Electronic supplementary information for

Hierarchical waxberry-like $LiNi_{0.5}Mn_{1.5}O_4$ as an advanced cathode material for lithium-ion batteries with superior rate capability and long-term cyclability†

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Figure S1 Raman spectra of the HWL-LNMO.

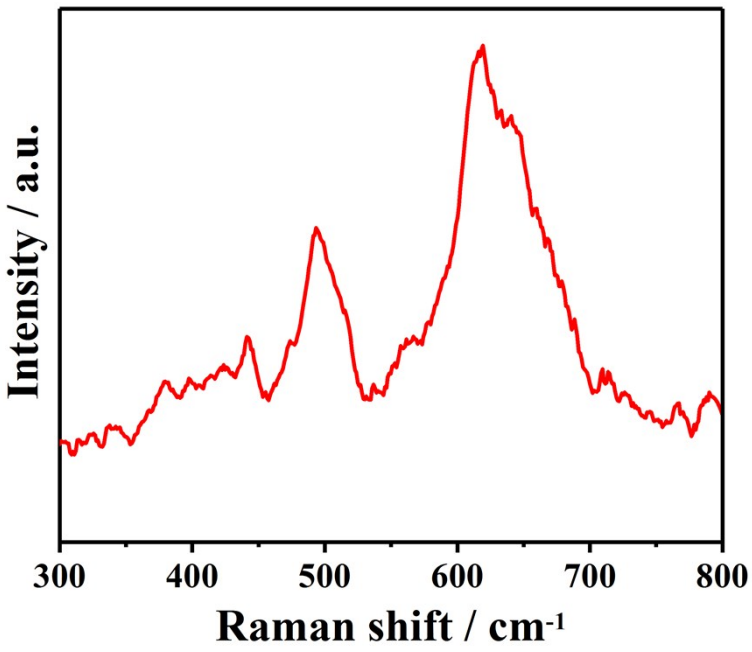

Figure S2 SEM images of carbonate precursors obtained by solvothermal reaction using (a) H_2O+HMT, (b) ethanol+HMT, (c) benzyl alcohol+HMT, (d) ethylene glycol+urea.

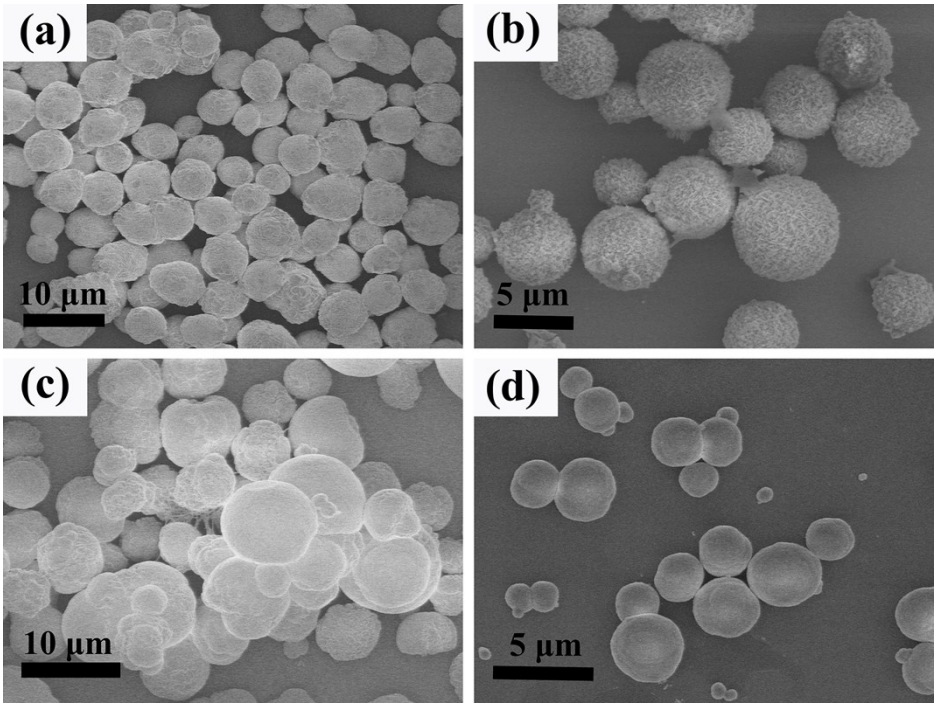

Figure S3 Cyclic voltammogram of the HWL-LNMO electrode at a scan speed of 0.05 mV s^{-1}.

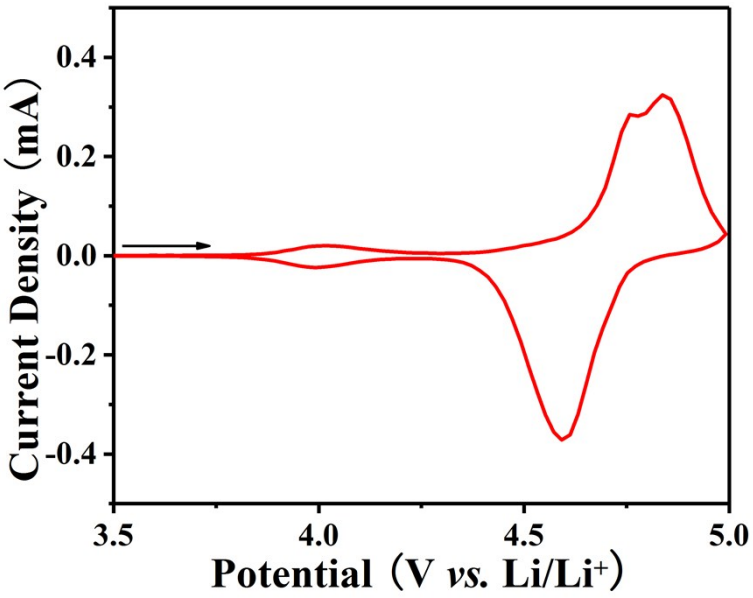

Figure S4 Cycling performance of LNMO prepared from different reaction solvents.

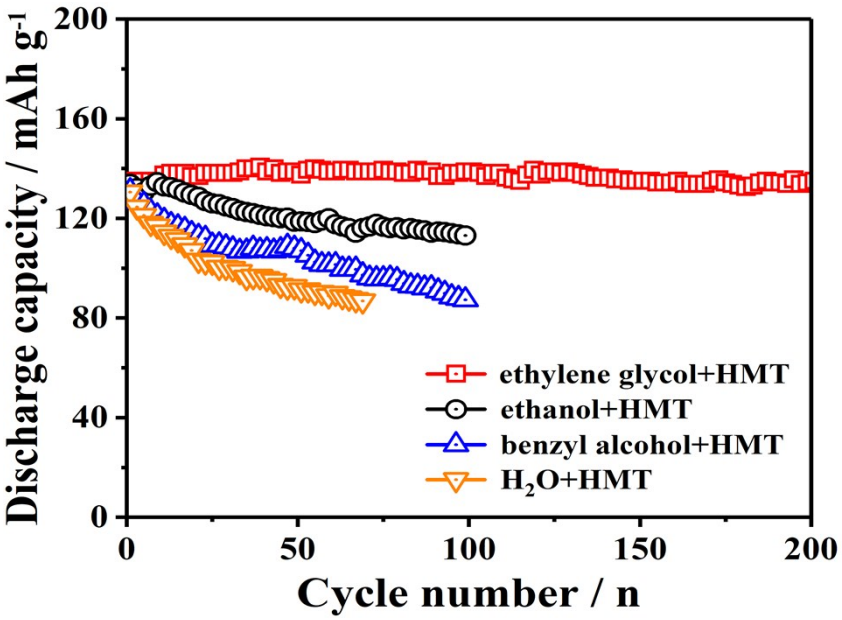

Figure S5 Discharge curves of HWL-LNMO at different discharge rates of 1 C to 30 C.

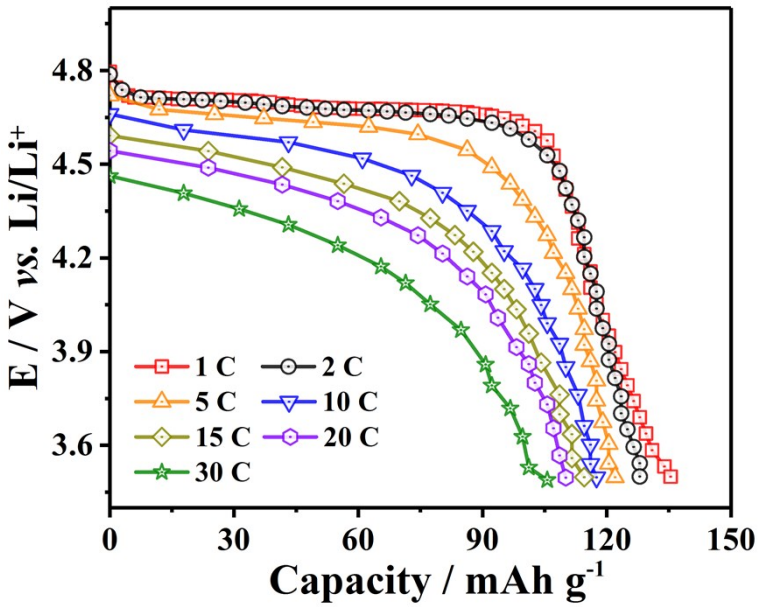

Figure S6 Comparison of the rate capabilities of HWL-LNMO, LNMO porous sphere,[27] LNMO octahedra,[34] SiO_2-coated LNMO,[43] Cr-doped LNMO[44] and TiO_2-coated LNMO[17].

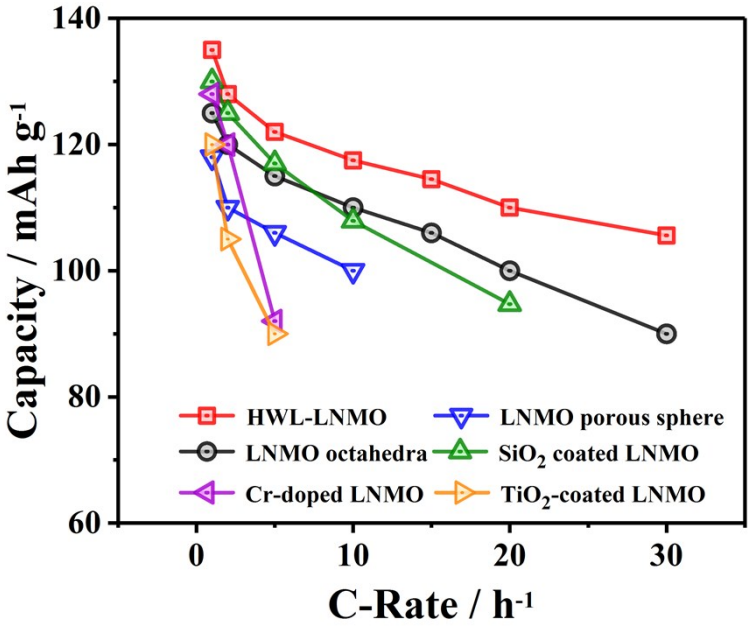

Table S7 Comparison of the high-rate cycle performances of our HWL-LNMO with other reported $LiNi_{0.5}Mn_{1.5}O_4$.

Cathode materials	Strategies	Cycling stability
LNMO porous nanorods	morphology-inheritance route[18]	91% after 500 cycles at 5 C
LNMO with high surface orientation	metal-organic framework method[15]	78.7% after 500 cycles at 10 C
LNMO particles	hydrothermal method[20]	88.1% after 1000 cycles at 5 C
LNMO porous ellipsoids	self-template method[26]	88.4% after 400 cycles at 5 C
Hierarchical LNMO	controlling microstructures of precursors[30]	91.4% after 1000 cycles at 5 C
LNMO nanoplates	hydrothermal method[36]	84.7% after 500 cycles at 40 C
Ours: HWL-LNMO	hydrothermal method	84% after 1200 cycles at 30 C

Figure S8 Electrochemical impedance spectroscopy (EIS) of the HWL-LNMO and SS-LNMO electrodes.