

Supporting Information

Fluorescent Silicon Nanoparticles Inhibit the Amyloid Fibrillation of Insulin

Yingying Ma,^a Renliang Huang,^{*,b} Wei Qi,^{*, a, c} Rongxin Su^{a c} and Zhimin He^a

^a State Key Laboratory of Chemical Engineering, School of Chemical Engineering and Technology, Tianjin University, Tianjin 300072, P. R. China

^b Tianjin Key Laboratory of Indoor Air Environmental Quality Control, School of Environmental Science and Engineering, Tianjin University, Tianjin 300072, P. R. China

^c Collaborative Innovation Center of Chemical Science and Engineering (Tianjin), Tianjin Key Laboratory of Membrane Science and Desalination Technology, Tianjin University, Tianjin 300072, P. R. China

* Author to whom any correspondence should be addressed

E-mail: tjuhrl@tju.edu.cn (R. H.), qiwei@tju.edu.cn (W. Q.)

Supplementary Figures

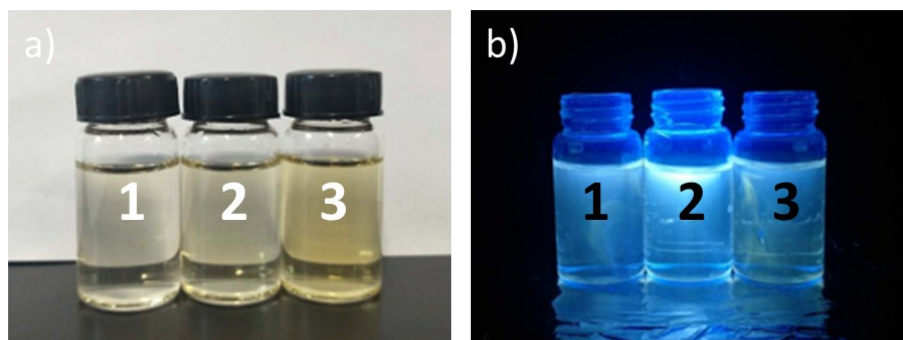


Fig. S1 Images of SiNPs with a concentration of 10 mg/mL under ambient light (a) and 365 nm UV irradiation (b).

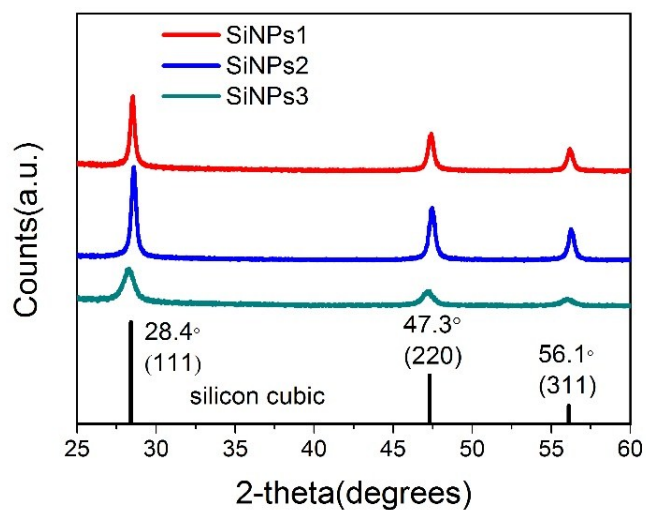


Fig. S2 XRD patterns of the SiNPs

(The standard diffraction lines of silicon cubic are also shown for comparison)

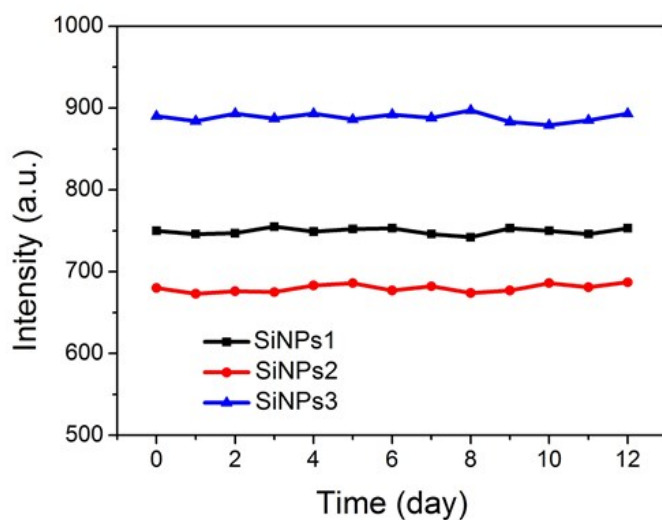


Fig. S3 The change in fluorescence intensity of SiNPs incubated in 20% acetic acid solution

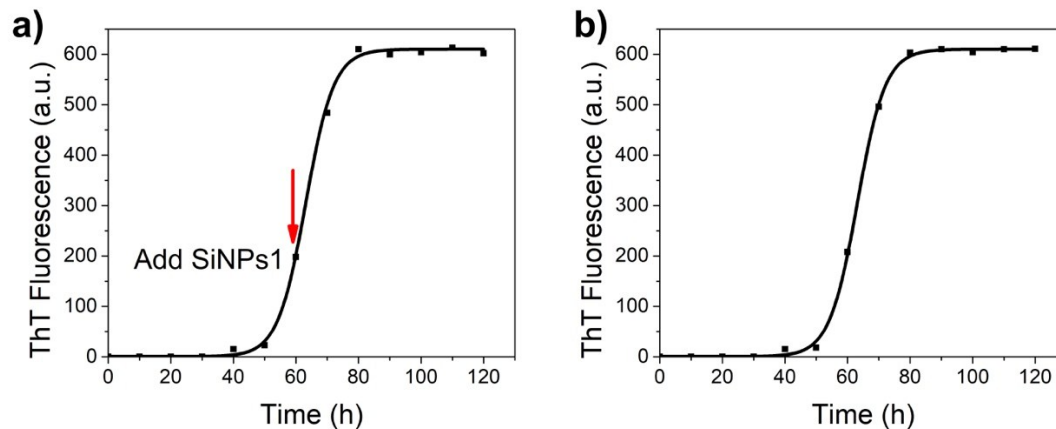


Fig. S4 ThT fluorescence intensity for insulin aggregation upon addition of 5.0 µg/mL SiNPs (a) and in the absence of SiNPs.

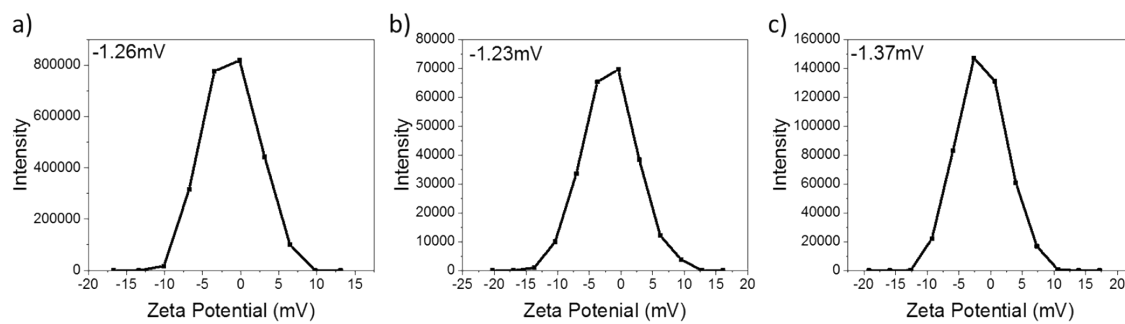


Fig. S5 Zeta potential values for SiNPs1 (a), 2 (b), and 3 (c) in 20% (v/v) acetic acid solution.

Supplementary Tables

Table S1 Effects of SiNPs on the kinetic parameters of insulin fibrillation in 20% (v/v) acetic acid solution. The concentration of insulin of insulin was 2 mg/mL. The fluorescence intensity of insulin alone was set as a reference value.

	Fibril Formation			
	Lag time (h)	Growth rate	Intensity	Amyloidogenic
Insulin	53.3	32.7	619	1
Insulin + SiNPs1				
0.5 µg/mL	64.3	11.7	188	0.30
1.0 µg/mL	67.3	9.5	156	0.25
2.5 µg/mL	69.7	5.8	89	0.14
5.0 µg/mL	76.8	5.5	67	0.11
Insulin + SiNPs2				
0.5 µg/mL	63.8	16.4	266	0.43
1.0 µg/mL	67.3	15.0	207	0.33
2.5 µg/mL	67.6	8.5	128	0.21
5.0 µg/mL	68.5	5.8	92	0.15
Insulin + SiNPs3				
0.5 µg/mL	54.9	23.6	386	0.62
1.0 µg/mL	56.1	13.5	239	0.39
2.5 µg/mL	59.9	11.5	155	0.25
5.0 µg/mL	65.3	8.5	123	0.20

Table S2 Secondary structures contents of insulin in 20% acetic acid solution.

	Secondary Structures		
	α -helix	β -sheet	unordered
Insulin	0.127	0.581	0.292
Insulin + SiNPs1			
0.5 μ g/mL	0.305	0.287	0.408
1.0 μ g/mL	0.343	0.250	0.407
2.5 μ g/mL	0.369	0.204	0.427
5.0 μ g/mL	0.414	0.150	0.436
Insulin + SiNPs2			
0.5 μ g/mL	0.273	0.338	0.389
1.0 μ g/mL	0.292	0.302	0.406
2.5 μ g/mL	0.347	0.244	0.409
5.0 μ g/mL	0.367	0.213	0.420
Insulin + SiNPs3			
0.5 μ g/mL	0.252	0.405	0.343
1.0 μ g/mL	0.277	0.316	0.407
2.5 μ g/mL	0.333	0.254	0.413
5.0 μ g/mL	0.349	0.239	0.412