Electronic Supplementary Material (ESI) for CrystEngComm

The fabrication of oriented ZnO porous nanoplates on the silver foil with tunable hydrophobicity

Yunlong Zhang, Heng Yang, Guan Zhang, Jingcheng Cui and Jinhua Zhan*

Key Laboratory of Colloid and Interface Chemistry, Ministry of Education, Department of Chemistry, Shandong University, Jinan, 250100, Shandong (P. R. China)

* Corresponding author: E-mail: jhzhan@sdu.edu.cn

Fax: +86-0531-8836-6280

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Supporting Information

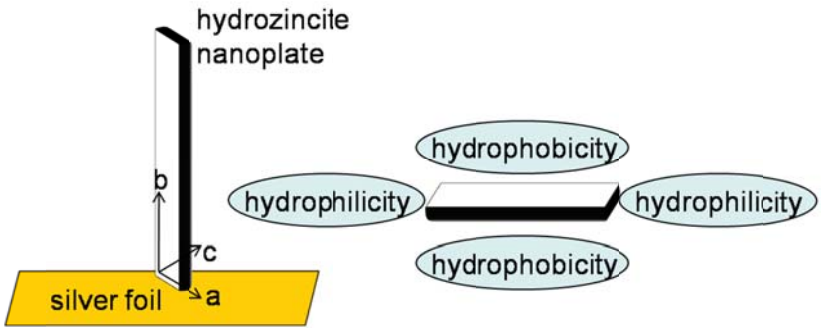

Figure S-1 nucleation and the grow model of hydrozincite on the silver foil

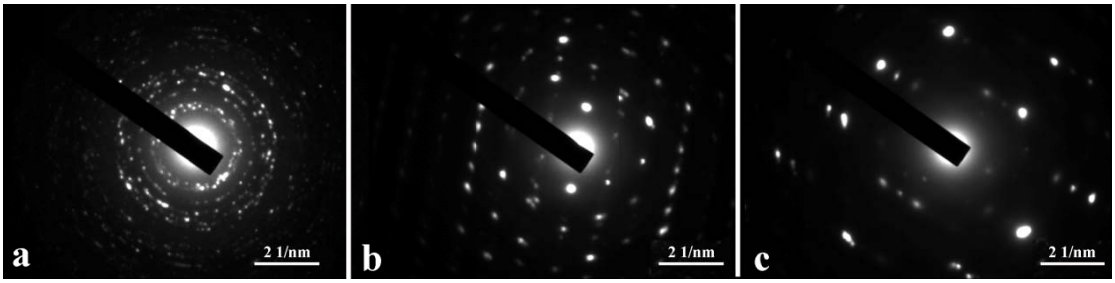

Figure S-2 the Selected area electron diffraction (SAED) patterns of ZnO nanoplates after annealing at different temperature (a) 300 ℃ (b) 400 ℃ (5) 500 ℃

Table 1 the contact angle for ZnO nanoplates modified with different fatty acids. (a) acetic acid, (b) butyric acid, (c) α-hexanoic acid, (d) caprylic acid, (e) decanoic acid, (f) lauric acid, (g) myristic acid, and (h) stearic acid

Fatty acids / Soaking time	a	b	c	d	e	f	g	h
0h	21°	21°	21°	21°	21°	21°	21°	21°
2h	12°	20°	97°	120°	138°	134°	137°	140°
4h	17°	29°	117°	128°	140°	136°	141°	144°
6h	31°	34°	125°	133°	142°	137°	144°	146°
8h	30°	20°	115°	130°	144°	144°	146°	149°
10h	28°	18°	110°	125°	140°	149°	148°	150°
12h	12°	14°	106°	118°	127°	131°	152°	155°

As shown in the table 1, the contact angle changed with the soaking time in the different fatty acids solution. The equilibrium time of acetic acid and butyric acid was about 6 hours, and the contact angle was 31 ° and 34 °. With the increased time, the contact angle decreased, for the ZnO surface was attacked with the strong acidity. With the carbon-chain of fatty acids longer, the acidity of fatty acids becomes weaker. The equilibrium time of butyric acid, α-hexanoic acid, caprylic acid, decanoic acid, lauric acid was 6 h, 6 h, 8 h, 10 h respectively. When the soaking time of samples was over the equilibrium time, the contact angle decreased. It might be due to the formation of multilayer of fatty acids on the surface. When the carbon chain increased, the equilibrium time was about 12 h, and the contact angles were 152 ° and 155°respectively. With the soaking time, the fatty acids might form monolayer on the sample surface.

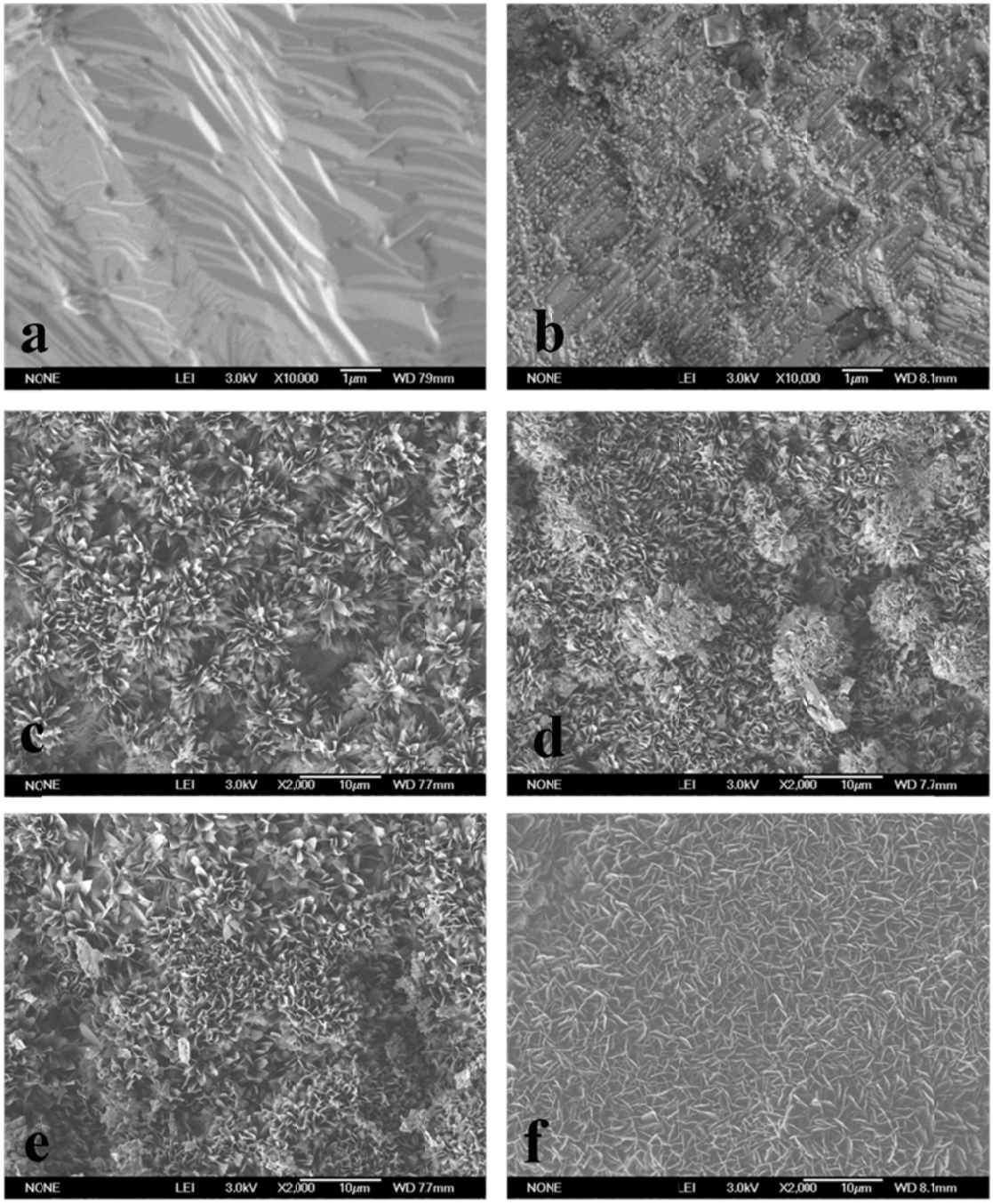

Figure S-3 SEM images of hydrozincite on the silver foil (a) 0 h, (b) 1h, (c) 2h, (d)3h, (e) 4 h, and (f) 6 h

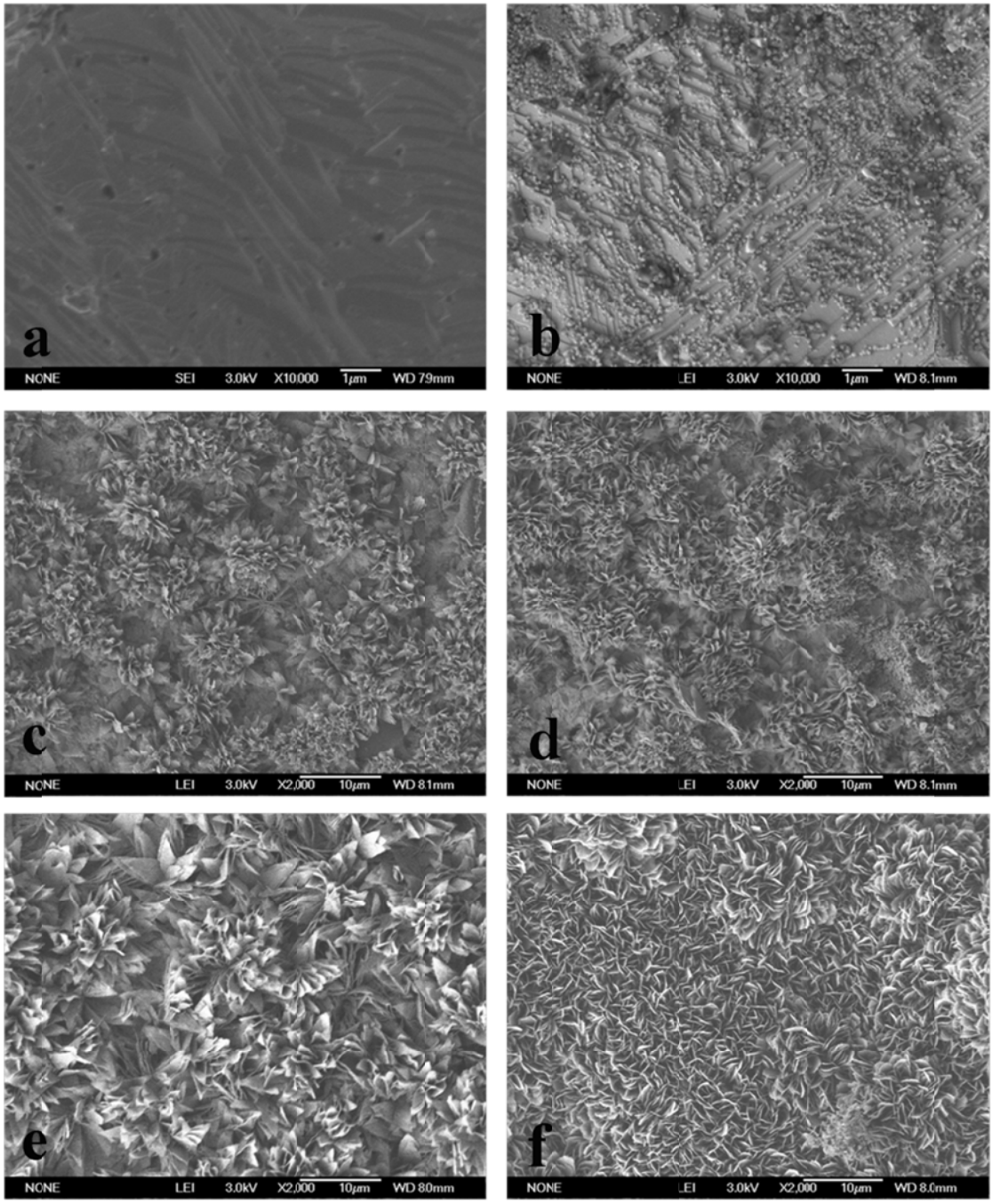

Figure S-4 SEM images of ZnO on the silver foil (a) 0 **h**, (b) 1 h, (c) 2 h, (d 3h, (e) 4 h, and (f) 6 h.

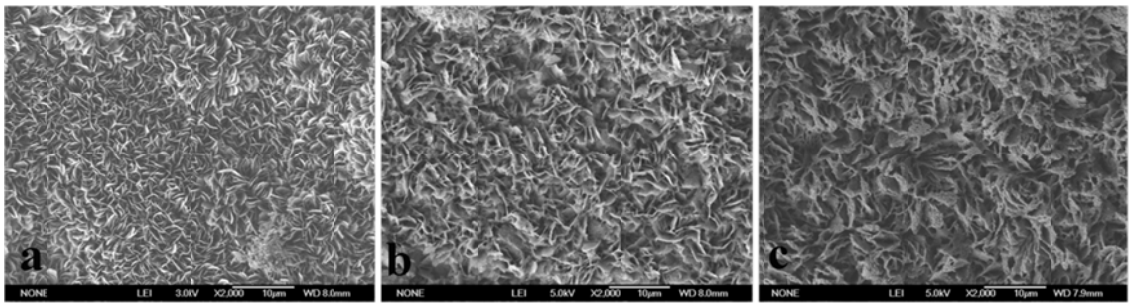

Figure S-5 SEM images of ZnO on the silver foil (a) 6 h, (b) after soaking in the stearic aids for 12 h. (c) after the UV irradiation of ZnO nanoplates with stearic acids for 6 h.

Table 2 the contact angle of samples with UV illumination

	Bare sliver	ZnO	ZnO with steatic acids
No UV illumination	64°	21°	155°
UV illumination for 6 h	64°	21°	21°

As shown the table, the contact angles of the samples changed with the increasing light illumination time. After light illumination for 6 h, the contact angle of bare silver foil was 64°, which was consistent with that of the sliver foil without light illumination. The contact angle of bare ZnO surface was 21° . It was also similar to that of the stearic-acid-covered samples after UV irradiation for 6h. Comparing the results, it was indicated that the silver and ZnO materials had no effect on the change of contact angle after the light illumination, though they were the unique photo-responses.

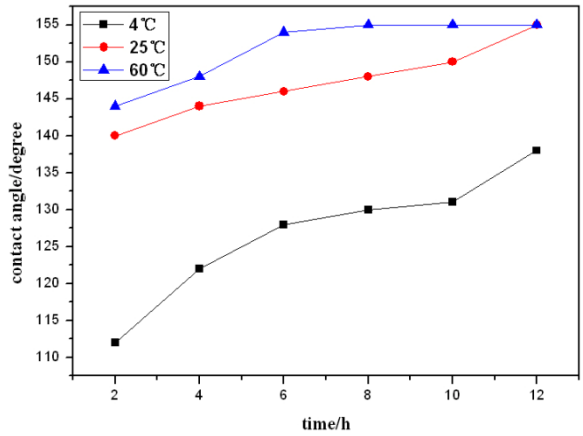

Figure S-6 The equilibrium curve of contact angles for ZnO nanoplates with different soaking time at different temperature in stearic acid. The growth time of ZnO nanoplates is 6 h.

The assemble temperature of the samples in the stearic acids was shown in the figure S-6, when it was 60℃, the equilibrium time was 6h, and 12h was necessary when it was air temperature (25℃). But when the temperature was 4℃, the equilibrium time was far above 12h. At the different temperatures, the fatty acids molecules showed different dynamic character. When the temperature was low, the diffusion of fatty acids molecules in the solution occurred at a more slowly rate than the high temperature. The air temperature was chosen, taking into account the green chemistry.