Remarkable lowering in the synthesis temperature of LiMn$_2$O$_4$ from citrate solution-gel synthesis facilitated by ethanol

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Figure S1: MS profiles of the citrate-Mn$^{2+}$,Li$^+$ precursor gels with different amount of ethanol, dried at 60°C, recorded at a heating rate of 10°C/min. Ions with a) m/z 17 (OH$^+$, NH$_3^+$) and b) m/z 18 (H$_2$O$^+$, NH$_4^+$) are fragments related to water and ammonia. Ions with c) m/z 22 (CO$_2^{2+}$), d) m/z 44 (CO$_2$) are fragments related to the carboxylate groups. Only the most relevant fragments are shown. Note that each sub-figure has its own ion current scale.

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Figure S2: MS profiles of the citrate-Mn\(^{2+}\), Li\(^+\) precursor gel without ethanol dried at 60°C, recorded at a heating rate of 10°C/min: a) fragments related to the carboxylate groups, b) fragments related to the citrate’s skeleton. Only the most relevant fragments are shown and cited in the article. Note that each sub-figure has its own ion current scale.

Figure S3: MS profiles of the citrate-Mn\(^{2+}\), Li\(^+\) precursor gel with 6M ethanol final concentration in solution, dried at 60°C, recorded at a heating rate of 10°C/min: a) fragments related to the carboxylate groups, b) fragments related to the citrate’s skeleton. Only the most relevant fragments are shown and cited in the article. Note that each sub-figure has its own ion current scale.

Figure S4: MS profiles of the citrate-Mn\(^{2+}\), Li\(^+\) precursor gel with 10M ethanol final concentration in solution, dried at 60°C, recorded at a heating rate of 10°C/min: a) fragments related to the carboxylate groups, b) fragments related to the citrate’s skeleton. Only the most relevant fragments are shown and cited in the article. Note that each sub-figure has its own ion current scale.
Figure S5: SEM pictures of films deposited on Si/SiO$_2$ from precursor: a) without ethanol, b) with 6M ethanol final concentration in solution, c) with 10M ethanol final concentration in solution. Films were therefore annealed at: a) 450$^\circ$C, b) 350$^\circ$C and c) 250$^\circ$C in dry air.