Nitrogen-doped graphene guided formation of monodisperse microspheres of LiFePO$_4$ nanoplates as the positive electrode material of lithium-ion batteries

Yingke Zhou[a,*], Jiming Lu[a], Chengji Deng[a], Hongxi Zhu[a], George Z. Chen[a,b], Shaowei Zhang[a], Xiaohui Tian[a]

[a]The State Key Laboratory of Refractories and Metallurgy, College of Materials and Metallurgy, Wuhan University of Science and Technology, Wuhan 430081, P. R.

[b]Department of Chemical and Environmental Engineering, Faculty of Engineering, University of Nottingham, Nottingham NG7 2RD, UK.

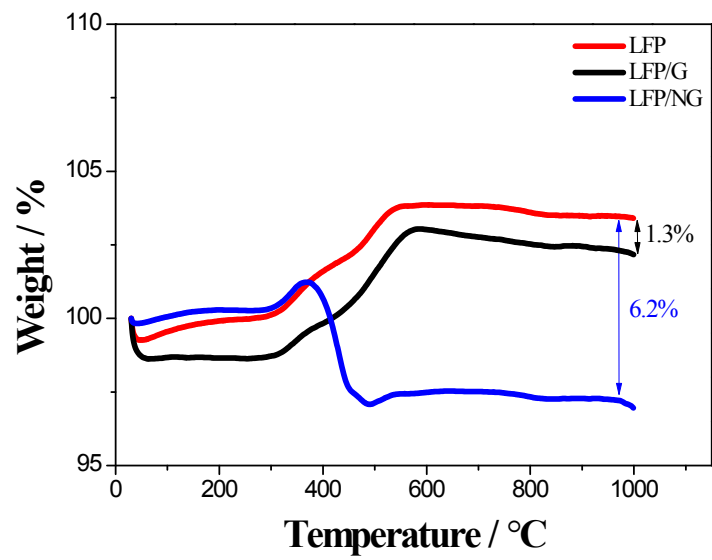* Corresponding author. Tel.: +86 2768 862928, Fax: +86 2768 862928. E-mail: zhouyk888@hotmail.com.

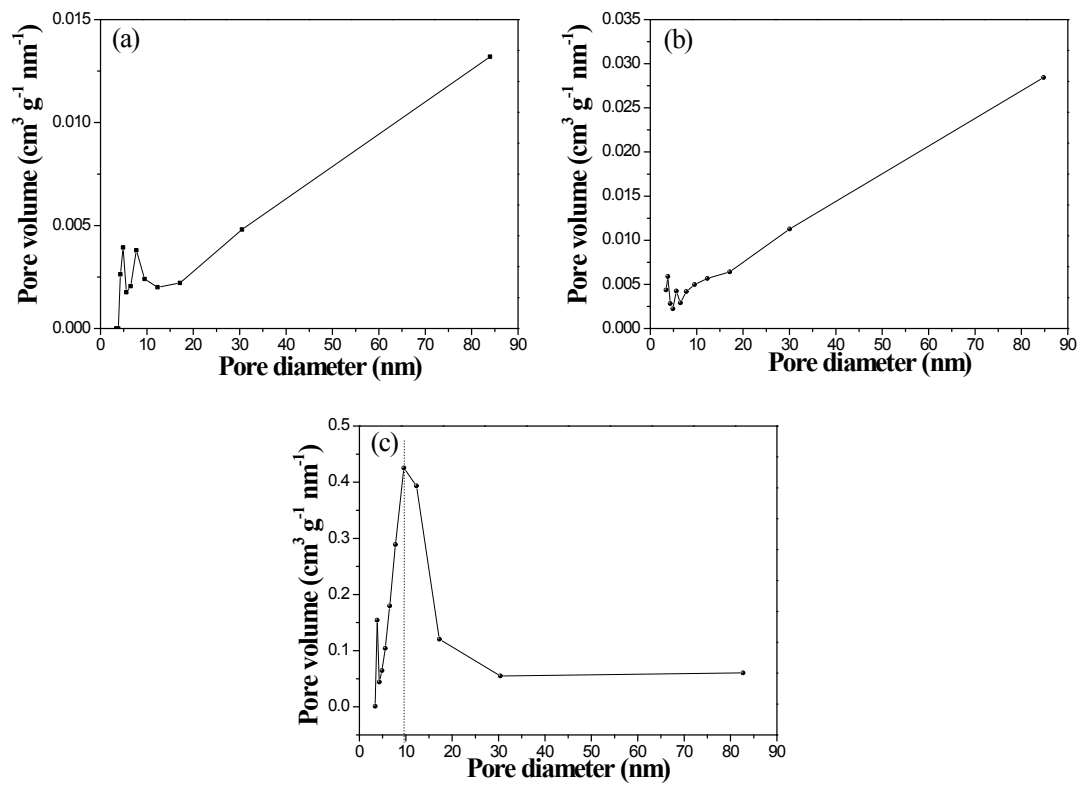**Fig. S1** TGA curves of LFP, LFP/G and LFP/NG.

Fig. S2 Pore-size distributions of (a) LFP, (b) LFP/G and (c) LFP/NG.

Table S1 Summary of the fitting results of LFP, LFP/G and LFP/NG from XPS.

Samples	C functional groups / (BE.eV)						N functional groups / (BE.eV)		
	C_1	C_2	C_3	C_4	C_5		N_1	N_2	N_3
	284.6	285.9	286.5	287.9	289		398.3	399.4	401.1
LFP	71.24	-	24.25	0.59	3.92		-	-	-
LFP/G	72.56	-	11.97	13.71	1.77		-	-	-
LFP/NG	66.34	12.38	10.27	4.53	6.47		27.26	36.12	36.62

Samples	O functional groups / (BE.eV)				Fe species / (BE.eV)			
	O_1	O_2	O_3	O_4	Fe_1	Fe_2	Fe_3	Fe_4
	530.9	531.5	532.6	533.8	709.9	713.5	723	727
LFP	56.89	32.96	7.49	2.66	60.13	10.41	24.11	5.35
LFP/G	65.27	21.1	7.58	6.05	48.06	20.44	22.05	9.44
LFP/NG	82.48	14.79	0	2.73	52.19	18.19	23.15	6.46

Notes. C_1: C-C; C_2: C-N; C_3: C-O; C_4: C=O; C_5: O-C=O. O_1: O-P; O_2: O-C; O_3: C=O; O_4: O-C=O.

N_1: Pyridinic N; N_2: Amino N; N_3: Graphitic N; Fe_1: Fe $2p_{3/2}$; Fe_2: Fe $2p_{3/2}$ satellite peak; Fe_3: Fe $2p_{1/2}$; Fe_4: Fe $2p_{1/2}$ satellite peak.

Table S2 Summary of the EIS fitted parameters, Li^+ diffusion coefficient and Warburg factor of the samples.

Samples	Fitted parameters				
	R_u / (Ω)	R_1 / (Ω)	R_2 / (Ω)	σ / (Ω $s^{-1/2}$)	D / (cm^2 s^{-1})
LFP	9.8	112.3	458.2	62.4	6.25×10^{-14}
LFP/G	7.9	42.8	239.5	25.5	3.75×10^{-13}
LFP/NG	6.6	6.7	91.2	24.8	3.99×10^{-13}