

Supplementary Information for

**Rapid room-temperature synthesis of ultrasmall cubic Mg–Mn spinel
cathode materials for rechargeable Mg-ion battery**

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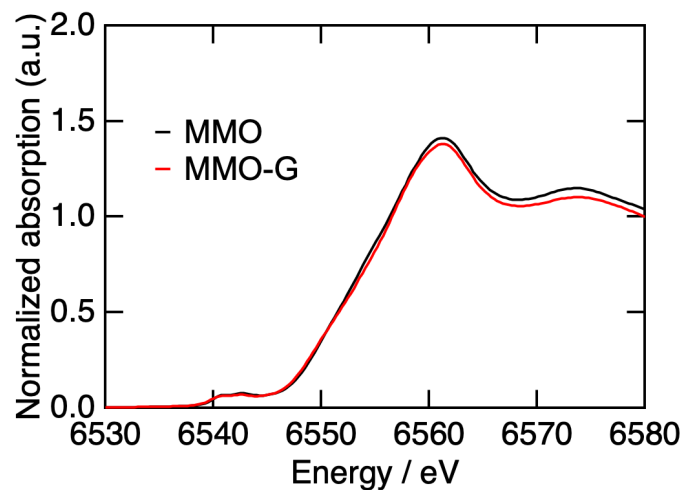


Fig. S1. Mn *K*-edge XANES spectra of MMO and MMO-G.

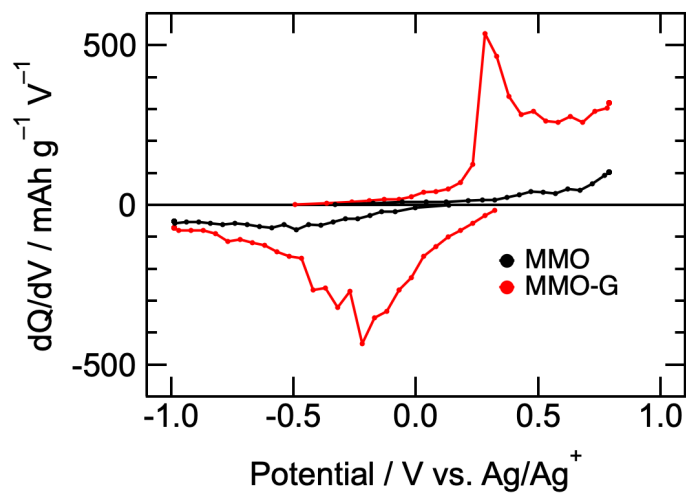


Fig. S2. dQ/dV curves of MMO and MMO-G cathodes.

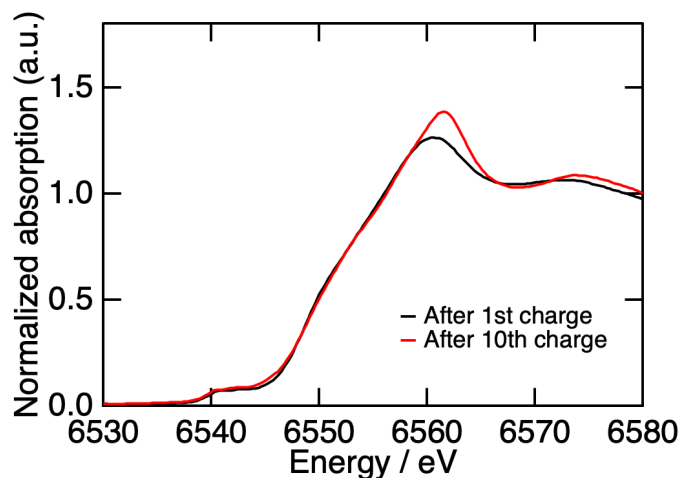


Fig. S3. Mn K-edge XANES spectra of MMO-G electrode after 1st and 10th charge.

Table S1. Comparison of the cathode performances for MgMn_2O_4 with anhydrous electrolytes.

Procedure (Calcination condition)	Particle size	Electrolyte	Discharge capacity	Current density	Ref.
Coprecipitation (500 °C, 24 h)	Not indicated	$\text{Mg}(\text{TFSA})_2/\text{CsTFSA}$ (150°C)	150 mAh g ⁻¹ 200 mAh g ⁻¹	13.5 mA g ⁻¹ 5.4 mA g ⁻¹	[12]
Coprecipitation (750 °C, 6 h)	200 nm	0.2 M $\text{Mg}(\text{Ac})_2$ + 0.1 M AlCl_3/PC	102 mAh g ⁻¹	Not indicated	[15]
Sol-gel (400 °C, 10 h)	17 nm	0.5 M $\text{Mg}(\text{ClO}_4)_2$ /EC-DEC	120 mAh g ⁻¹	10 μA	[16]
Sol-gel (400 °C, 10 h)	11 nm	0.5 M $\text{Mg}(\text{TFSA})_2$ + 0.5 M DPGDME/AN	220 mAh g ⁻¹ 80 mAh g ⁻¹	27 mA g ⁻¹ 135 mA g ⁻¹	[18]
Sol-gel (550 °C, 10 h)	31 nm	0.5 M $\text{Mg}(\text{TFSA})_2$ + 0.5 M DPGDME/AN	70 mAh g ⁻¹ 50 mAh g ⁻¹	27 mA g ⁻¹ 135 mA g ⁻¹	[18]
Sol-gel (650 °C, 12 h)	40 nm	0.5 M $\text{Mg}(\text{ClO}_4)_2/\text{AN}$	100 mAh g ⁻¹	4 mA g ⁻¹	[19]
Sol-gel (700 °C, 24 h)	120 nm	$\text{Mg}(\text{TFSA})_2/\text{EC-PC}$	225 mAh g ⁻¹	1 mA g ⁻¹	[23]
Alcohol reduction (r.t., 30 min)	5 nm	0.5 M $\text{Mg}(\text{ClO}_4)_2/\text{AN}$	230 mAh g ⁻¹ 150 mAh g ⁻¹	10 mA g ⁻¹ 190 mA g ⁻¹	This work