Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Carbon-coated $Ni_{0.5}Mg_{0.5}Fe_{1.7}Mn_{0.3}O_4$ as novel anode material for high energy density lithium-ion batteries

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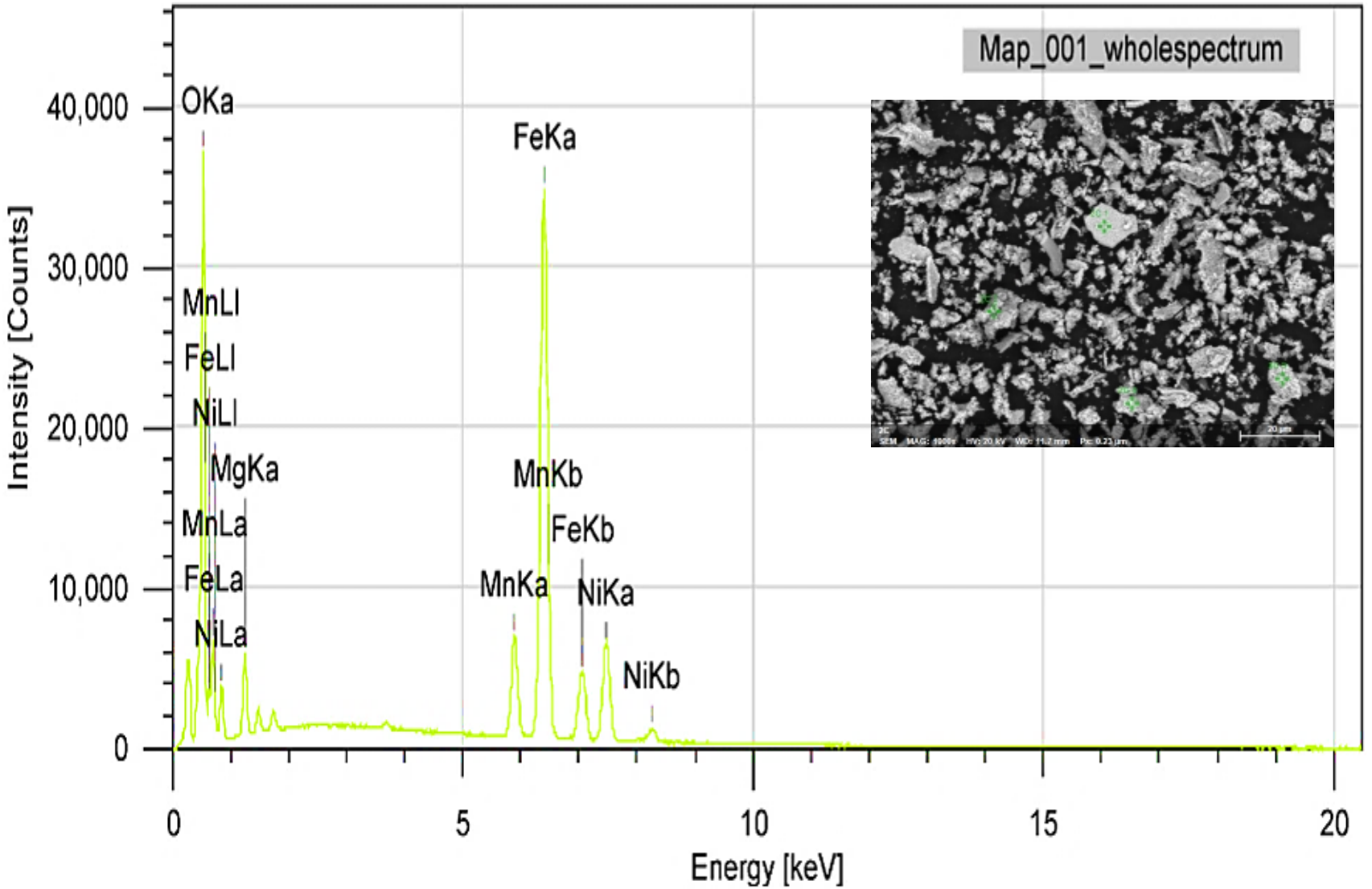

Fig. S1. EDX spectra of $Ni_{0.5}Mg_{0.5}Fe_{1.7}Mn_{0.3}O_4$ material

Table S1. The results of the Rietveld analysis for structural parameters, Chi-squared factor (χ^2), and various reliability R-factors for the synthesized $Ni_{0.5}Mg_{0.5}Fe_{1.7}Mn_{0.3}O_4$ material.

Material	$Ni_{0.5}Mg_{0.5}Fe_{1.7}Mn_{0.3}O_4$
Wavelengths (Å)	$\lambda_{k\alpha1}$ = 1.54056 $\lambda_{k\alpha2}$ = 1.54439
Crystal structure	Cubic structure
Space group	
Lattice parameters	a = 8.36257 Å V = 584.817 Å^3
R-factors	Rp = 8.01 Rwp = 10.9 Rexp = 11.29
χ^2	2.47

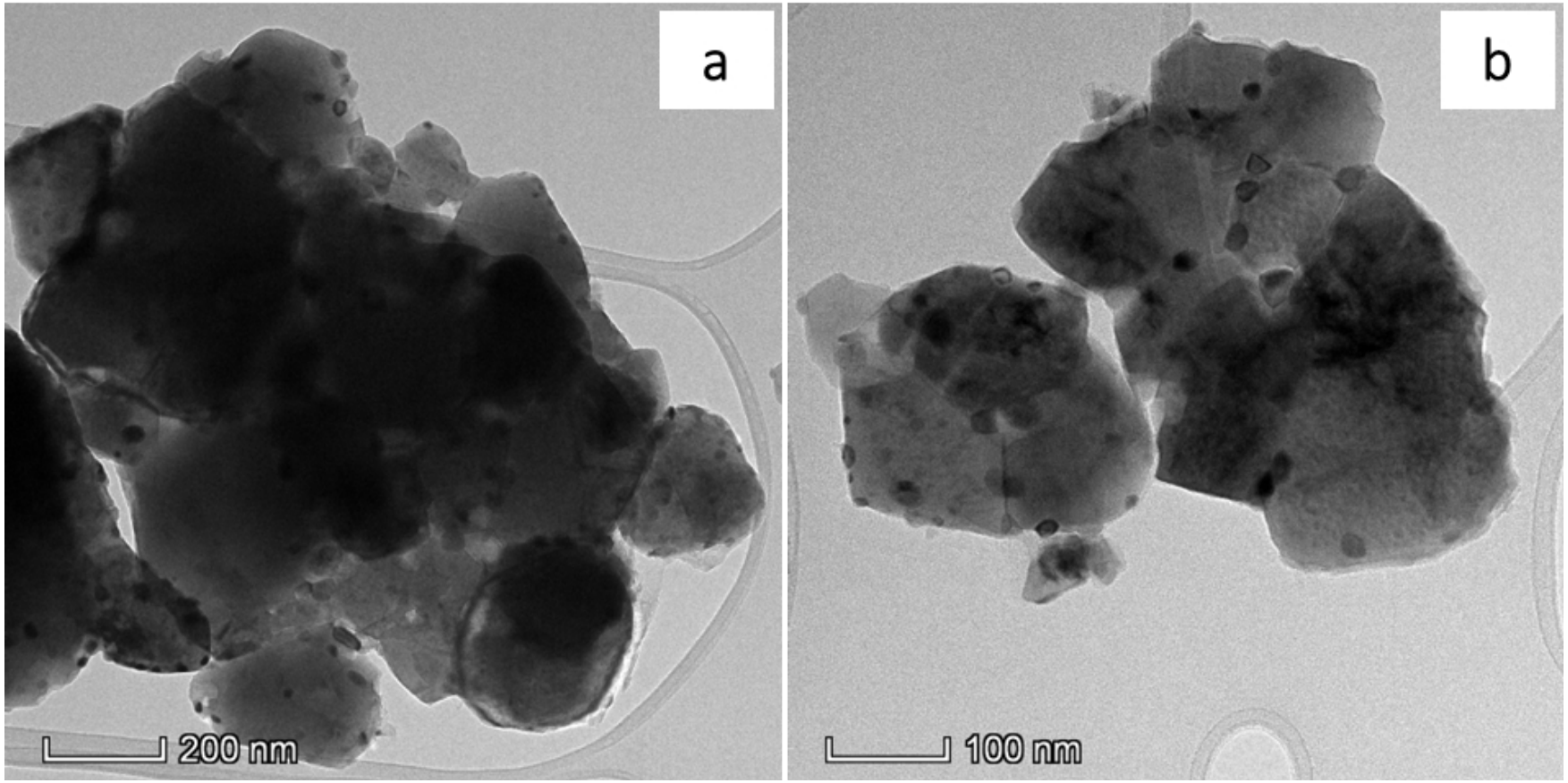

Fig. S2. TEM images of the uncoated $Ni_{0.5}Mg_{0.5}Fe_{1.7}Mn_{0.3}O_4$ sample.

Table S2. Comparison of the capacities for the 75th cycles at 0.125C, 100th cycles at 2C (100 mA. g^{-1} = 0.125C), and rate capability performance of uncoated and carbon-coated $Ni_{0.5}Mg_{0.5}Fe_{1.7}Mn_{0.3}O_4$ (the unit of capacity: mAh. g^{-1}).

Anode material	Capacity of the 75th cycle at 0.125 C	Capacity of the 100th cycle at 2C	Capacities at various C-rates						
			0.03C	0.06C	0.125C	0.25C	0.625C	1.25C	2C
$Ni_{0.5}Mg_{0.5}Fe_{1.7}Mn_{0.3}O_4$	744.3	36	809	739	710	681	637	593	192
$Ni_{0.5}Mg_{0.5}Fe_{1.7}Mn_{0.3}O_4$/C	819.1	343	720	778	760	731	690	651	372

Table S3. EIS fitting data of uncoated $Ni_{0.5}Mg_{0.5}Fe_{1.7}Mn_{0.3}O_4$ and coated $Ni_{0.5}Mg_{0.5}Fe_{1.7}Mn_{0.3}O_4$/C electrodes before and after 100 cycles at 2C (100 mA. g^{-1} = 0.125C).

Anode material		R_s (Ω)	R_f (Ω)	R_{ct} (Ω)	R_{total}
$Ni_{0.5}Mg_{0.5}Fe_{1.7}Mn_{0.3}O_4$	After rest	4.45	1012	18 646	19 662.5
	After 100 cycles	25.8	944.9	2145	3115.7
$Ni_{0.5}Mg_{0.5}Fe_{1.7}Mn_{0.3}O_4$/C	After rest	3.98	162.4	10 237	10 403.4
	After 100 cycles	3.59	51.68	400	455.3