Supporting Information

Robust LiTi$_2$(PO$_4$)$_3$ Microflowers As High-rate and Long-life Cathodes for Mg-based Hybrid Ion Batteries

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**Fig. S1** The XRD pattern of bare LTP.

**Fig. S2** Nitrogen adsorption-desorption isotherms of (a) LTP-F precursor, (b) LTP-F/C and (c) bare LTP.
Fig. S3 (a) EDS elemental mappings, and (b) EDS spectrum of the residual carbon skeleton after etching the LTP from LTP-F/C.

Fig. S4 (a, b) SEM images of the bare LTP.
Fig. S5 TGA curve of LTP-F/C.

Fig. S6 (a) The initial discharge-charge curves and (b) cycling performances of bare LTP at 1 C. (c) The rate performances of bare LTP.

Fig. S7 Contribution ratio of plateau discharge capacity of LTP-F/C at different rates.
Fig. S8 Rate performances of LTP-F/C under different concentrations of LiCl.

![Graph showing rate performances of LTP-F/C under different concentrations of LiCl.]

Fig. S9 (a) CV curves of LTP-F/C and bare LTP for the first cycle at a scanning rate of 0.1 mV s⁻¹. (b) The Nyquist plots of the LTP-F/C and bare LTP after two cycles with equivalent circuit inset.

![Graph showing CV curves and Nyquist plots.]

Fig. S10 (a) Discharge/charge curves of LTP-F/C cathode in the LTP-F/C|Mg²⁺|Mg cell (1st cycle), LTP-F/C|Li⁺|Li cell (1st cycle), at 1 C (1 C = 140 mA h g⁻¹) and (b) corresponding cycling performances.

![Graph showing discharge/charge curves and cycling performances.]
**Fig. S11** (a) GITT curve of LTP-F/C at 1.0-2.0 V, (b) GITT potential response curve with time. The experiment was carried out at constant current pulse of 50 mA g\(^{-1}\) for 5 min followed by a relaxation period of 10 min and a voltage range. (c) Diffusivity versus state of discharge.

**Fig. S12** (a, b) SEM images of the LTP-F/C electrode after 3000 cycles at 10 C.

**Fig. S13** SEM images of the Mg anode before cycling (a) and after 3000 cycles at 10 C (b).