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Supplementary Information for

Monodisperse Porous Nanodiscs with Fluorescent and Crystalline Wall Structure

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Materials. Zinc meso-tetra (4-pyridyl) porphyrin (ZnTPyP) was purchased from Frontier Scientific, Inc., Myristyltrimethylammonium bromide (MTAB) was purchased from Aldrich Chemical Co. and used without further purification. Hydrochloric acid (HCl 1M) and Sodium hydroxide (NaOH 1M) solution were purchased from Aldrich Chemical Co. All the solutions were prepared in ultrapure water from a Barnstead Nanopure water system, and filtered through a 0.2-μm syringe filters to remove particles.

Sample preparation methods. The porous nanodiscs of ZnTPyP were synthesized through a simple solution procedure. In a typical preparation, 0.5 ml fresh stock ZnTPyP solution (0.01 M ZnTPyP dissolved in 0.2 M HCl solution) was quickly added into 9.5 mL of continuously stirred aqueous solution of MTAB (0.01 M) and NaOH (0.008 M) at room temperature (25°C). After the mixture was stirred for 30 min, the solution became green. The green solution was centrifuged at 7000 rpm and washed twice with Millipore water to remove the surfactant.

Characterization. The powders were re-dispersed in pure water and deposited onto silicon wafer substrate and copper grid for the characterization by scanning electron microscopy (SEM) and transmission electron microscopy (TEM). SEM images were taken using a Hitachi 5200 FEG microscope. TEM was performed on a JEOL 2010 with 200kV acceleration voltage, equipped with a Gatan slow scan CCD camera. The X-ray diffraction (XRD) spectra were recorded on a Siemens D500 diffractometer using Ni-filtered Cu Kα radiation with λ 1.54 Å.

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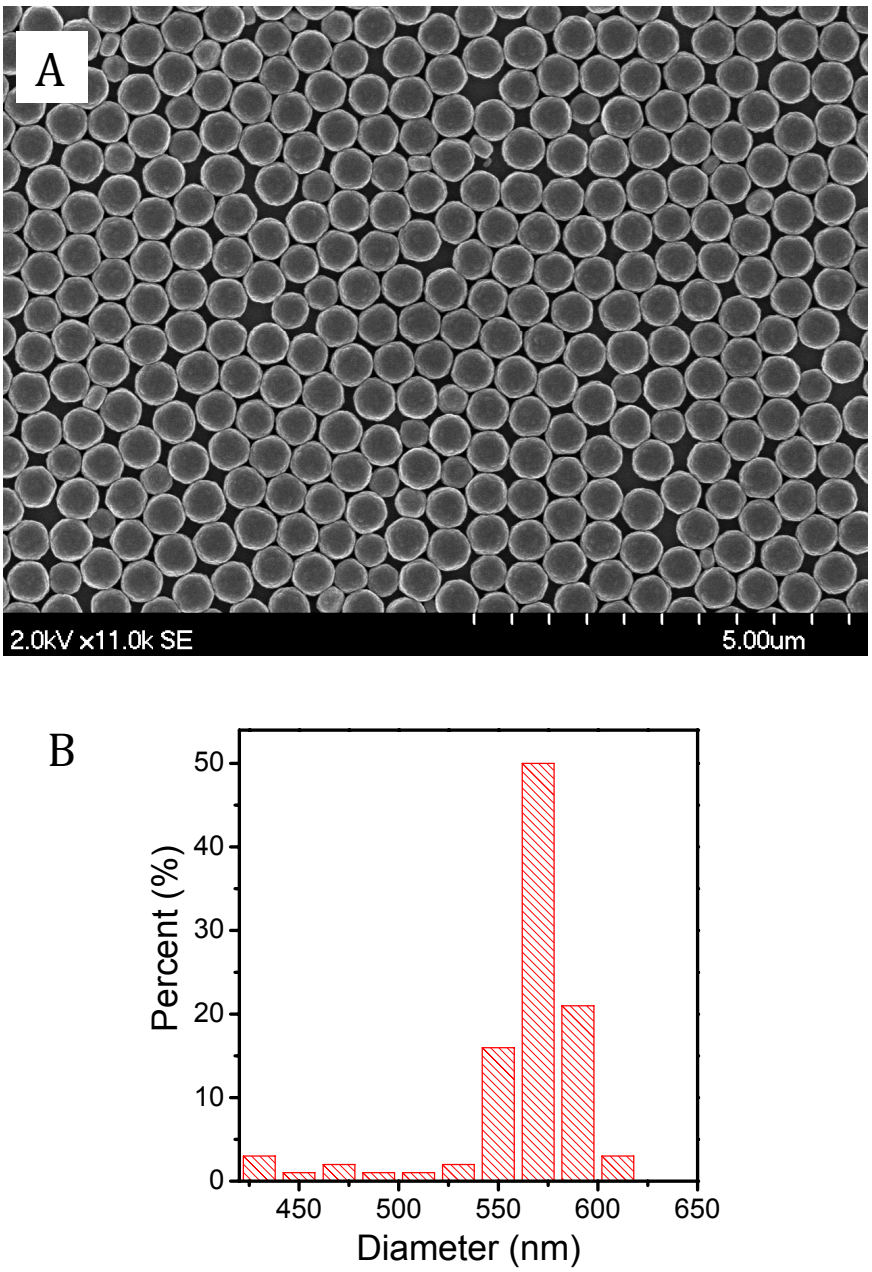

Figure S1. (A) Typical large-scale SEM image of porous ZnTPyP nanodiscs. (B) Their size distribution.

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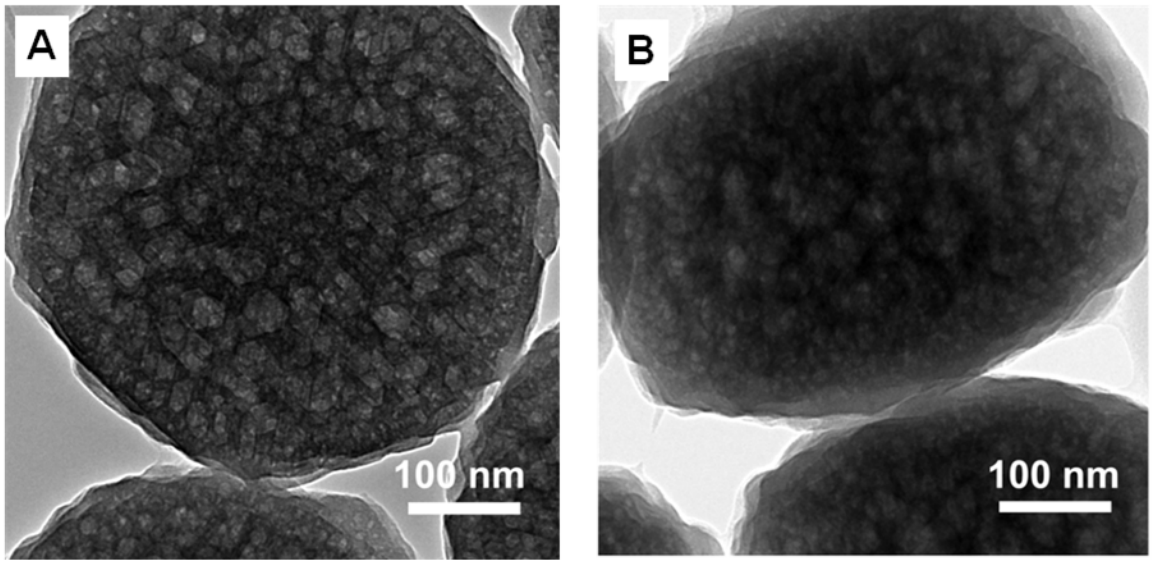

Figure S2. TEM images of ZnTPyP porous nanodiscs: (A) top view; (B) side view

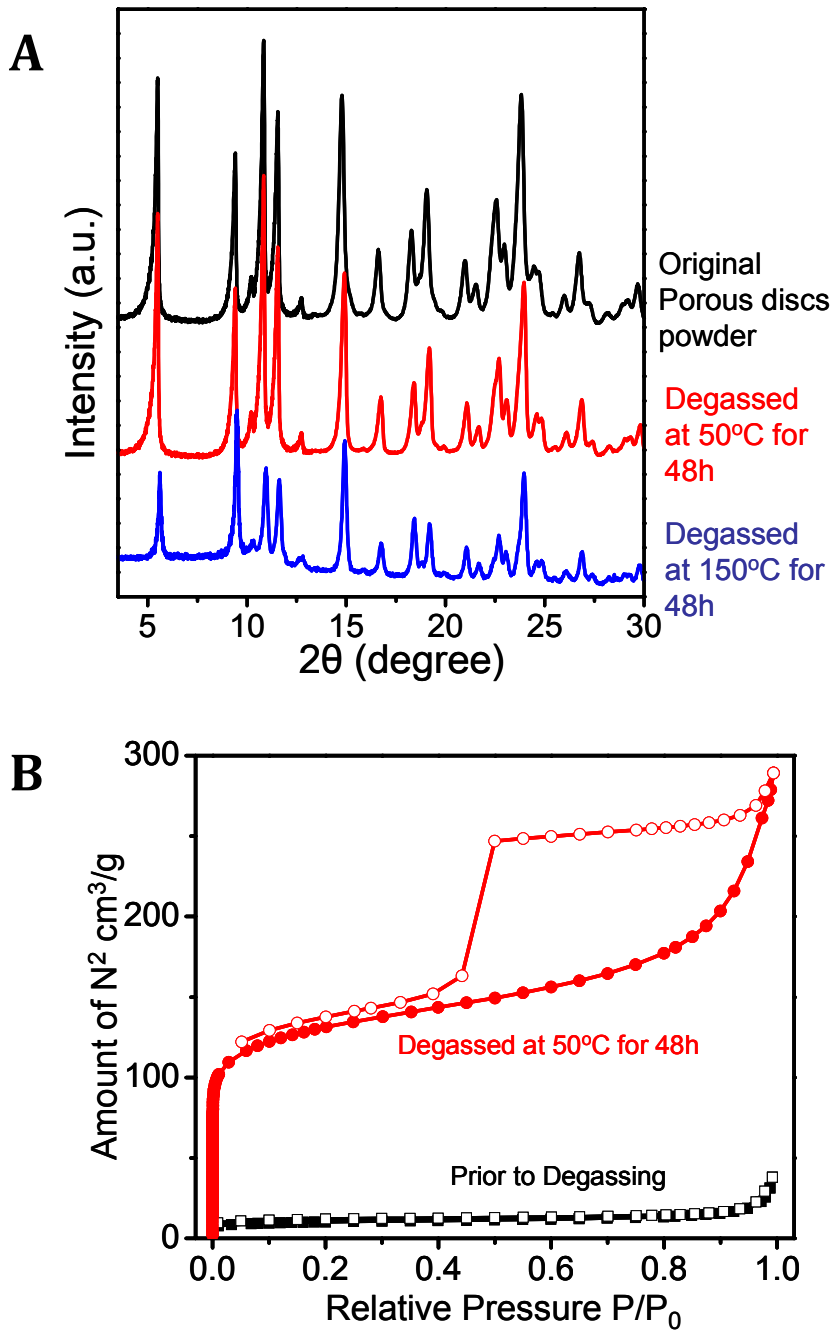

Figure S3.

(A) XRD spectra of ZnTPyP porous nanodiscs before degassing (black), after degassing at 50 ˚C for 48 hours (red), and, to further illustrate stability, after degassing at 150 ˚C for 48 hours (blue).

(B) Nitrogen sorption isotherms obtained at 77 K for ZnTPyP nanodiscs before (black) and after (red) degassing at 50 ˚C for 48 hours, indicating successful removal of water.

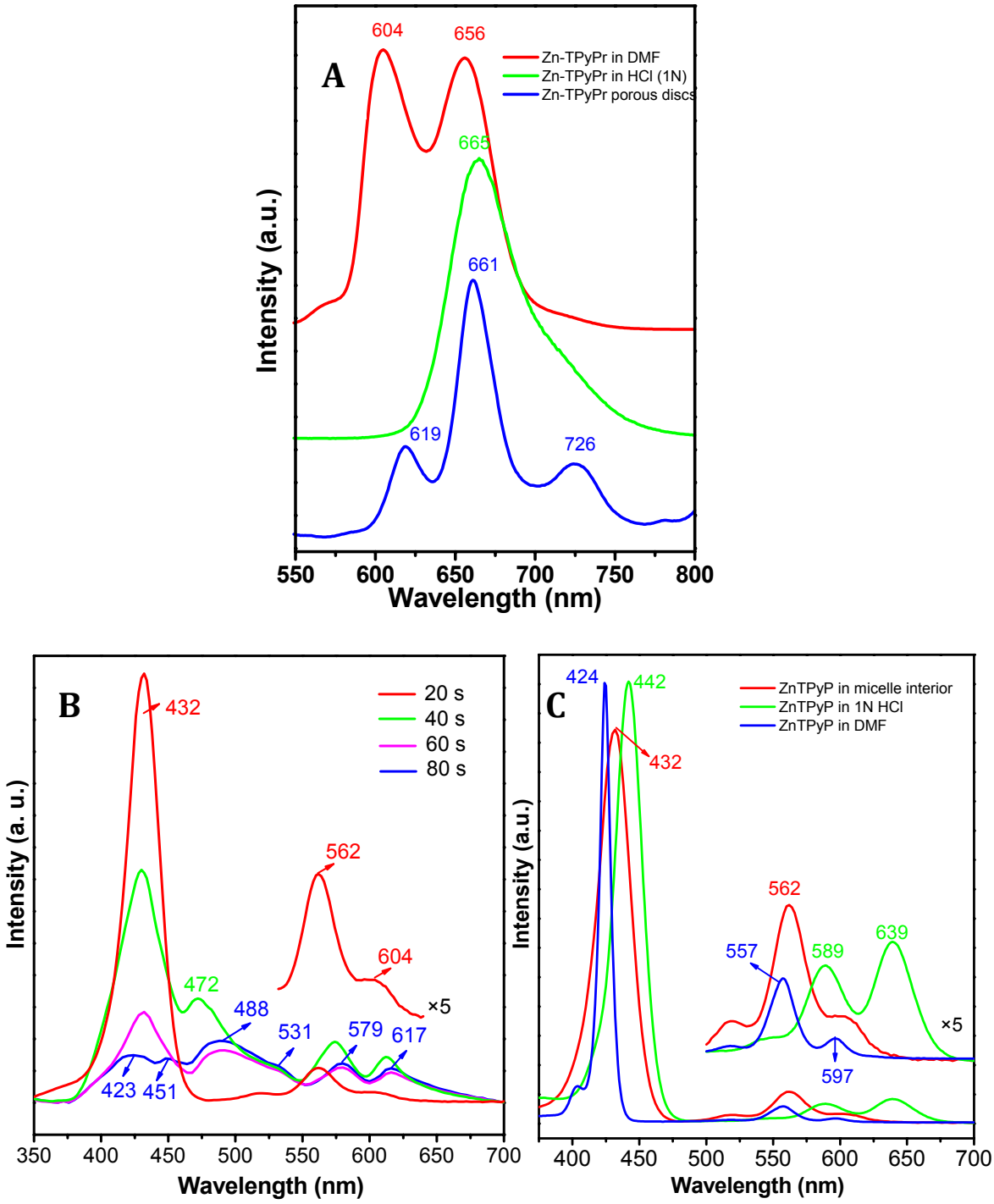

Figure S4. (A) Fluorescence spectra of ZnTPyP molecules in DMF and HCl, and ZnTPyP porous nanodiscs dispersed in water. (B) UV-Vis spectra following the time progression of the self-assembly process of the porous nanodiscs after adding base and surfactant. (C) UV-Vis spectra of ZnTPyP molecules in DMF, HCl (as tetrapyridinium cation), and in micellar interior 20 s after adding base and surfactant. The spectrum in the

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micelle is similar to those in DMF and (for the tetra-pyridinium cation) in HCl, indicating that the molecules have not yet assembled extensively at 20 s.

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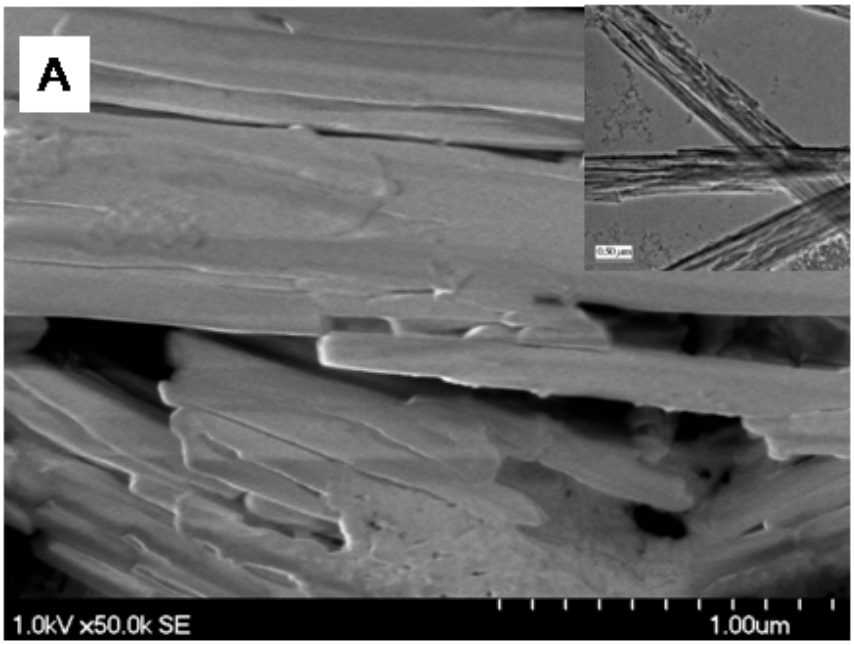

Fig. S5. SEM image of irregularly shaped ZnTPyP nanostructures synthesized without using surfactants.

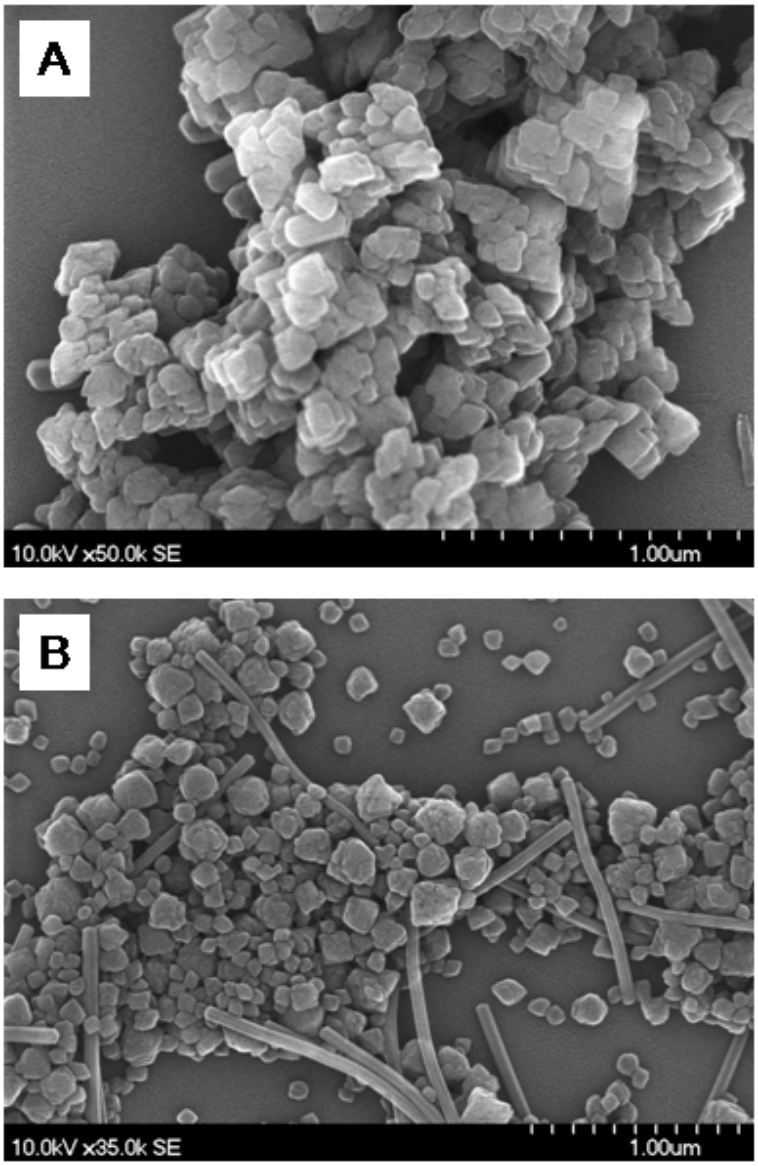

Fig. S6. Representative SEM images of different ZnTPyP nanostructures synthesized using alcohols:

(A) methano:H_2O = 8:2; (B) ethanol:H_2O = 8:2

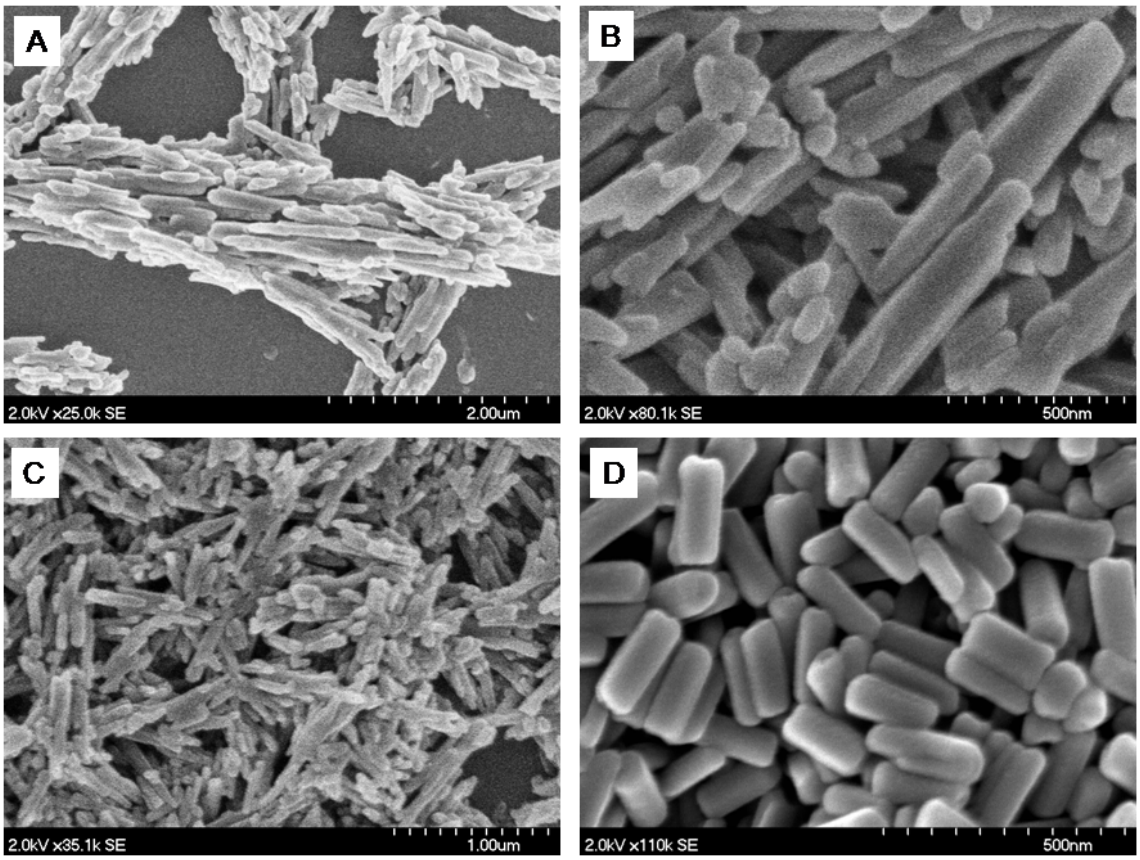

Fig. S7. Representative SEM images of various ZnTPyP nanostructures synthesized using different surfactants:

(A) HTEAB (C6); (B) OTAB (C8); (C)N-DTAB (C10); (D) DTAB (C12).