

Supporting information

Gemini surfactant with pyrrolidinium head groups and hydroxyl-substituted spacer: surface property and assisted one-pot synthesis of dendritic Au nanocrystals

Saisai Yan,^{ab} Wanying Wei,^{ab} Zhinong Gao,^{*ab} Yan Xia^{ab} and Jia Han^{ab}

^a College of Chemistry and Molecular Sciences, Wuhan University, Wuhan 430072, Hubei, P.R. China.

^b Key Laboratory of Biomedical Polymers, Ministry of Education of China, Wuhan 430072, Hubei, P.R. China.

*Corresponding author: Zhinong Gao

E-mail: gzn@whu.edu.cn

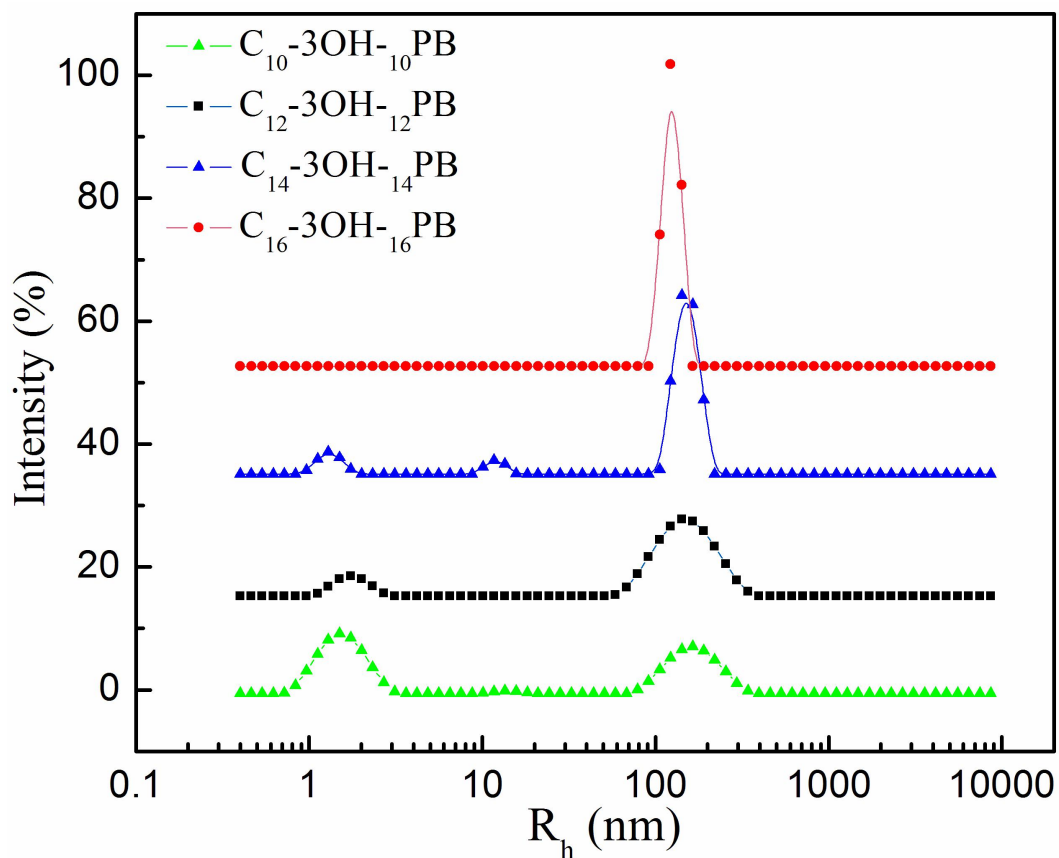


Figure S1. Size distribution of C_n -3OH- n PB ($n=10, 12, 14$ and 16) at 10 CMC.

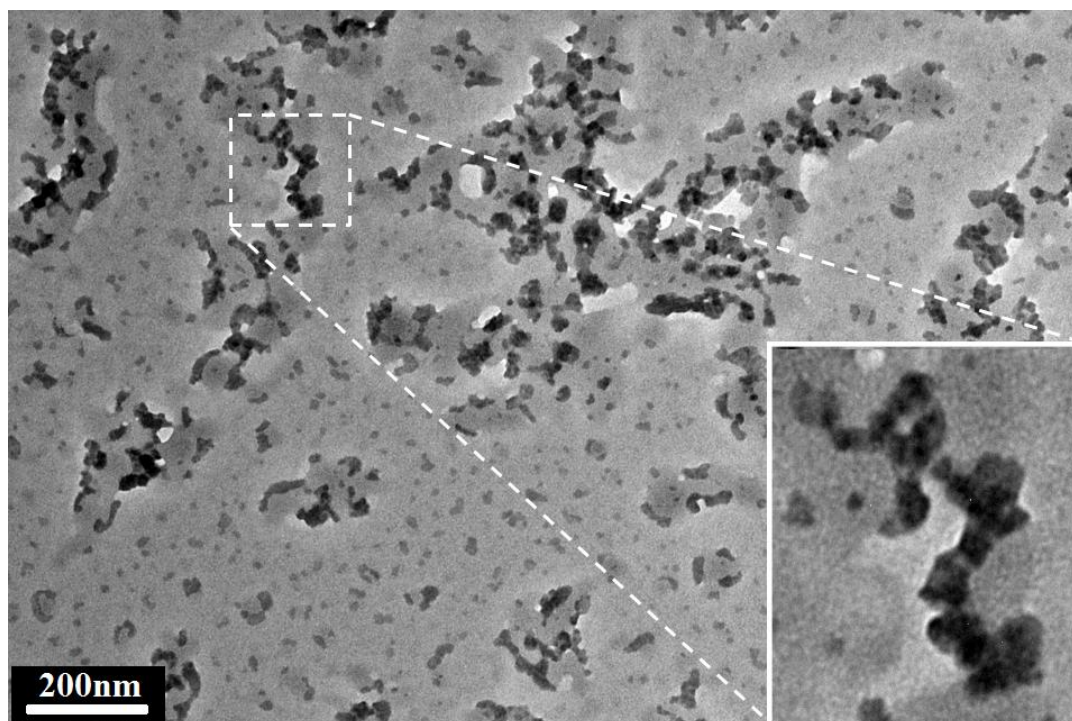


Figure S2. Morphology of aggregations formed by C_{16} -3OH- 16 PB at 50 CMC.

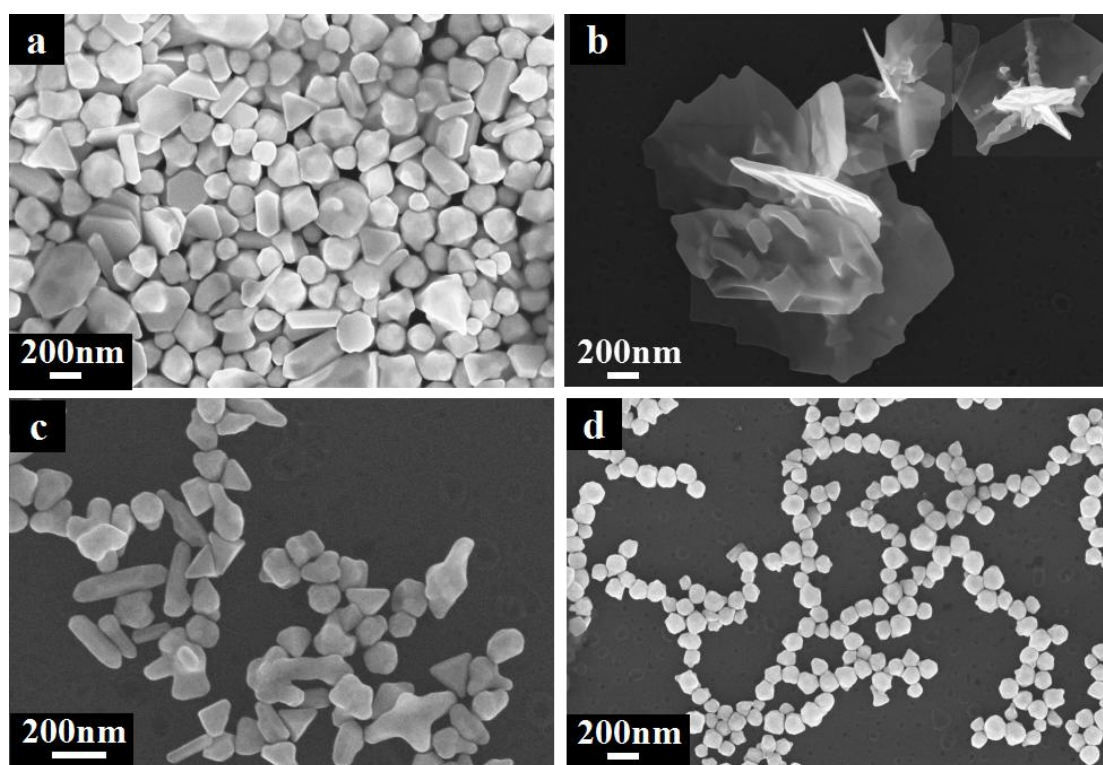


Figure S3. SEM images of Au nanostructures obtained under different concentration of C₁₄-3OH-14PB: (a) 0.01 M, (b) 0.005 M, (c) 0.001 M, (d) 0.0005 M.

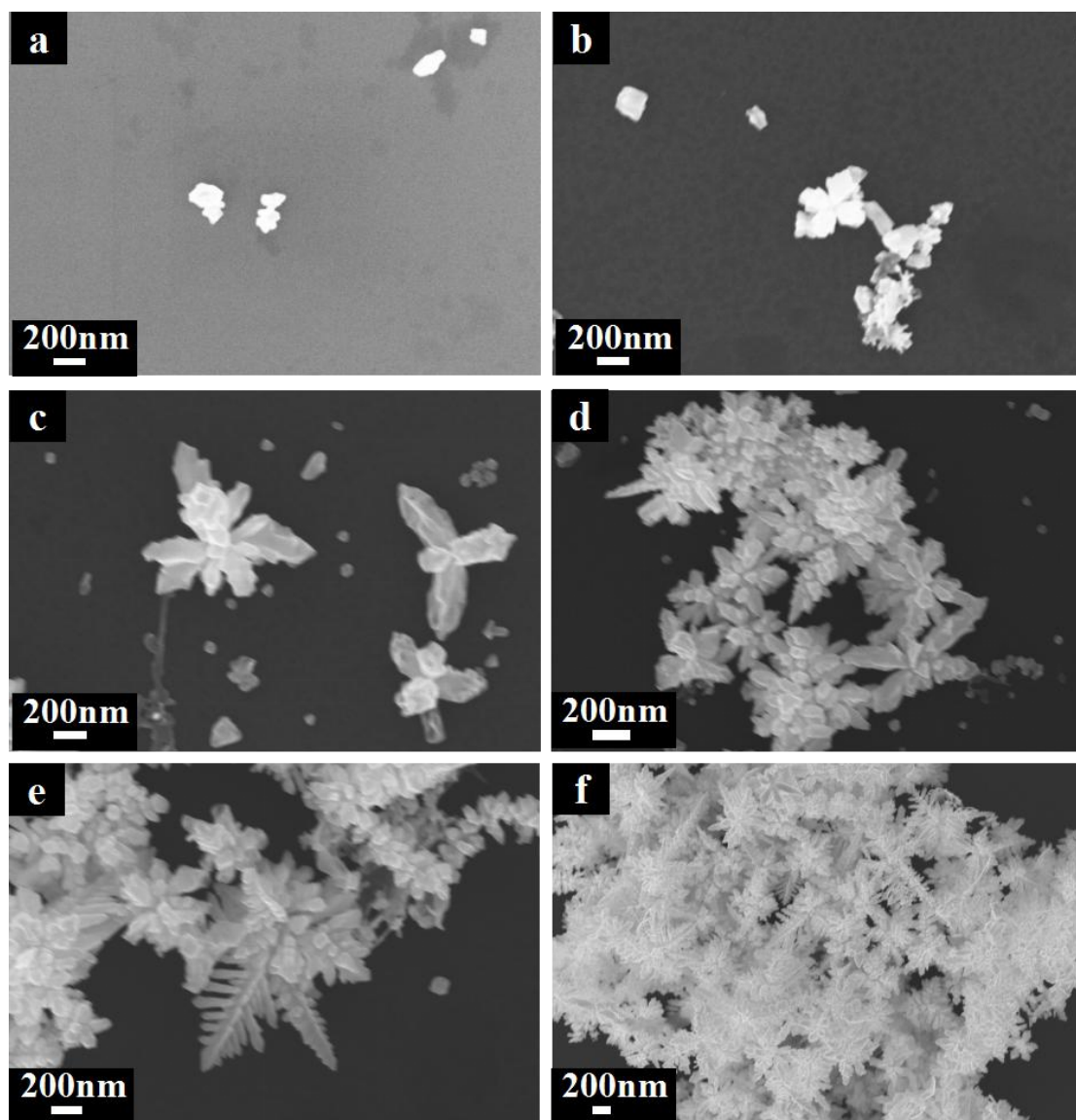


Figure S4. SEM images of Au nanostructures prepared from the standard procedure by adjusting the reaction time: (a) 2 min, (b) 30 min, (c) 2 h, (d) 3 h, (e) 4 h, (f) 18 h.

Table S1. Surface properties of C_n -3OH- n PB ($n=10, 12, 14$ and 16) determined from surface tension, conductivity and steady-state fluorescence measurements

Gemini surfactant	CMC ^a (mM)	CMC ^b (mM)	CMC ^c (mM)	C_{20} (M)	γ_{CMC}
C_{10} -3OH- $_{10}$ PB	2.450	3.27	2.10	0.56	34.16
C_{12} -3OH- $_{12}$ PB	0.513	0.53	0.56	0.098	34.25
C_{14} -3OH- $_{14}$ PB	0.081	0.081	0.088	0.022	35.19
C_{16} -3OH- $_{16}$ PB	0.010	0.018	0.010	0.0035	40.37

^a Surface tension measurements. ^b Electrical conductivity measurements. ^c Steady-state fluorescence measurements.

Table S2. The detailed experimental data and processing parameters in the experiments of different length of hydrocarbon chain.

Gemini surfactants	V^a (mL)	HAuCl ₄ ^b (mL)	AA ^c (mL)	Time (h)	Temperature (°C)
C ₁₀ -3OH-10PB	4.0	0.2	0.4	18	25.0
C ₁₂ -3OH-12PB	4.0	0.2	0.4	18	25.0
C ₁₄ -3OH-14PB	4.0	0.2	0.4	18	25.0
C ₁₆ -3OH-16PB	4.0	0.2	0.4	18	25.0

^a The concentration of gemini surfactants used in this system was 0.02 M.

^b The concentration of HAuCl₄ used in this system was 1.0 wt %.

^c The concentration of AA used in this system was 0.1 M.

Table S3. The detailed experimental data and processing parameters in the experiments of different concentration of C₁₆-3OH-16PB.

C^a (M)	V^b (mL)	HAuCl ₄ ^c (mL)	AA ^d (mL)	Time (h)	Temperature (°C)
0.0001	4.0	0.2	0.4	18	25.0
0.0005	4.0	0.2	0.4	18	25.0
0.0001	4.0	0.2	0.4	18	25.0
0.01	4.0	0.2	0.4	18	25.0

^a The different concentration of C₁₆-3OH-16PB.

^b The volume of C₁₆-3OH-16PB used in this system.

^c The concentration of HAuCl₄ used in this system was 1.0 wt %.

^d The concentration of AA used in this system was 0.1 M.

Table S4. The detailed experimental data and processing parameters in the experiments of different concentration of AA.

C ₁₆ -3OH-16PB ^a (mL)	HAuCl ₄ ^b (mL)	C ^c (M)	V^d (mL)	Time (h)	Temperature (°C)
4.0	0.2	0.2	4.0	18	25.0

4.0	0.2	0.4	4.0	18	25.0
4.0	0.2	0.8	4.0	18	25.0
4.0	0.2	1.6	4.0	18	25.0

^a The concentration of C₁₆-3OH-₁₆PB used in this system was 0.001 M.

^b The concentration of H₂AuCl₄ used in this system was 1.0 wt %.

^c The different concentration of AA.

^d The volume of AA used in this system.

Table S5. The detailed experimental data and processing parameters in the experiments of different concentration of H₂AuCl₄.

C ₁₆ -3OH- ₁₆ PB ^a (mL)	AA ^b (mL)	V ^c (mL)	Temperature (°C)	Time (h)
4.0	0.4	0.1	25.0	18
4.0	0.4	0.2	25.0	18
4.0	0.4	0.5	25.0	18
4.0	0.4	1.0	25.0	18

^a The concentration of C₁₆-3OH-₁₆PB used in this system was 0.001 M.

^b The concentration of AA used in this system was 0.4 M.

^c The volume of H₂AuCl₄ used in this system with the same concentration (1.0 wt %).

Table S6. The detailed experimental data and processing parameters in the experiments of different concentration of AA.

C ₁₆ -3OH- ₁₆ PB ^a (mL)	H ₂ AuCl ₄ ^b (mL)	AA ^c (mL)	Temperature (°C)	Time
4.0	0.2	0.4	25.0	2 min
4.0	0.2	0.4	25.0	30 min
4.0	0.2	0.4	25.0	2 h
4.0	0.2	0.4	25.0	3 h
4.0	0.2	0.4	25.0	4 h
4.0	0.2	0.4	25.0	18 h

^a The concentration of C₁₆-3OH-₁₆PB used in this system was 0.001 M.

^b The concentration of H₂AuCl₄ used in this system was 1.0 wt %.

^c The concentration of AA used in this system was 0.4 M.