Supplementary Material (ESI) for NEW JOURNAL OF CHEMISTRY

Electronic Supporting information

Large-scale synthesis of $LiMn_2O_4$ cathode materials via a rheology-assisted solid-phase method using citric acid

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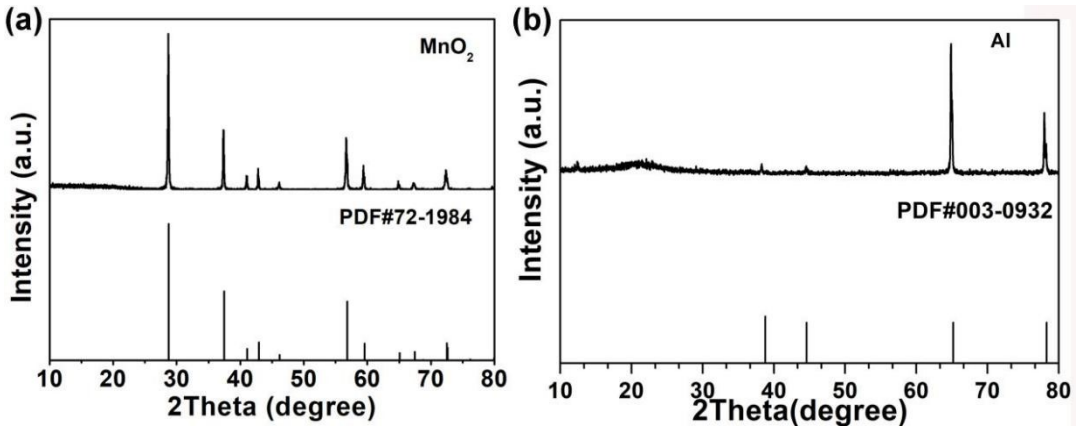

Figure. S1 XRD patterns of (a) MnO_2 raw materials and aluminum foil.

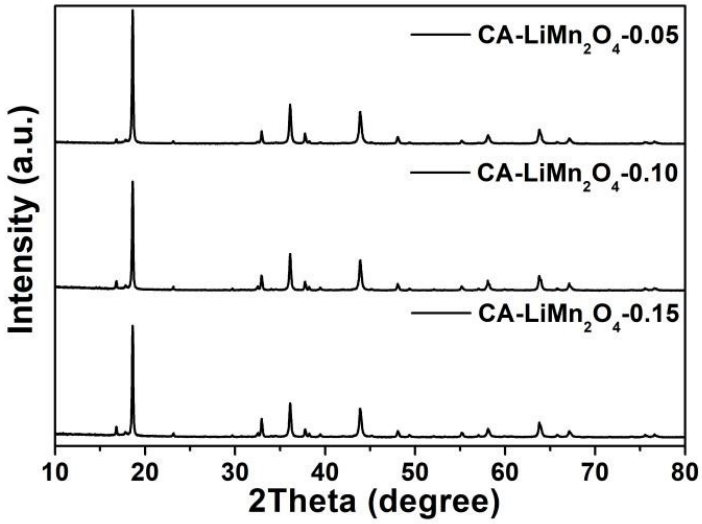

Figure. S2 XRD patterns of CA-$LiMn_2O_4$ with different amounts of citric acid.

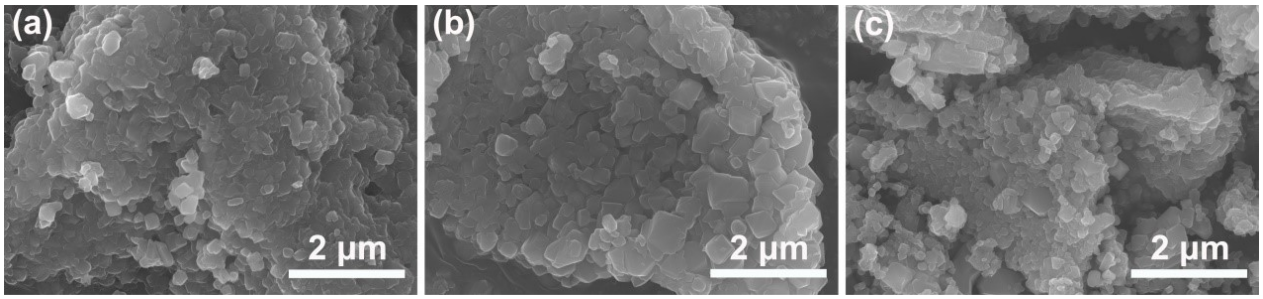

Figure. S3 SEM images of (a) $LiMn_2O_4$, (b)CA-$LiMn_2O_4$ and (c) SUC-$LiMn_2O_4$

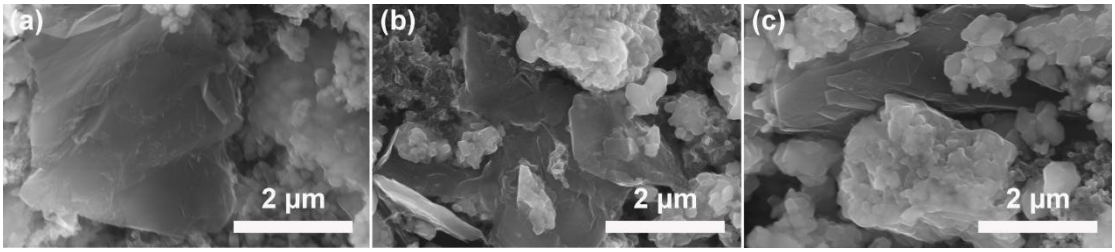

Figure S4. SEM images of (a) $LiMn_2O_4$, (b) CA-$LiMn_2O_4$ and (c) SUC-$LiMn_2O_4$ samples after 300 cycles.

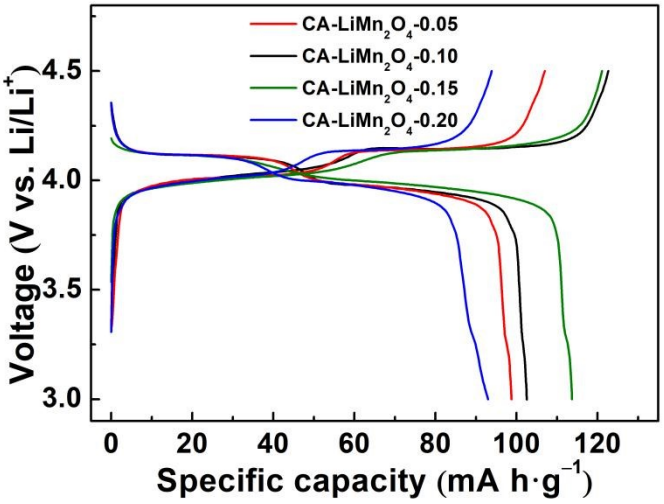

Figure. S5 Representative capacity-voltage curves of CA-$LiMn_2O_4$ with different amounts of citric acid.

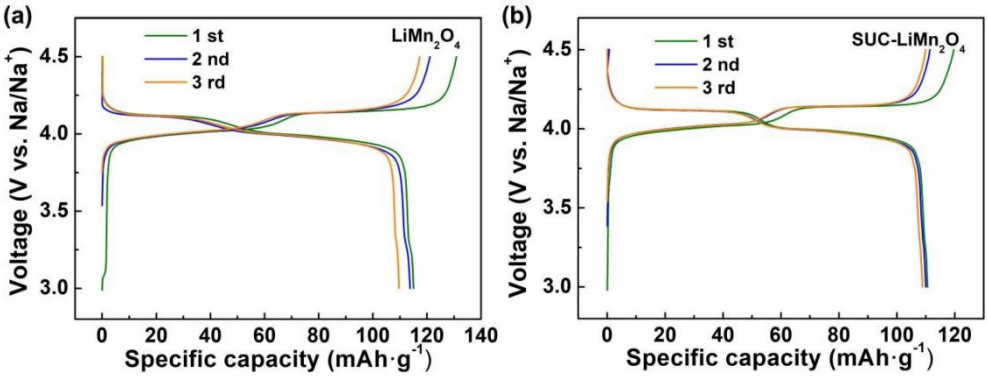

Figure. S6 Representative capacity-voltage curves of (a) $LiMn_2O_4$ and (b) SUC-$LiMn_2O_4$ for initial three cycles.

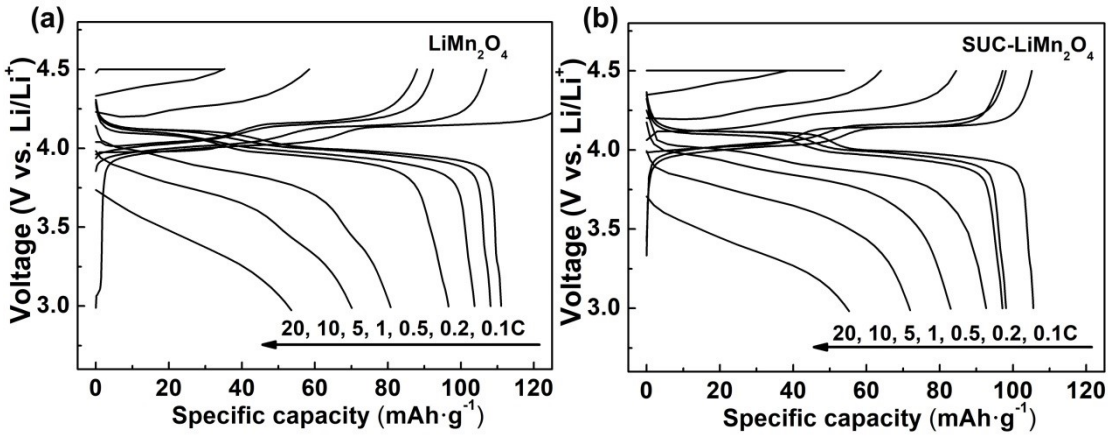

Figure. S7 Galvanostatic charge/discharge curves of (a) $LiMn_2O_4$ and (b) SUC-$LiMn_2O_4$ at various rates.

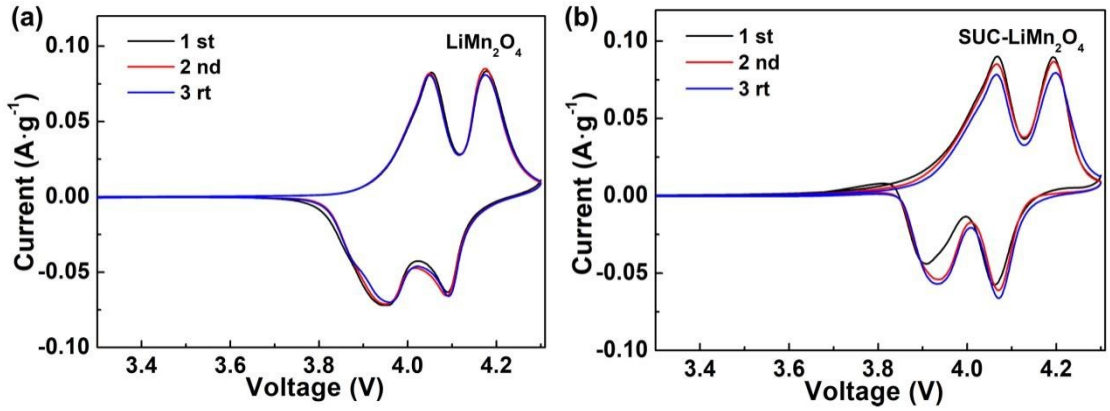

Figure. S8 The CV curves of (a) $LiMn_2O_4$ and (b) SUC-$LiMn_2O_4$ in initial three cycles.

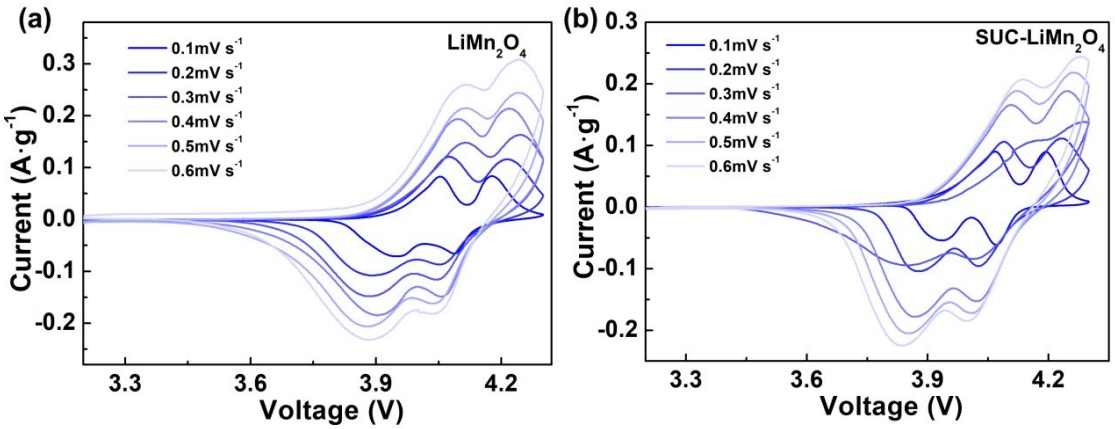

Figure. S9 The CV curves of (a) $LiMn_2O_4$ and (b) SUC-$LiMn_2O_4$ at the sweep rates of 0.1-0.6 mV s^{-1}.

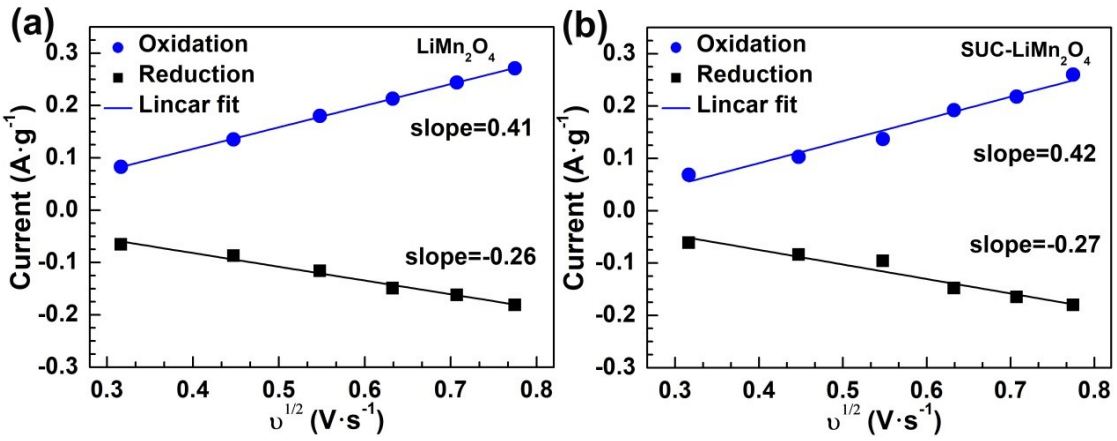

Figure. S10 (a) $LiMn_2O_4$ and (b) SUC-$LiMn_2O_4$ in the linear dependence of electrode reaction current densities on square root of scan rate.

Table S1. Summary of electrochemical performance from $LiMn_2O_4$ related electrodes.

Ref.	Structural formula	Synthesis method	$LiMn_2O_4$: C:PVDF	Specific capacity (mAh g^{-1})
1-JES 2020[1]	$LiAl_{0.16}Mn_{0.84}O_4$	Simple combustion method	80:10:10	117 (0.1C),103(0.2C),100 (0.5C), 81 (1C), 60 (2C),
2-JAC 2021[2]	$LiMn_2O_4$	Hydrothermal treatment	80:10:10	106 (0.1C), 101 (0.2C), 97 (0.5C), 93 (1C), 91 (2C), 79 (5C), 66.5 (10C),
3-JACS 2019[3]	$LiNi_{0.5}Mn_{1.5}O_4$	surface doping	80:10:10	111(0.2C), 106 (0.5C), 102 (1C), 97 (2C), 66 (5C),
4-CI-2021[4]	$LiMn_2O_4/LaCoO_3$	molten salt method	80:10:10	114(0.2C), 102 (0.5C), 102 (1C), 75(2C), 42 (5C),
5-ASS-2019[5]	$LiMn_2O_4$/GO	Hydrothermal treatment	80:10:10	128(0.1C), 108 (0.25C), 91 (0.5C), 80(1C),
This work	CA-$LiMn_2O_4$	rheology-assisted solid-phase method	80:10:10	117 (0.1C), 105 (0.2C), 101 (0.5C), 95 (1C), 90 (2C), 83 (5C), 75 (10C), 63 (20C),

References

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2. W. Xu, Y. Zheng, L. Lin, W. Lei, Z. Wang, H. Song, Y. Cheng, R. Qi, H. Peng and H. Lin, *Journal of Alloys and Compounds*, 2021, **870**, 159387.

3. W. Zhang, X. Sun, Y. Tang, H. Xia, Y. Zeng, L. Qiao, Z. Zhu, Z. Lv, Y. Zhang and X. Ge, *Journal of the American Chemical Society*, 2019, **141**, 14038-14042.

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