Electronic Supplementary Information

Reversible self-assembly of ferritin molecules for fabrication of size controlled microspheres and microrods

Yuanqing Gu and Jianguo Huang*

Department of Chemistry, Zhejiang University, Hangzhou, Zhejiang 310027, China
E-mail address: jghuang@zju.edu.cn

Experimental Details

Reagents: Ferritin solution (type I from horse spleen, 50 mg mL^{-1} in saline), polyethylenimine (PEI, branched, average Mw ~25,000), and poly(diallyldimethylammonium chloride) (PDDA, medium molecular weight, average Mw 200,000–350,000) were purchased from Sigma-Aldrich. Poly(sodium-*p*-styrenesulfonate) (PSS, Mw 70,000) was bought from Acros Organics. All the other chemicals were guaranteed reagents and were used without further purification. Milli-Q water with resistivity of 18.2 MΩ cm obtained from Millipore Advantage A10 (MA, U.S.A.) was used in all related cases. The solutions employed for thin polyelectrolyte film deposition on the track-etched polycarbonate (PC) membrane (isopore membrane, Φ 25 mm, pore diameter 400 nm; Millipore Corp., MA, U.S.A.) pore surfaces were: PEI solution, 1 mg mL^{-1} in 0.5 M aqueous sodium chloride solution; PSS solution, 1 mg mL^{-1} in 0.5 M aqueous sodium chloride solution; PDDA solution, 1 mg mL^{-1} in 0.5 M aqueous sodium chloride solution.

Characterizations: The ferritin microspheres dispersed in 1-octanol and the microrods dispersed in chloroform were respectively dropped onto silicon wafer for the field emission scanning electron microscope (FE-SEM) observation, or onto carbon coated copper mesh grid for the transmission electron microscope (TEM) observation, and the specimens were dried in air. The FE-SEM micrographs were obtained on a Zeiss Ultra 55 instrument with EDS 7426 equipment operating at an acceleration voltage of 10.0 kV. The specimens were sputtered with platinum or gold to increase the conductivity. The TEM and high resolution transmission electron microscope (HR-TEM)

micrographs were acquired on a Philips CM 200 instrument working at an acceleration voltage of 160 kV. Dynamic light scattering (DLS) analyses were performed using a Malvern Instruments Zetasizer Nano-S.

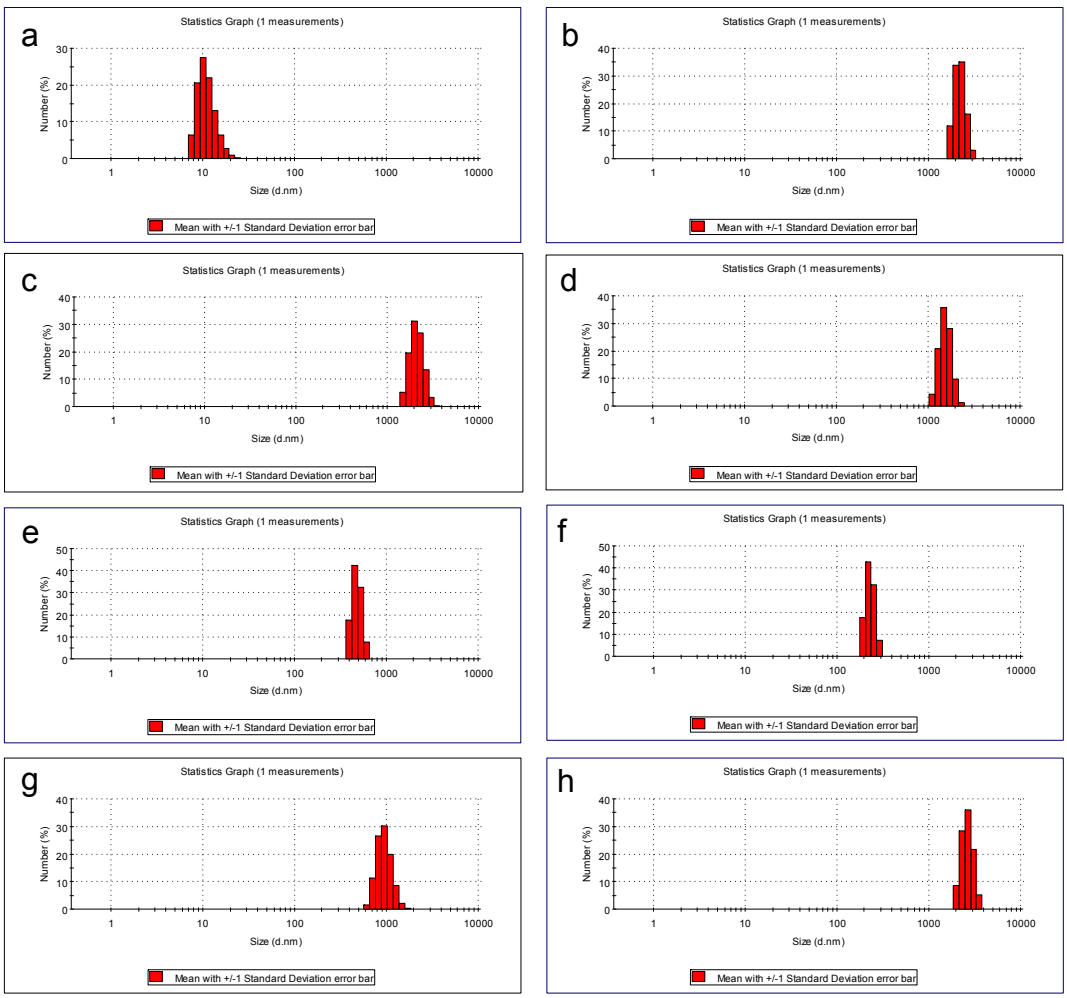

Fig. S1 DLS diagrams of the ferritin molecules in saline (a), the ferritin microspheres assembled in methanol (b), ethanol (c), 1-propanol (d), 1-butanol (e), 1-hexanol (f), 1-decanol (g), and 1-dodecanol (h), respectively.

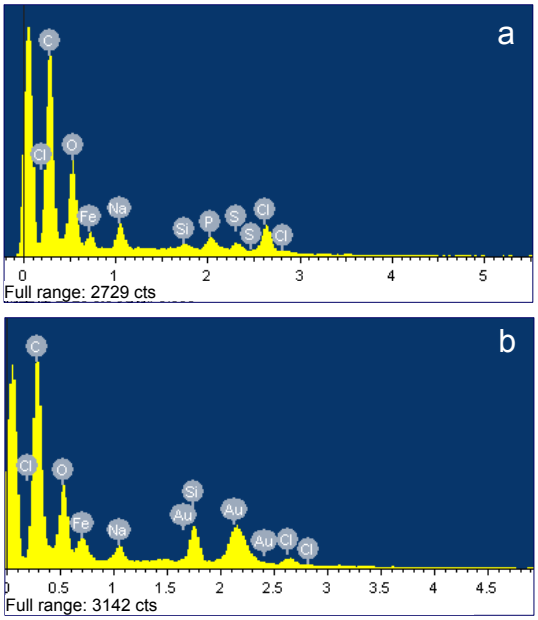

Fig. S2 Energy dispersive X-ray (EDX) spectra of the ferritin microspheres obtained in 1-octanol (a) and the microrods (b). The Si signal originated from the silicon wafer used to support the specimens, and the Au peaks came from sputtered gold coating during the sample preparation to improve the conductivity for the FE-SEM observations.

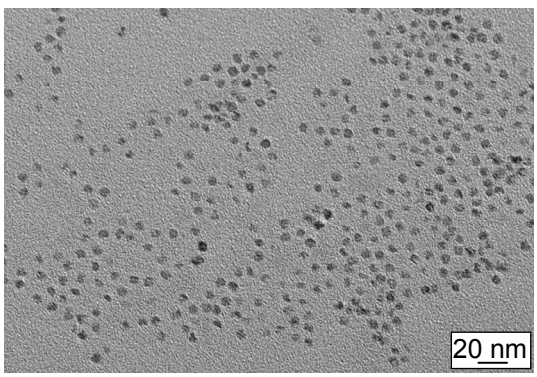

Fig. S3 TEM image of the virginal ferritin molecules.

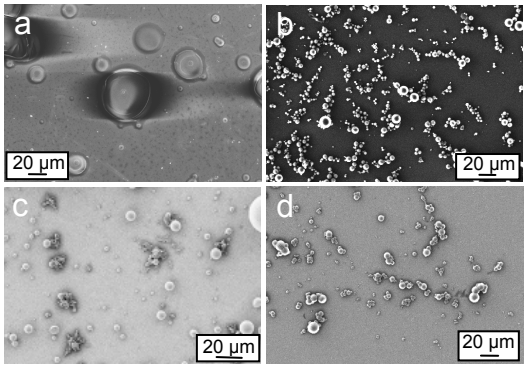

Fig. S4 FE-SEM micrographs of the ferritin microspheres assembled in 1-butanol (a), 1-hexanol (b), 1-decanol (c), and 1-dodecanol (d), respectively.

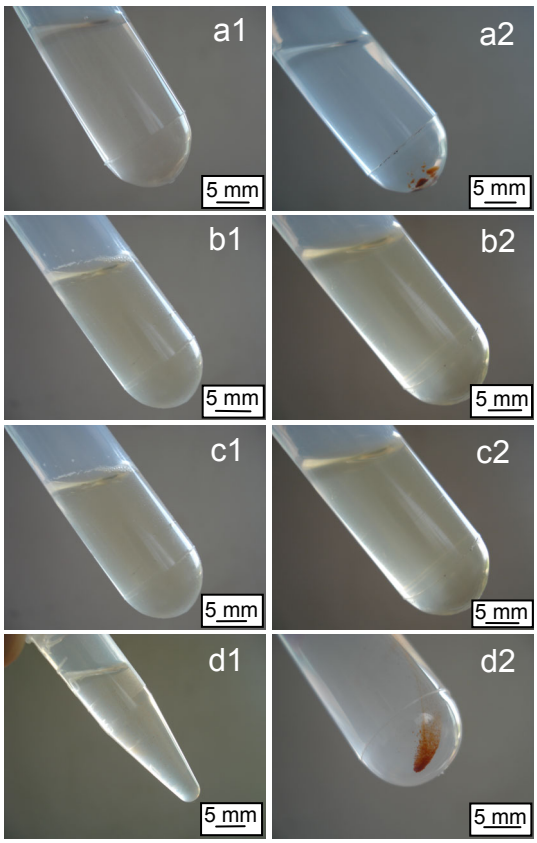

Fig. S5 Photographs of the assembly and re-dispersion behaviors of the ferritin microspheres formed in 1-octanol. (a) The initial ferritin microspheres formed in 1-octanol; (b) the ferritin microspheres re-dispersed in saline; (c) the virginal ferritin molecules dispersed in saline; (d) the ferritin microspheres re-disperesed in chloroform. Images in the left column and the right column are the photographs of the corresponding samples before and after centrifugation at 3000 rpm for 5 min, respectively.

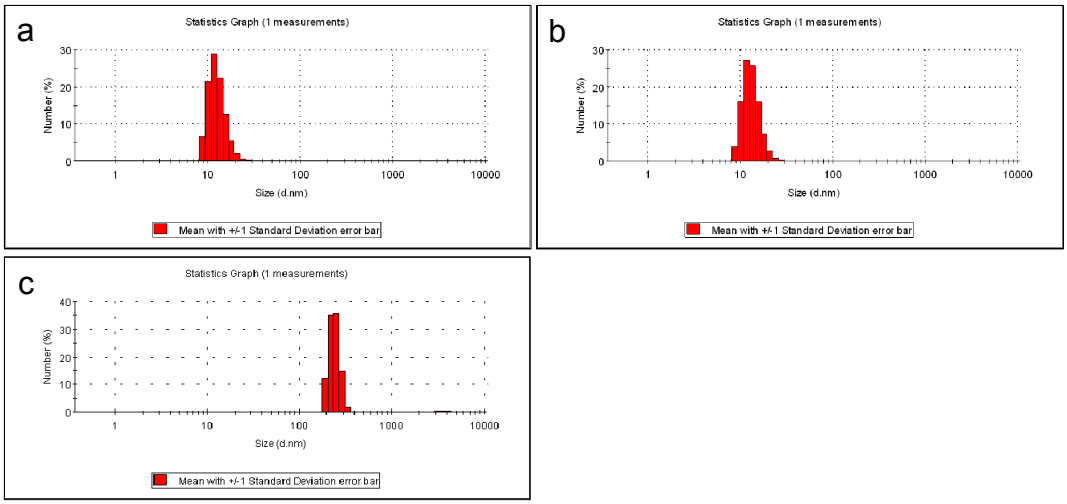

Fig. S6 DLS diagrams of the ferritin molecules in saline solution after being centrifugated at 3000 rpm for 5 min (a), the ferritin microspheres that obtained in 1-octanol re-dispersed in saline (b), and the ferritin microspheres originally attained in 1-octanol re-dispersed in chloroform (c).