

Shape Matters: The Effect of Particle Morphology on the Fast-Charging Performance of LiFePO₄/C Nanoparticle Composite Electrodes

Julia Seher^{†‡} and Michael Fröba^{†}*

[†]Institut für Anorganische und Angewandte Chemie, Universität Hamburg, Martin-Luther-King-
Platz 6, 20146 Hamburg, Germany

[‡]Bundesanstalt für Materialforschung und -prüfung, Unter den Eichen 87, 12205 Berlin,
Germany

ASSOCIATED CONTENT

Supporting Information

Table S1. Initial weights and volumes for the LiFePO₄ nanoparticle syntheses.

#	<i>c/a</i>	<i>m</i> _{LiOH} (g)	<i>V</i> _{EG} (mL)	<i>m</i> _{FeSO₄} (g)	<i>V</i> _{EG} (mL)	<i>V</i> _{H₃PO₄} (μL)
1	6.9	3.6247	145.9	8.8891	145.9	2373
2	3.6	0.4167	20.4	1.1344	21.5	275
3	3.2	4.0016	190.5	10.56	193.0	2559
4	2.4	4.7857	189.5	10.64	191.0	2580
5	2.5	1.3870	60.4	3.3933	61.0	823

Table S2. Initial weights and volumes for the LiFePO₄/C core/shell nanoparticle syntheses.

#	<i>c/a</i>	<i>V</i> _{H₂O} (mL)	<i>V</i> _{EtOH} (mL)	<i>m</i> _{LFP} (mg)	<i>m</i> _{CTAB} (g)	<i>m</i> _R (g)	<i>V</i> _{NH₃} (μL)	<i>V</i> _F (μL)
1	6.9	1444	724	962.2	10.7870	0.4223	420	600
2	3.6	368	188	241.5	2.7064	0.1032	105	150
3	3.2	1451	725	965.1	10.9100	0.4257	420	600
4	2.4	1451	747	981.3	10.9400	0.4197	420	600
5	2.5	1450	730	967.4	10.8152	0.4214	420	600

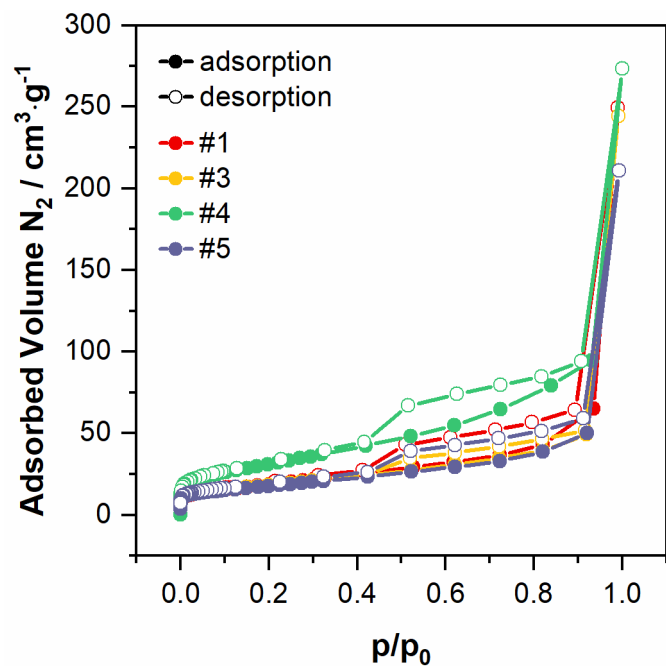


Figure S1. Nitrogen isotherms of LiFePO₄/C core/shell nanoparticles. The BET surface area are 70 m²·g⁻¹, 65 m²·g⁻¹, 113 m²·g⁻¹ and 63 m²·g⁻¹. There was not enough material of #2 for a proper measurement, nevertheless a similar shaped isotherm is expected.

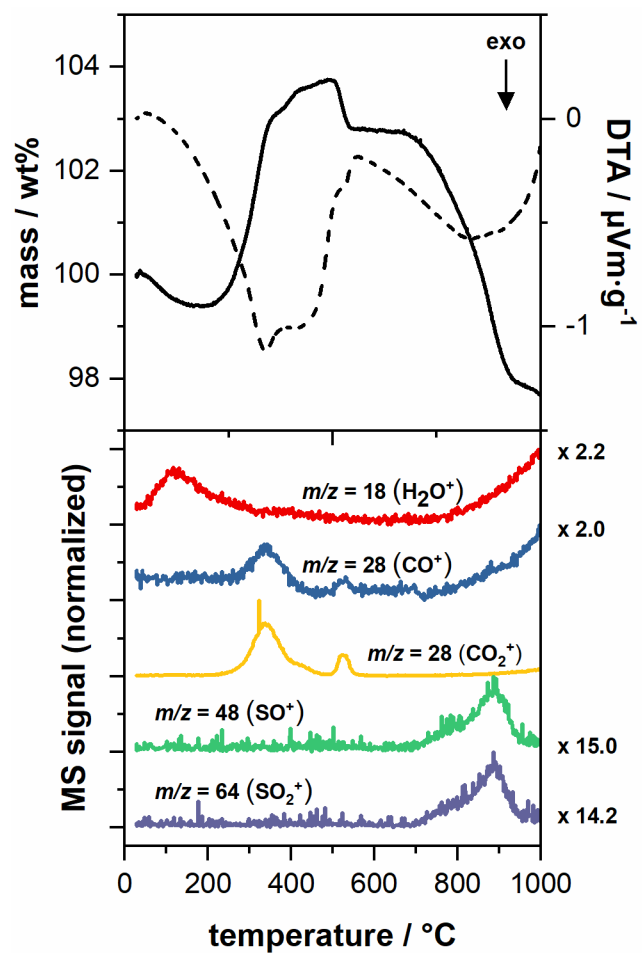


Figure S2. TG-DTA-MS analysis of LiFePO₄/C core/shell nanoparticles (Ar:O₂, 80:20, 5 K·min⁻¹).

1).

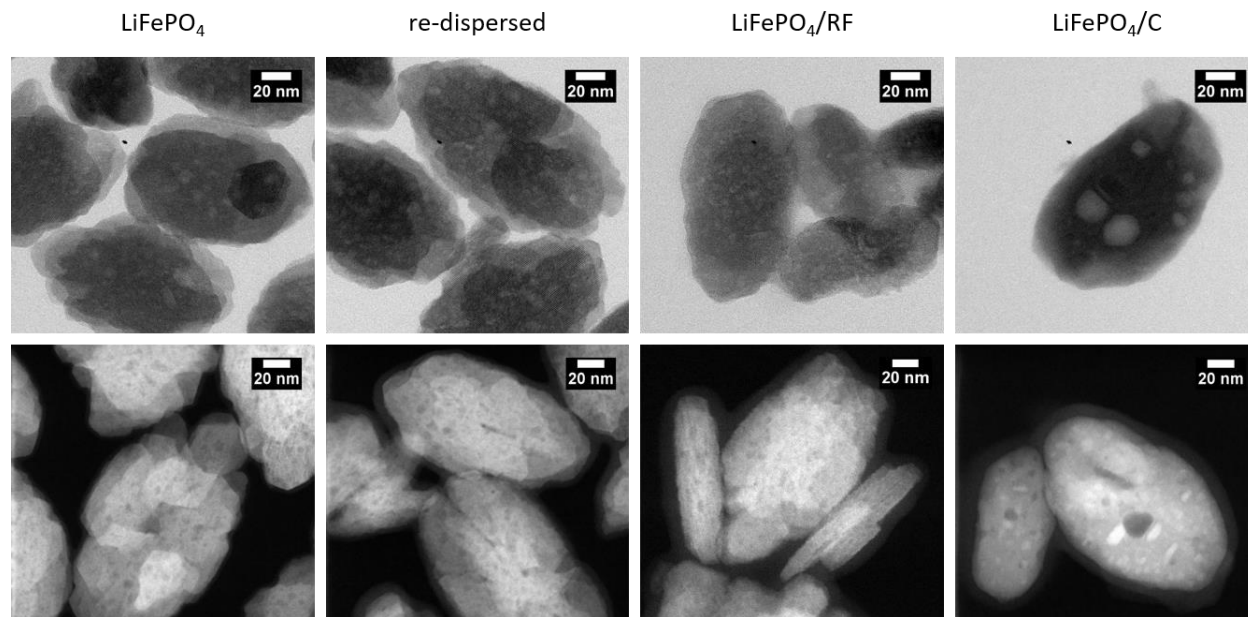


Figure S3. Growth of sulfur-rich domains in LiFePO_4 nanoparticles during the multistep synthesis (from left to right): TEM and STEM images of LiFePO_4 nanoparticles as synthesized and re-dispersed for polymer coating; $\text{LiFePO}_4/\text{RF}$ and LiFePO_4/C core/shell nanoparticles.

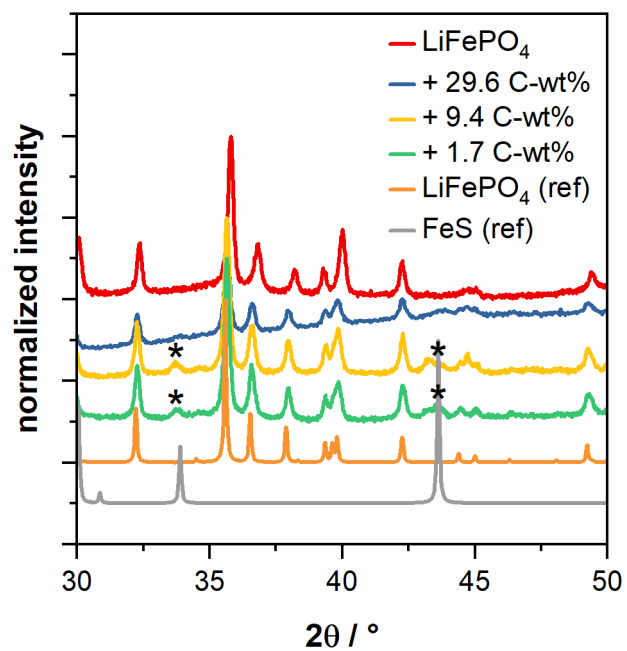


Figure S4. X-ray patterns of LiFePO₄ nanoparticles, corresponding LiFePO₄/C core/shell nanoparticles with different carbon content and reference patterns (LiFePO₄ COD 2100916, FeS COD 1011180).