## Large-Scale, Low-Cost Synthesis of Monodispersed Gold Nanorods by Using A Gemini Surfactant

Yong Xu,§ Yang Zhao,§ Lei Chen, Xuchun Wang, Jianxia Sun, Haihua Wu, Feng Bao,

Jian Fan, Qiao Zhang\*

Jiangsu Key Laboratory for Carbon-Based Functional Materials & Devices, Institute of Functional Nano and Soft Materials (FUNSOM) and Collaborative Innovation Center of Suzhou Nano Science and Technology, Soochow University, Suzhou 215123, P. R. China

Corresponding author: qiaozhang@suda.edu.cn

P16-8-16	AgNO <sub>3</sub>	HAuCl <sub>4</sub>	HC1	AA	Seed	Figure number
(mM)	(mM)	(mM)	(mM)	(mM)	(mL)	
12	0.15	0.25	10	0.32	0.1	3a, 4a (green line)
12	0.15	0.25	10	0.32	0.16	4a (magenta line)
12	0.3	0.25	6	0.32	0.1	3b, 4a (navy line)
12	0.3	0.25	10	0.32	0.1	3c, 4a (blue line)
12	0.5	0.25	10	0.32	0.1	3d, 4a (black line)
12	0.5	0.25	10	0.64	0.1	4a (red line)

**Table S1.** Growth conditions for AuNRs synthesis using P16-8-16



**Figure S1**. Digital images showing the preparation process of AuNRs: (a) fresh P16-8-16 aqueous solution; (b) growth solution after the addition of AgNO<sub>3</sub> and HAuCl<sub>4</sub>; (c) growth solution after pre-reduction, and (d) the obtained AuNRs solution.



Figure S2 TEM image (a) and UV-vis spectrum (b) of the obtained spherical nanoparticles in the absence of silver ions. Reaction condition: [P16-8-16] = 12 mM,  $[HAuCl_4] = 0.25 \text{ mM}$ , [ascorbic acid] = 0.32 mM, [HCl] = 10 mM, and the volume of seed is 0.1mL.



Figure S3 TEM image (a) and UV-vis spectrum (b) of the obtained spherical nanoparticles in the absence of P16-8-16. Reaction condition:  $[AgNO_3] = 0.3mM$ ,  $[HAuCl_4] = 0.25 mM$ , [ascorbic acid] = 0.32 mM, [HCl] = 10 mM, and the volume of seed is 0.04mL.



**Figure S4** HRTEM image (a) and SAED pattern (b) of the obtained gold quadrupeds in the presence of P16-8-16. Reaction condition: [P16-8-16] = 24 mM,  $[AgNO_3] = 0.3 \text{mM}$ ,  $[HAuCl_4] = 0.25 \text{ mM}$ , [ascorbic acid] = 0.32 mM, [HCl] = 10 mM, and the volume of seed is 0.04mL.



**Figure S5** The original NMR spectra of the Gemini surfactant before (a) and after (b) reacting with Au<sup>3+</sup>. CDCl<sub>3</sub>is used as the solvent.