Supplementary Information

A Green Recycling Process Designed for LiFePO₄ Cathode Materials for Li-ion Batteries†

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Fig. S1 HRTEM image of LiFePO₄ synthesized at 700 °C.
Fig. S2 Cyclic voltammetries of LiFePO$_4$ synthesized at (a) 650 °C (b) 700 °C (c) 750 °C (d) recycled LiFePO$_4$ (700 °C).
Fig. S3 (a) Process to recover used LiFePO$_4$ from the fully-cycled pouch cells (disassembled LiFePO$_4$ electrode materials washed in DMC solution) (b) electrochemical performance of LiFePO$_4$ from recycled battery (c) rate capabilities (d) cycle characteristics. Because each pouch cell only contains very small amount of active cathode materials, we disassembled several pouch cells and combined all of these recovered powders in order to carry out the electrochemical test measurements.
Fig. S4 X-ray diffraction patterns of (a) recovered spent Li$_{1-x}$FePO$_4$ powders (b) after annealing process at 700 °C in a box furnace, where all the Fe$^{2+}$ sources are oxidized to Fe$^{3+}$. 
Fig. S5 X-ray diffraction patterns of (a) amorphous FePO$_4$·2H$_2$O (Aldrich) and α-quartz FePO$_4$ after heat treatment (600 °C, 6 hr) (b) LiFePO$_4$ synthesized at 700 °C with amorphous FePO$_4$·2H$_2$O and α-quartz FePO$_4$. 
Fig. S6 Capacity vs. voltage curves of (a) LiFePO₄ synthesized with amorphous FePO₄·2H₂O (b) LiFePO₄ synthesized with α-quartz FePO₄.