Supporting Information for

Kinetics of Nucleation and Growth in Two-Phase Electrochemical Reaction of Li_xFePO_4

Gosuke Oyama[1], Yuki Yamada[1], Ryu-ichi Natsui[2], Shin-ichi Nishimura[1], and Atsuo Yamada[1]*

[1]Department of Chemical System Engineering, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8656, Japan

[2]Department of Electronic Chemistry, Interdisciplinary Graduate School of Science and Engineering, Tokyo Institute of Technology, 4259 Nagatsuta, Midori-ku, Yokohama 226-8502, Japan

*E-mail: yamada@chemsys.t.u-tokyo.ac.jp

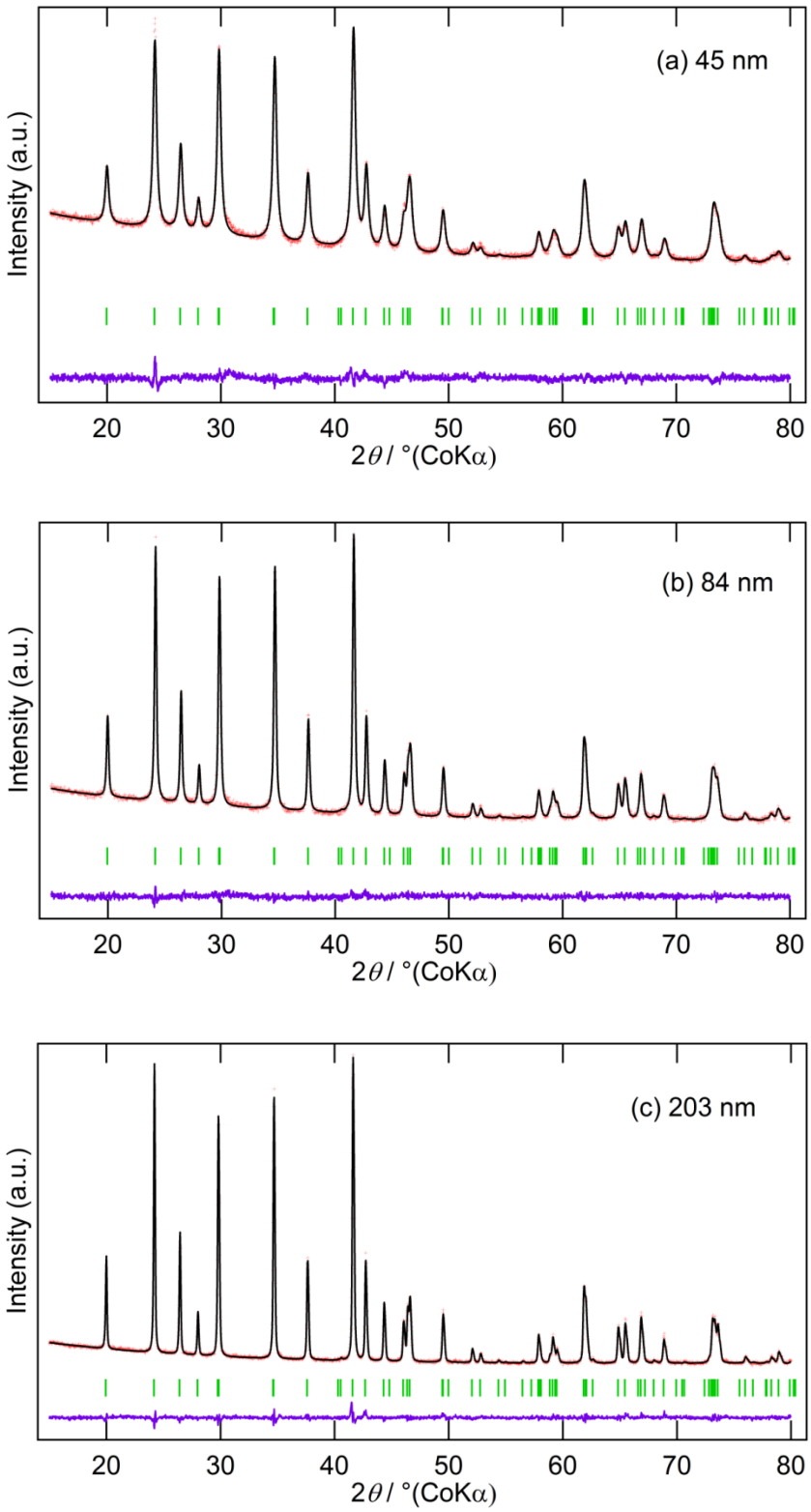


Fig. S1 Rietveld refinement patterns of the X-ray diffraction data for synthesized $LiFePO_4$ with different particle sizes: (a) 45 nm, (b) 84 nm, and (c) 203 nm.

Table S1 Refined structural parameters of synthesized $LiFePO_4$ with different particle sizes.

$LiFePO_4$ 44.5 (4) nm

Site	*x*	*y*	*z*	*g*	B_{eq}
Li	0	0	0	1	1
Fe	0.28219 (10)	0.25	0.9736 (3)	1	0.6
P	0.0963 (2)	0.25	0.4159 (5)	1	0.6
O1	0.0965 (4)	0.25	0.7450 (8)	1	1
O2	0.4513 (6)	0.25	0.2093 (5)	1	1
O3	0.1660 (3)	0.0424 (5)	0.2795 (5)	1	1

a = 10.3247 (5), *b* = 6.0012 (3), *c* = 4.696 (3)

R_{exp} = 1.19, R_{wp} = 1.44, R_p = 1.14, $S = R_{wp} / R_{exp}$ =1.20

$LiFePO_4$ 84.3 (8) nm

Site	*x*	*y*	*z*	*g*	B_{eq}
Li	0	0	0	1	1
Fe	0.28219 (10)	0.25	0.9736 (3)	1	0.6
P	0.0963 (2)	0.25	0.4159 (5)	1	0.6
O1	0.0965 (4)	0.25	0.7450 (8)	1	1
O2	0.4513 (6)	0.25	0.2093 (5)	1	1
O3	0.1660 (3)	0.0424 (5)	0.2795 (5)	1	1

a = 10.3234 (2), *b* = 6.00397 (12), *c* = 4.69389 (12)

R_{exp} = 1.16, R_{wp} = 1.40, R_p = 1.12, $S = R_{wp} / R_{exp}$ =1.21

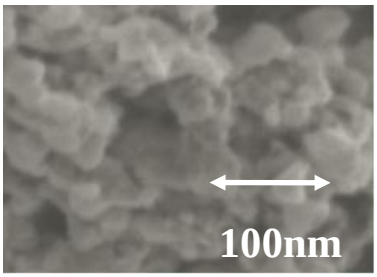
$LiFePO_4$ 203 (4) nm

Site	*x*	*y*	*z*	*g*	B_{eq}
Li	0	0	0	1	1
Fe	0.28220 (11)	0.25	0.9748 (4)	1	0.6
P	0.0951 (2)	0.25	0.4171 (6)	1	0.6
O1	0.0991 (6)	0.25	0.74650 (12)	1	1
O2	0.4551 (7)	0.25	0.2072 (9)	1	1
O3	0.1672 (7)	0.0444 (9)	0.2830 (7)	1	1

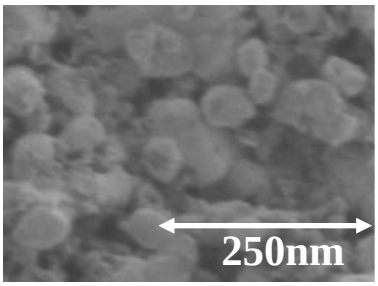
a = 10.3254 (3), *b* = 6.00706 (14), *c* = 4.69307 (13)

R_{exp} = 1.31, R_{wp} = 1.82, R_p = 1.40, $S = R_{wp} / R_{exp}$ =1.39

(a) 45 nm



(b) 84 nm



(c) 203 nm

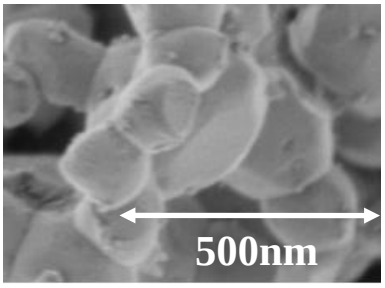


Fig. S2 SEM images of synthesized $LiFePO_4$ with different particle sizes: (a) 45 nm, (b) 84 nm, and (c) 203 nm.

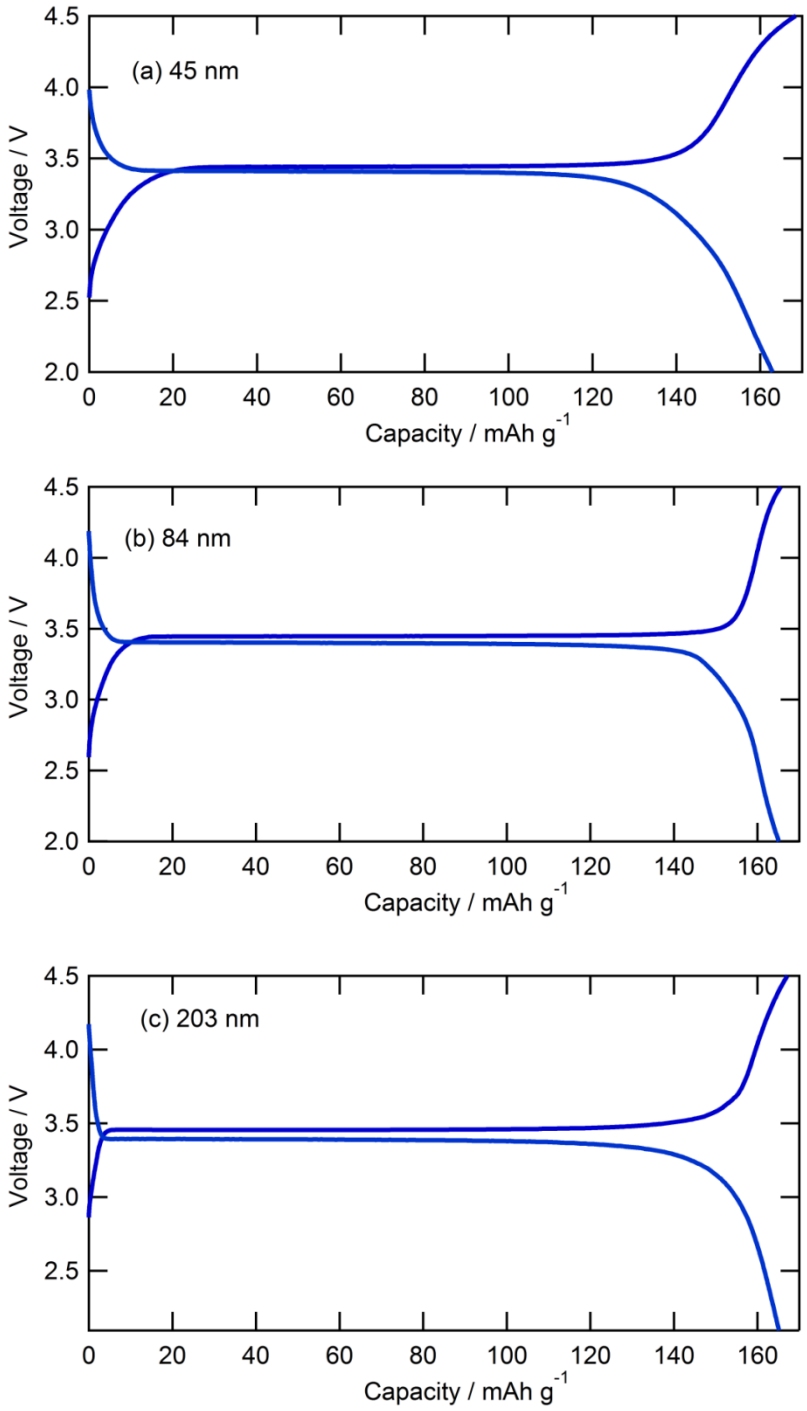


Fig. S3 Charge-discharge curves of synthesized $LiFePO_4$ with different particle sizes: (a) 45 nm, (b) 84 nm, and (c) 203 nm. The current was set at C/20 rate.

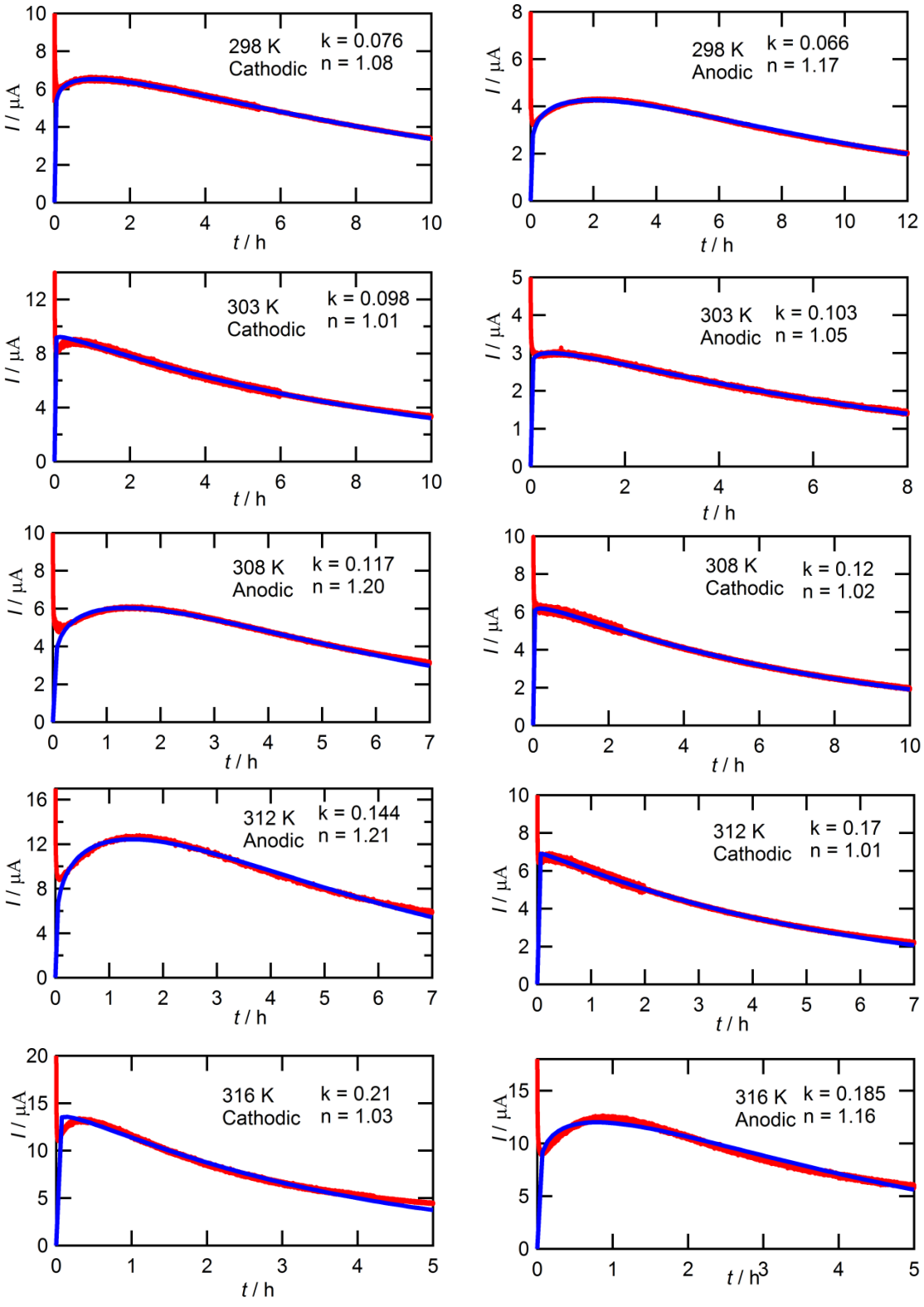


Fig. S4 Chronoamperograms obtained for 203 nm $LiFePO_4$ composite electrode (thickness: 1 µm) under 10 mV anodic and cathodic steps (cathodic: from 3.41 V to 3.40 V, anodic: from 3.45 V to 3.46 V). The lines in red and blue denote experimental curve and fitting result with KJMA equation, respectively.