Electronic Supplementary Material (ESI) for Nanoscale

Photoluminescence of Silicon Quantum Dots in Nanospheres

(Supporting Information)

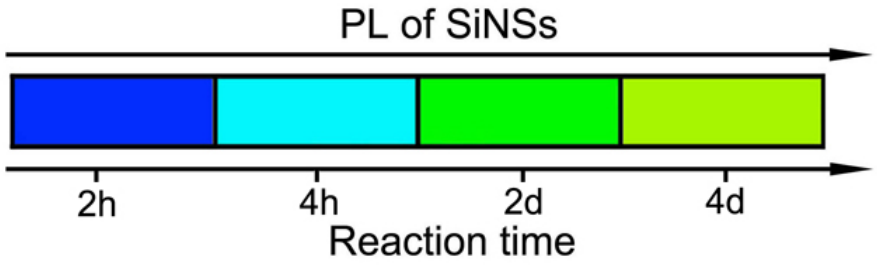

Fig. S1 The relationship between tunable PL emission of SiNSs and the reaction time.

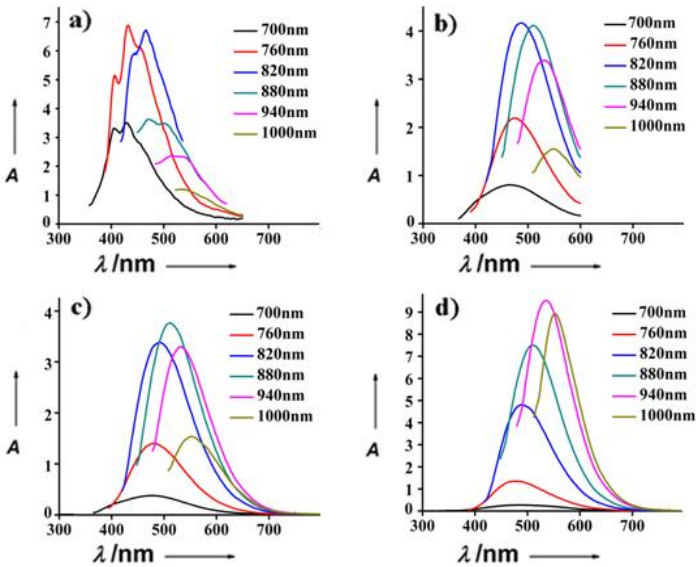

Fig. S2 Up converted PL of SiNSs prepared with different reaction time: a) 2 h, b) 4 h, c) 2 d and d) 4 d.

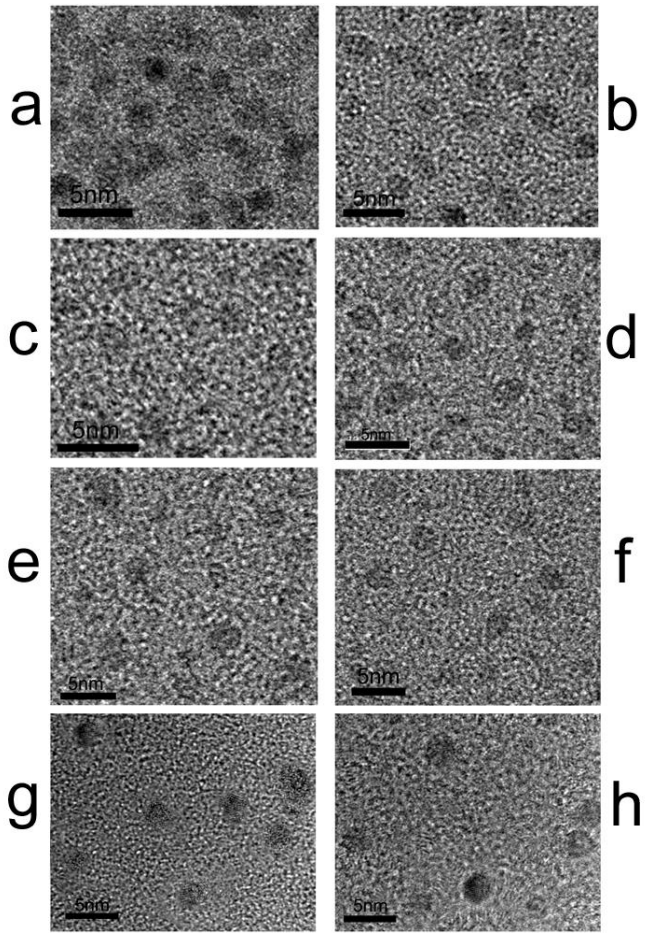

Fig. S3 TEM images of SiNSs with different Si dots average spacing: a to h for spacing about 1.6, 2.5, 3.5, 4.6, 5.6, 6.9, 9.7, and 11.8 nm, respectively.

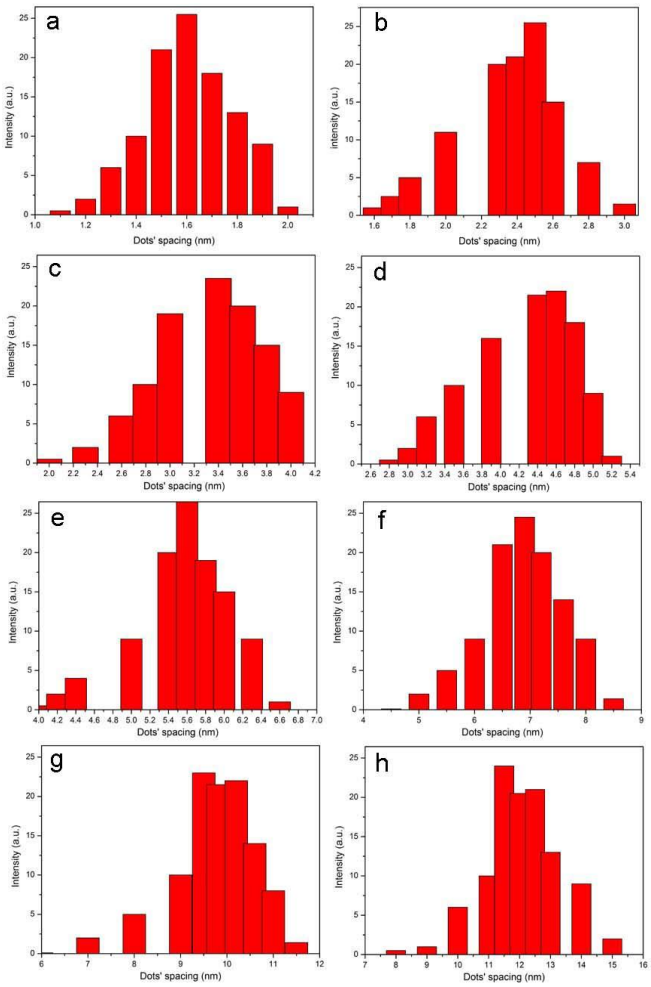

Fig. S4 The histograms of dots spacing of SiNSs: a to h for average spacing about 1.6, 2.5, 3.5, 4.6, 5.6, 6.9, 9.7, and 11.8 nm, respectively.

The PL quantum yield test:

The quantum yield (Φ) of SiQDs and SiNSs were measured by comparing the integrated photoluminescence intensities and the absorbance values with the reference quinine sulfate or Rhodamine B. The quinine sulfate (literature Φ = 0.54) was dissolved in 0.1M H_2SO_4 (refractive index η = 1.33); Rhodamine B (literature Φ = 0.97) was dissolved in ethanol (η = 1.323); SiQDs were dissolved in ethanol (η = 1.323), and the SiNSs were dissolved in distilled water (η = 1.33).

$$\Phi = \Phi_R \times \frac{I}{I_R} \times \frac{A_R}{A} \times \frac{\eta^2}{\eta_R^{\ 2}}$$

Where Φ is the quantum yield, I is the measured integrated emission intensity, η is the refractive index, and A is the optical density. The subscript R refers to the reference fluorophore of known quantum yield.