

Supporting Information

Freeze-drying-Assisted Preparation of High-Compaction-Density $\text{LiMn}_{0.69}\text{Co}_{0.01}\text{Fe}_{0.3}\text{PO}_4$ Cathode Materials with High-Capacity and Long Life-Cycle for Lithium ion Batteries

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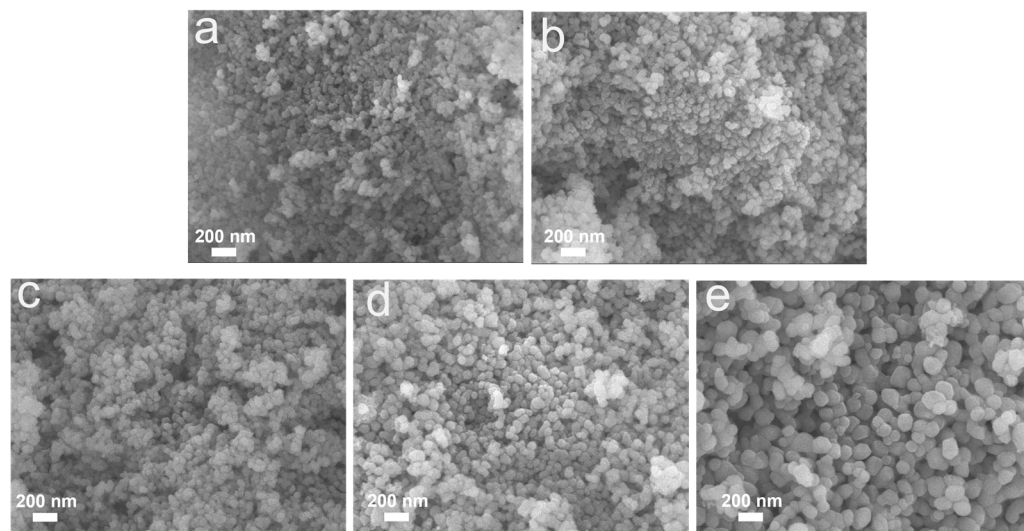


Figure S1. SEM images of LMFP-M1/C (a) and LMFP-400/C, LMFP-450/C, LMFP-500/C, LMFP-550/C (b, c, d, e).

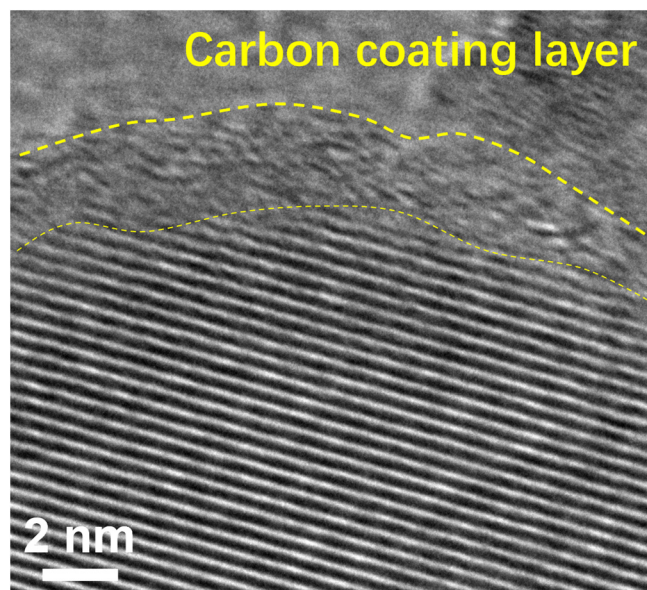


Figure S2. The TEM image of LMFP-M1 sample.

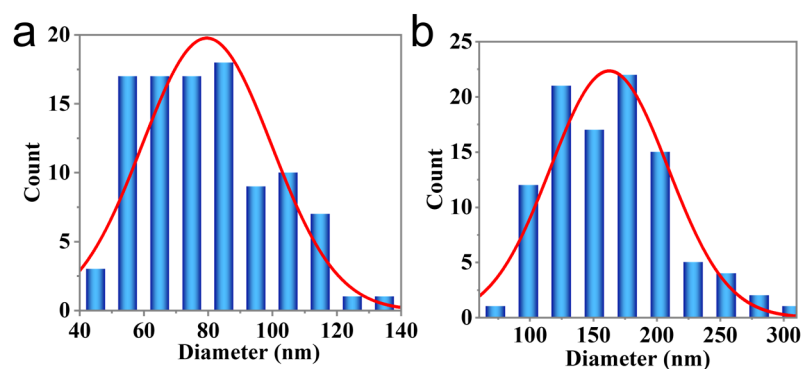


Figure S3. particle size distribution of (a) LMFP-M1 and (b) LMFP-500.

Table S1. Cycle performance comparison of LMFP-based cathode materials prepared by different methods.

Samples	Synthetic method	Electrochemical performances Cyclic capacity (mAh g ⁻¹)	References
LMFP-500/C	Solvothermal	143.8@1C, remains 90% after 800 cycles	This work
LiMn _{0.8} Fe _{0.2} PO ₄	Microwave-sol-vothermal	129@0.5C, remains 95.7% after 50 cycles	50
LiMn _{0.5} Fe _{0.5} PO ₄	Solvothermal	143.8@1C, remains 89% after 500 cycles	51
LiMn _{0.7} Fe _{0.3} PO ₄	Solvothermal	153.9@1C, remains 95% after 100 cycles	27
LiMn _{0.5} Fe _{0.5} PO ₄ /C	Solvothermal	142@1C, remains 95% after 100 cycles	52

$\text{LiMn}_{0.8}\text{Fe}_{0.2}\text{PO}_4/\text{C}$	Solvothermal	146.1@1C, remains 92.7% after 150 cycles	45
$\text{LiMn}_{0.5}\text{Fe}_{0.5}\text{PO}_4$	Sol-gel	110@0.33C, remains 95% after 40 cycles	53
$\text{LiMn}_{0.5}\text{Fe}_{0.5}\text{PO}_4$	Solvothermal	145@1C, remains 95% after 100 cycles	54
$\text{LiMn}_{1/3}\text{Fe}_{1/3}\text{PO}_{1/3}$	Solvothermal	158@0.1C, remains 80% after 100 cycles	55
$\text{LiMn}_{0.8}\text{Fe}_{0.2}\text{PO}_4$	Solid-state reaction	140@0.2C, remains 90.2% after 200 cycles	36

Table S2. The specific capacities at various C-rates of LMFP-M1/C and LMFP-400/C, LMFP-450/C, LMFP-500/C, LMFP-550/C.

Samples	0.1C mAh/g	0.2C mAh/g	1C mAh/g	2C mAh/g	5C mAh/g	10C mAh/g
LMFP-M1/C	164.0	162.9	151.8	148.1	143.6	136.1
LMFP-400/C	164.2	154.2	146.5	143.3	134.6	116.1
LMFP-450/C	165.0	153.7	142.3	137.3	126.7	107.2
LMFP-500/C	166.2	151.6	139.5	133.8	122.2	103.5
LMFP-550/C	162.2	145.7	131.0	125.6	117.6	105.4