

## Supporting Information

### High performance nano-sized $\text{LiMn}_{1-x}\text{Fe}_x\text{PO}_4$ cathode material for advanced lithium-ion batteries

Zhihong Lei<sup>a</sup>, Ahmad Naveed<sup>a</sup>, Jingyu Lei<sup>a</sup>, Jiulin Wang<sup>\*a</sup>, Jun Yang<sup>a</sup>, Yanna Nuli<sup>a</sup>,  
Xiangchen Meng<sup>b</sup>, Yunliang Zhao<sup>b</sup>

<sup>a</sup> Shanghai Electrochemical Energy Devices Research Center, Department of  
Chemical Engineering, Shanghai Jiao Tong University, Shanghai 200240, P. R.  
China.

<sup>b</sup> Song Yuan Power Supply Company, Jilin Electric Power Co. LTD. Jilin 138000, PR  
China.

\*Corresponding author. Tel.: +86 21 54745887.

E-mail address: wangjiulin@sjtu.edu.cn

Table S1 Refined cell parameters of  $\text{LiMn}_{1-x}\text{Fe}_x\text{PO}_4/\text{C}$  ( $0 \leq x \leq 1$ ) materials

Iron proportion	a(Å)	b(Å)	c(Å)	Volume (Å <sup>3</sup> )	Carbon content (%)
x = 0	6.10553	10.45085	4.74697	302.89	5.34
x = 0.05	6.10227	10.45149	4.74786	302.81	5.64
x = 0.10	6.09713	10.43212	4.74042	301.52	5.50
x = 0.15	6.08934	10.43192	4.73890	301.03	6.48
x = 0.20	6.09331	10.43535	4.74054	301.43	6.08
x = 0.25	6.08084	10.43030	4.74531	300.97	5.86
x = 0.30	6.07246	10.41302	4.73188	299.12	7.35
x = 0.40	6.06129	10.40572	4.72702	298.14	6.55
x = 0.50	6.05326	10.39118	4.71638	296.66	6.68
x = 1	5.99712	10.32512	4.69412	290.66	6.04

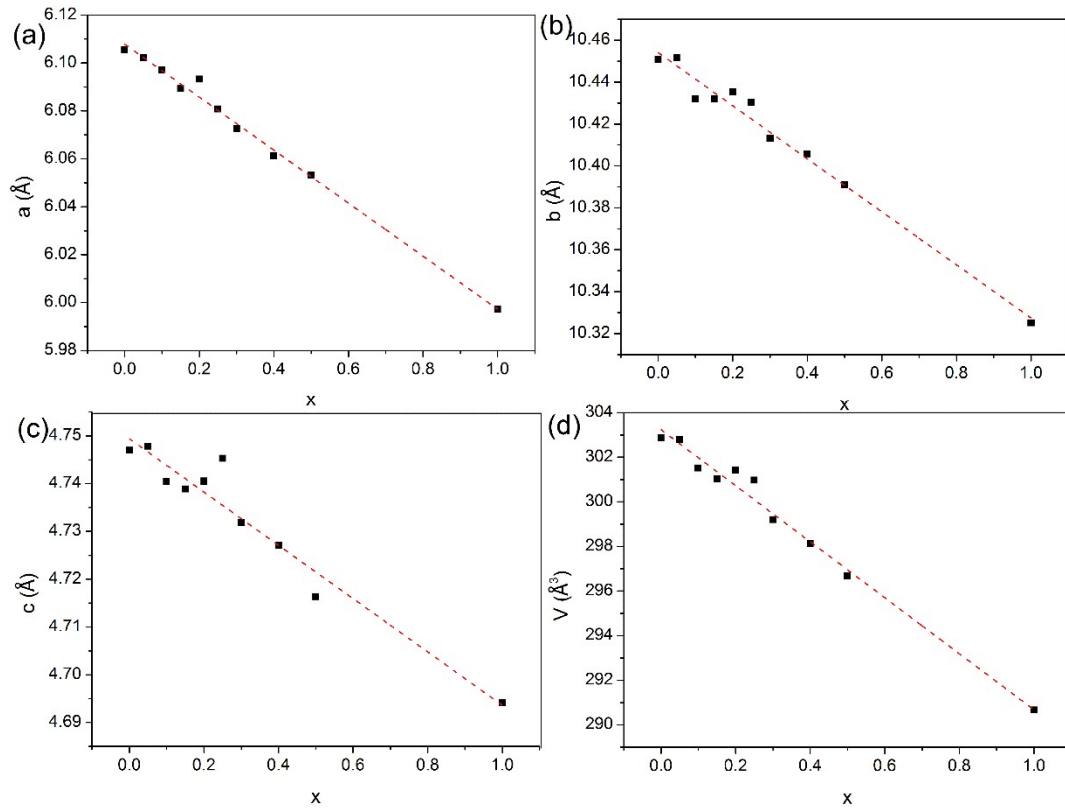


Figure S1. The crystal lattice parameters comparison of  $\text{LiMn}_{1-x}\text{Fe}_x\text{PO}_4/\text{C}$  ( $0 \leq x \leq 1$ ) materials.

Table S2. Atomic position of  $\text{LiMn}_{0.7}\text{Mn}_{0.3}\text{PO}_4$  determined by Rietveld structure refinement.

Label	x	y	z	Symmetry multiplicity
Li	0	0	0	4
Mn	0.28243	0.25	0.97211	4
Fe	0.27907	0.25	0.96776	4
P	0.09389	0.25	0.41314	4
O1	0.095852	0.25	0.73001	4
O2	0.45568	0.25	0.21398	4
O3	0.16138	0.05160	0.27820	8

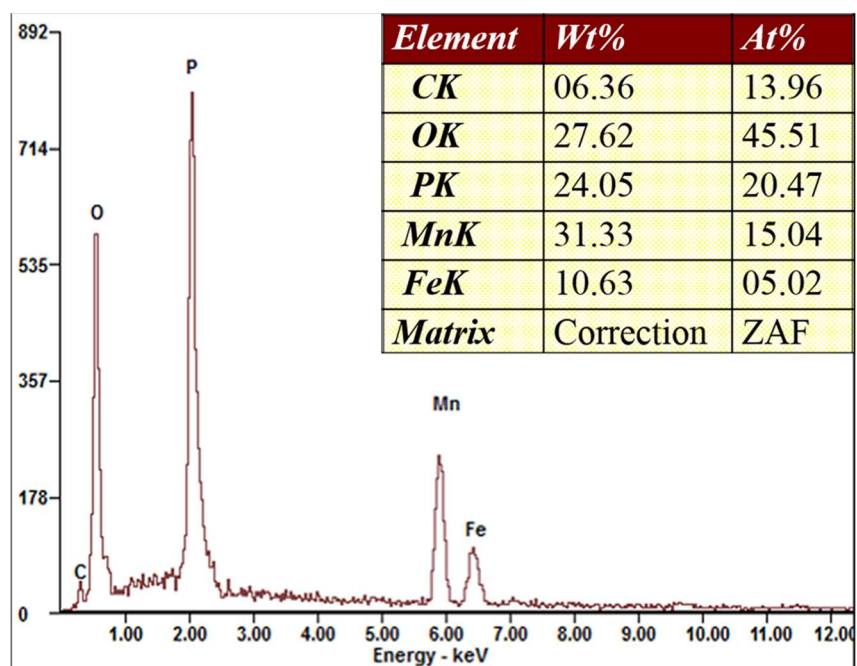


Figure S2. The SEM-EDX spectrum of  $\text{LiMn}_{0.75}\text{Fe}_{0.25}\text{PO}_4/\text{C}$  material.

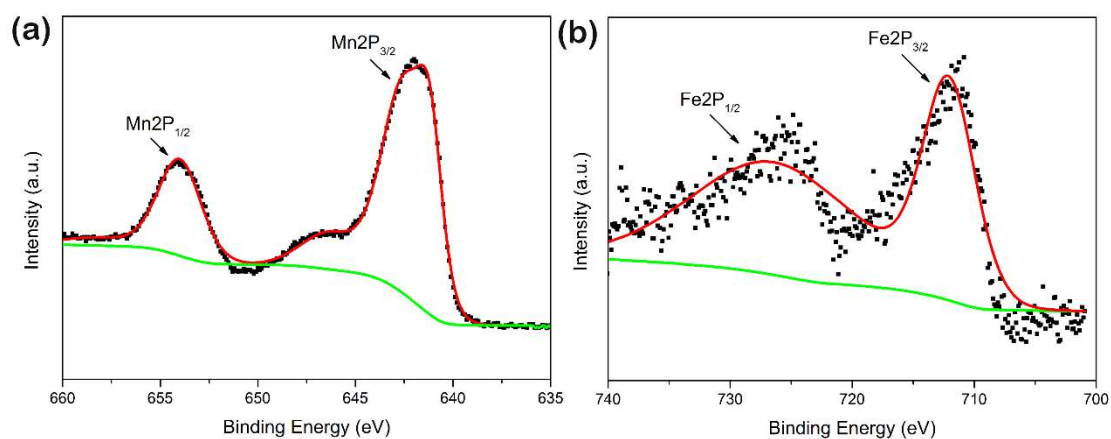


Figure S3. XPS spectra of Mn and Fe element in  $\text{LiMn}_{0.7}\text{Fe}_{0.3}\text{PO}_4/\text{C}$  material.

Table S3 Electronic conductivities of Selected  $\text{LiMn}_{1-x}\text{Fe}_x\text{PO}_4/\text{C}$  materials

Material	Conductivity ( $\text{S cm}^{-1}$ )
$\text{LiMn}_{0.7}\text{Fe}_{0.3}\text{PO}_4/\text{C}$	$5.8 \times 10^{-5}$
$\text{LiMn}_{0.75}\text{Fe}_{0.25}\text{PO}_4/\text{C}$	$3.1 \times 10^{-5}$
$\text{LiMnPO}_4/\text{C}$	$2.3 \times 10^{-5}$
$\text{LiFePO}_4/\text{C}$	$6.8 \times 10^{-5}$