Supplementary Material (ESI) for Energy & Environmental Science.


# High Performance $LiFePO_4$ Electrode Materials: Influence of Colloidal Particle Morphology and Porosity on Li-ion Battery Power Capability

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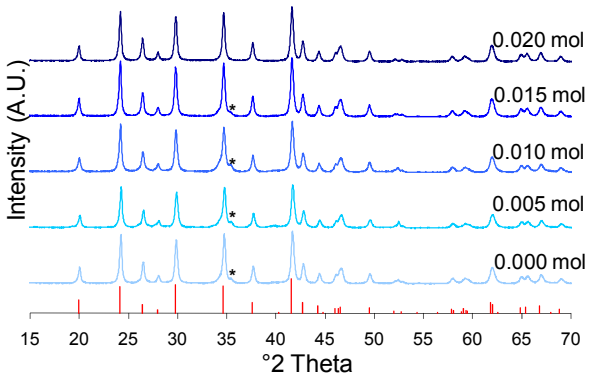
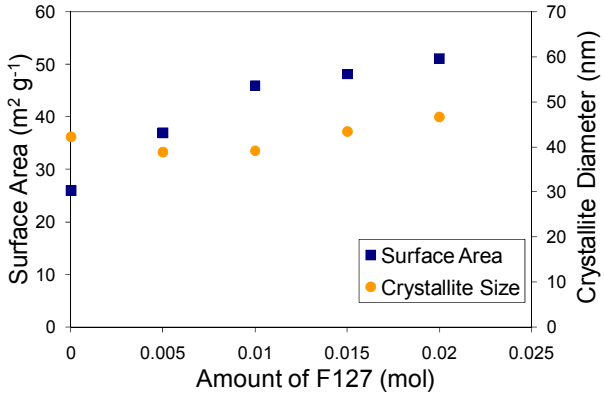
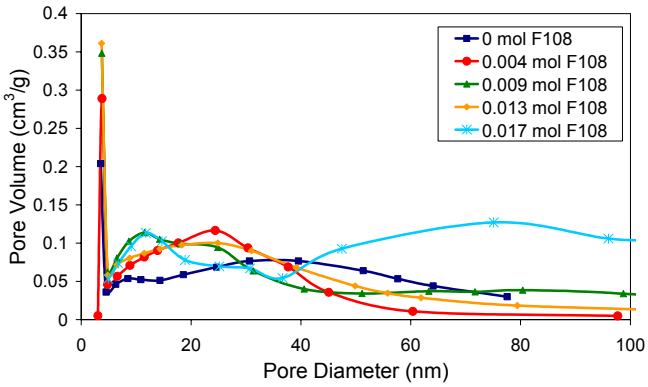



(a)

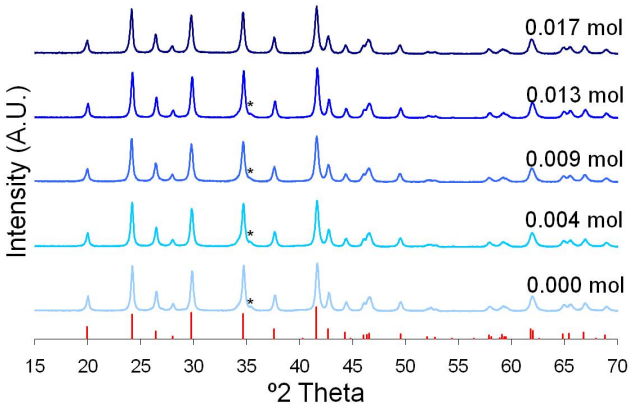



(b)

**Figure S1.** (a) XRD analysis (the presence of small quantities of iron phosphate is denoted with the asterisks) and (b) BET surface area determined from nitrogen sorption and crystallite diameter determined from XRD Rietveld analysis for $LiFePO_4$ samples prepared with different concentrations of F127 triblock copolymer




(a)




(b)

**Figure S2.** (a) Desorption pore size distribution and (b) XRD analysis for $LiFePO_4$ samples prepared with increasing amounts of F108 (small traces of iron phosphate impurities are denoted with asterisks).

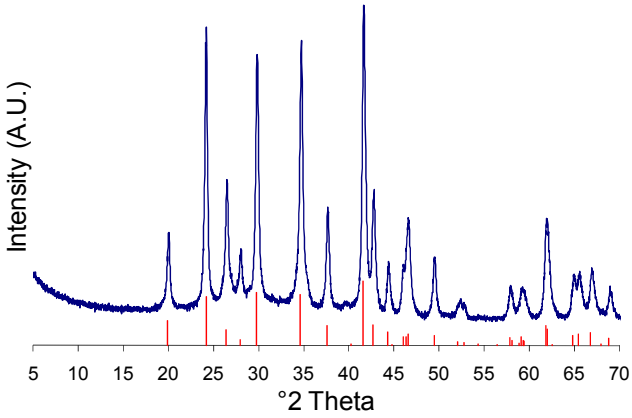



**Figure S3.** XRD analysis for the sample made with equimolar amounts of ascorbic acid to $LiFePO_4$ showing a significant amorphous contribution in the sample due to the broad maximum at 20-35 °2θ. (19.2% carbon from elemental analysis).

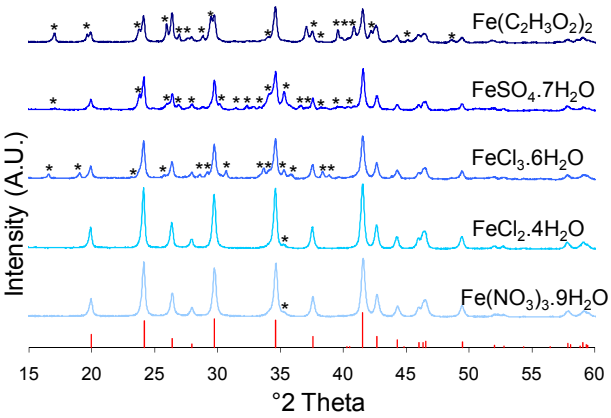
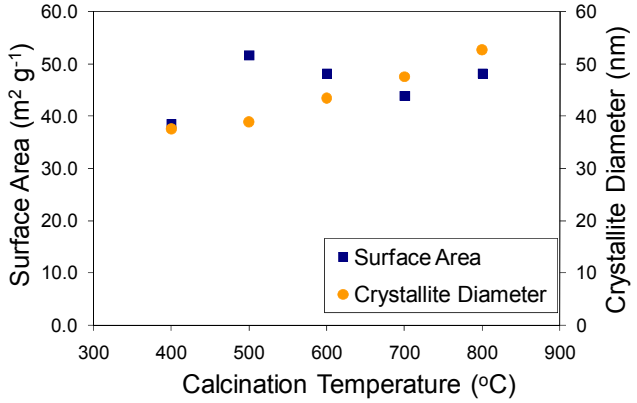
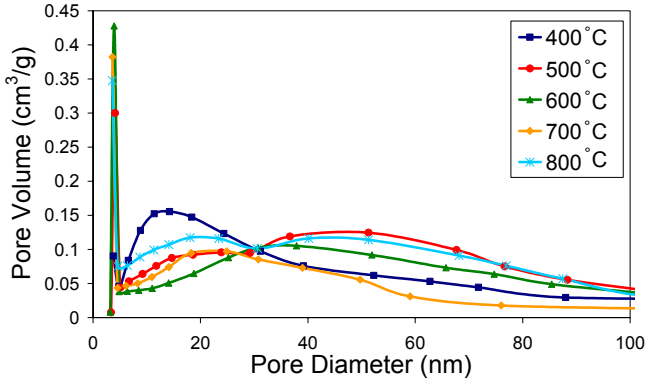


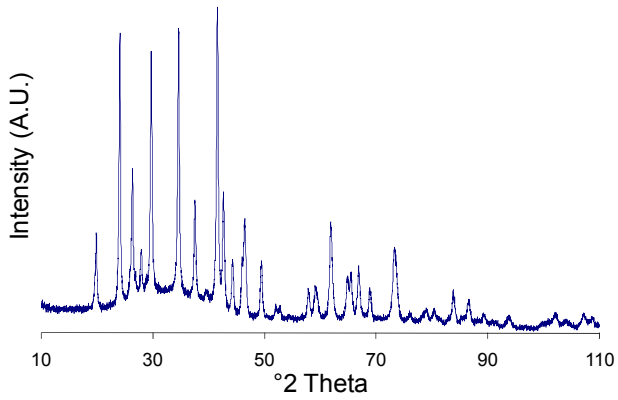

**Figure S4**. XRD results for $LiFePO_4$ samples prepared via solution chemistry with different iron precursors. The peaks are indexed to Triphylite [40-1499] and the impurities are denoted with the asterisks.




(a)




(b)




(c)

**Figure S5**. a) BET surface area and crystallite diameter, (b) BJH Desorption Pore Size Distribution for the $LiFePO_4$ samples synthesised with F127 and calcined at various temperatures and (c) XRD analysis for the $LiFePO_4$ sample calcined at 400 °C. The broad peak between 20-40 °2θ indicates the presence of a large contribution of amorphous material.

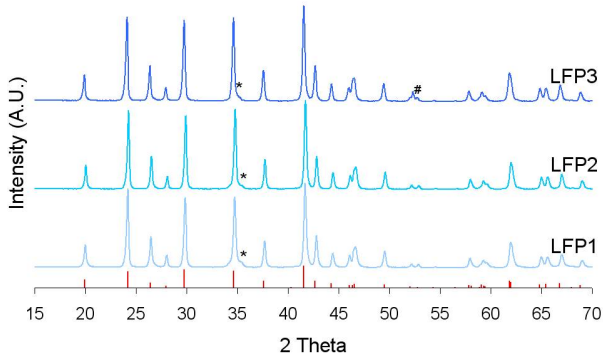
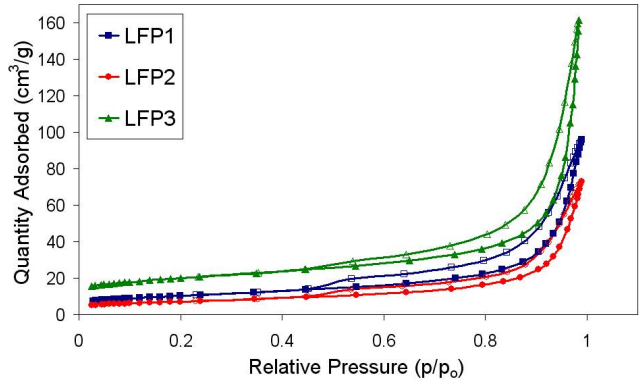
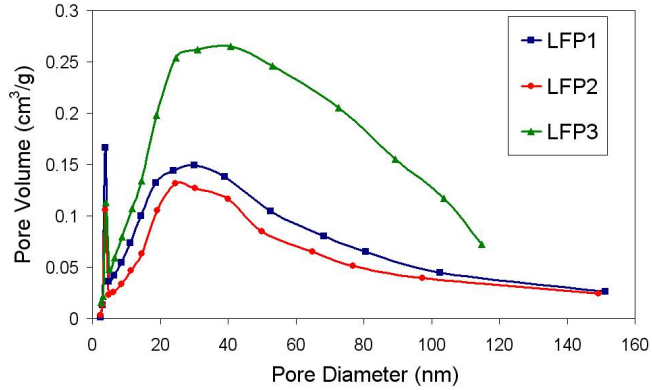



**Figure S6.** XRD analysis for $LiFePO_4$ optimised materials; LFP1, LFP2 and LFP3. The asterisk denotes trace amounts of iron phosphate impurities and the hash indicates presence of iron impurity. Peaks are indexed to triphylite [40-1499].




**(a)**




**(b)**

**Figure S7**. Nitrogen sorption analysis for optimised $LiFePO_4$ materials (a) adsorption (filled marker) and desorption (open marker) and (b) BJH pore size distribution taken from the desorption branch of the isotherm.