

## Supporting information

### **Simultaneously tuning cationic and anionic redox in P2-Na<sub>0.67</sub>Mn<sub>0.75</sub>Ni<sub>0.25</sub>O<sub>2</sub> cathode material through a synergic Cu/Mg co-doping**

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**Table S1 Atoms occupancy of Bare from Rietveld refinement.**

Atom	Site	x	y	z	Occ
Nae	2b	0	0	1/4	0.25
Naf	2d	1/3	2/3	3/4	0.42
Mn	2a	0	0	0	0.75
Ni	2a	0	0	0	0.25
O	4f	1/3	2/3	0.09628	1

**Table S2 Atoms occupancy of Cu<sub>0.04</sub> from Rietveld refinement.**

Atom	Site	x	y	z	Occ
Nae	2b	0	0	1/4	0.25
Naf	2d	1/3	2/3	3/4	0.42
Mn	2a	0	0	0	0.71
Ni	2a	0	0	0	0.25
Cu	2a	0	0	0	0.04
O	4f	1/3	2/3	0.09556	1

**Table S3 Atoms occupancy of Mg<sub>0.04</sub> from Rietveld refinement.**

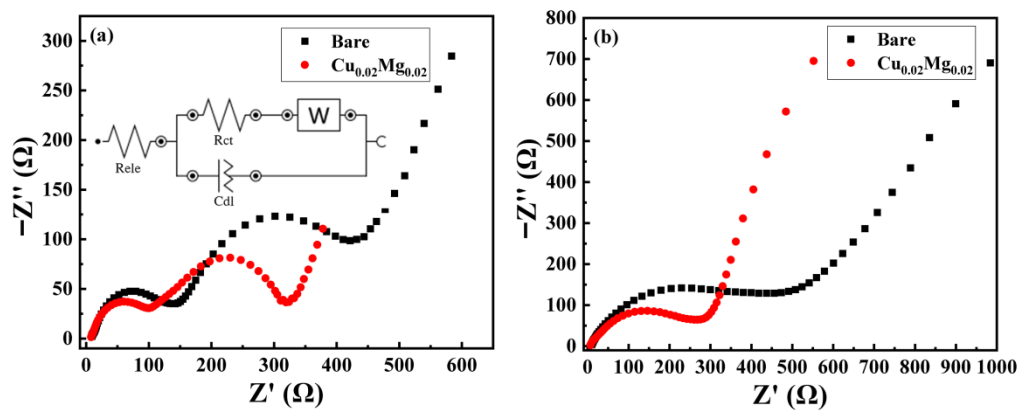
Atom	Site	x	y	z	Occ
Nae	2b	0	0	1/4	0.25
Naf	2d	1/3	2/3	3/4	0.42
Mn	2a	0	0	0	0.71
Ni	2a	0	0	0	0.25
Cu	2a	0	0	0	0.04
O	4f	1/3	2/3	0.09641	1

**Table S4 Atoms occupancy of Cu<sub>0.02</sub>Mg<sub>0.02</sub> from Rietveld refinement.**

Atom	Site	x	y	z	Occ
Nae	2b	0	0	1/4	0.25
Naf	2d	1/3	2/3	3/4	0.42
Mn	2a	0	0	0	0.71
Ni	2a	0	0	0	0.25
Cu	2a	0	0	0	0.02
Mg	2a	0	0	0	0.02
O	4f	1/3	2/3	0.09713	1

**Table S5 The loading mass for the electrodes in rate and cycling tests(0.1C).**

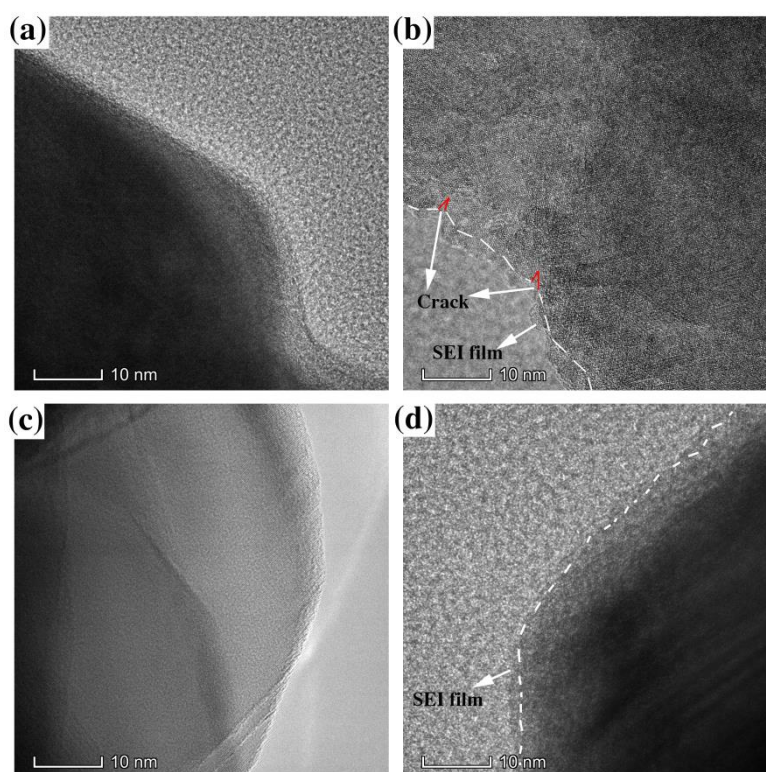
Samples	Bare	Cu <sub>0.04</sub>	Mg <sub>0.04</sub>	Cu <sub>0.02</sub> Mg <sub>0.02</sub>
Rate test(mg)	1.9545	1.9424	1.9473	1.9579
Cycle tests(mg)	1.9523	1.9478	1.9517	1.9622



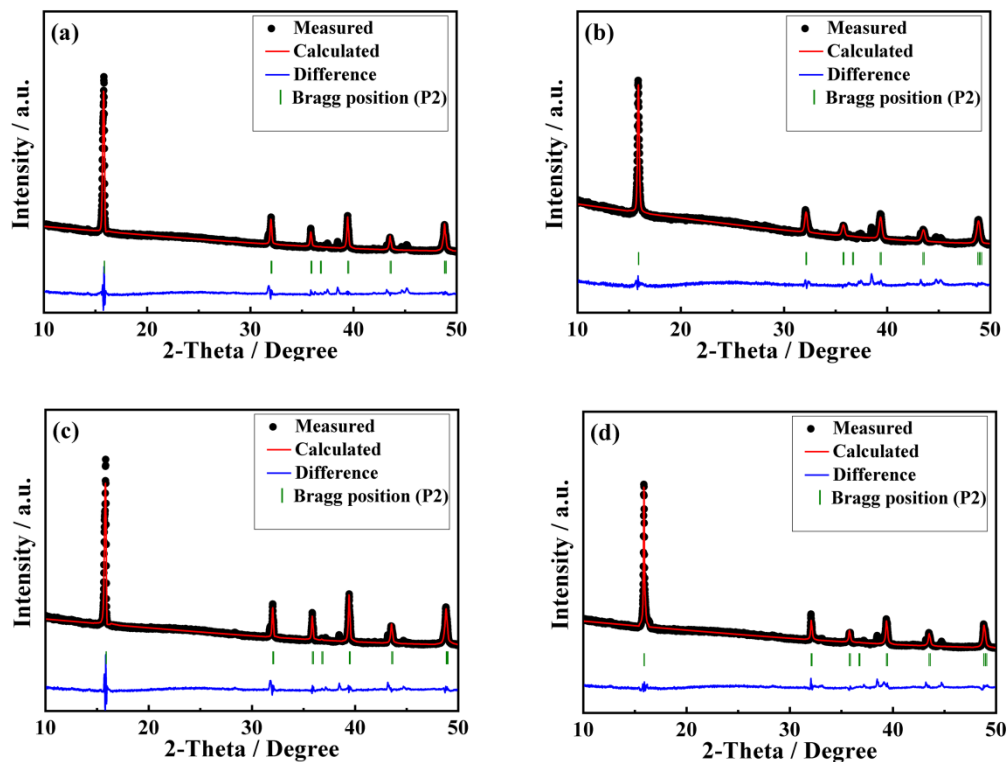
**Figure S1** The Nyquist plots measured before and after 100 cycles.

**Table S6** The simulation results of EIS before and after 100 cycles.

Samples	$R_{le}(\Omega)$	$R_{ct}(\Omega)$
Bare(before)	11.25	129.35
$Cu_{0.02}Mg_{0.02}$ (before)	7.67	102.80
Bare(after)	7.48	414.08
$Cu_{0.02}Mg_{0.02}$ (after)	5.82	195.39



**Figure S2** The HRTEM images of the bare (a,b) and  $Cu_{0.02}Mg_{0.02}$  (c,d) cathode materials measured before and after 100 cycles.



**Figure S3** The refinement results of the bare (a,b) and Cu<sub>0.02</sub>Mg<sub>0.02</sub> (c,d) cathode materials by the XRD measured before and after 100 cycles.

**Table S7** The variation of lattice parameters for the bare and Cu<sub>0.02</sub>Mg<sub>0.02</sub> cathode before and after 100 cycles by the Rietveld refinement.

Samples	Bare	Cu <sub>0.02</sub> Mg <sub>0.02</sub>
Δa(%)	0.6	0.2
Δc(%)	0.3	0.16
ΔV(%)	0.5	0.3