorophosph.
	687.8	13.8	CF_2 PVdF
	689.3	0.7	CF_3 PVdF
		22.1	