Supporting Information

Compartmentalized Hollow Silica Nanospheres Templated from Nanoemulsions

Si-Han Wu,[†] Yann Hung,[†] and Chung-Yuan Mou[†, *]

†Department of Chemistry, National Taiwan University, Taipei, Taiwan 10617

*Center for Condensed Matter Sciences, National Taiwan University, Taipei, Taiwan 10617

E-mail: cymou@ntu.edu.tw

Calculation of the HLB number from a mixture of surfactants

The HLB number of a mixture, consisting of surfactant A with HLB_A and surfactant B with HLB_B, is obtained by the following formula.

$$HLB_{mix} = (HLB_A \times f_A) + (HLB_B \times f_B)$$

f_A is the weight fraction of surfactant A in the mixture
f_B is the weight fraction of surfactant B in the mixture

Sample	**HLB_A/Surfactant**	f_A	**HLB_B/Surfactant**	f_B	**HLB_{mix}**
MC-HSN	10.0/ CTAB	0.131	6.00/ Hexanol	0.869	6.52
SNP-CO520	10.0/ CTAB	0.107	10.0/ CO-520	0.893	10.0
SNP-TritonX100	10.0/ CTAB	0.102	13.5/ Triton X-100	0.898	13.1
SNP-Brij98	10.0/ CTAB	0.101	15.3/ Brij98	0.899	14.8

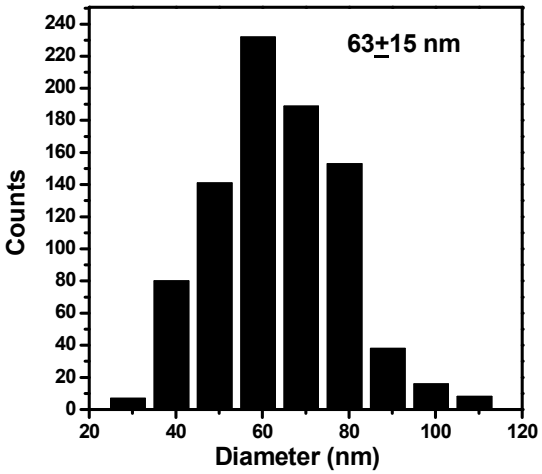

Figure S1. Size distribution histogram determined by TEM micrograph of SC-HSN.

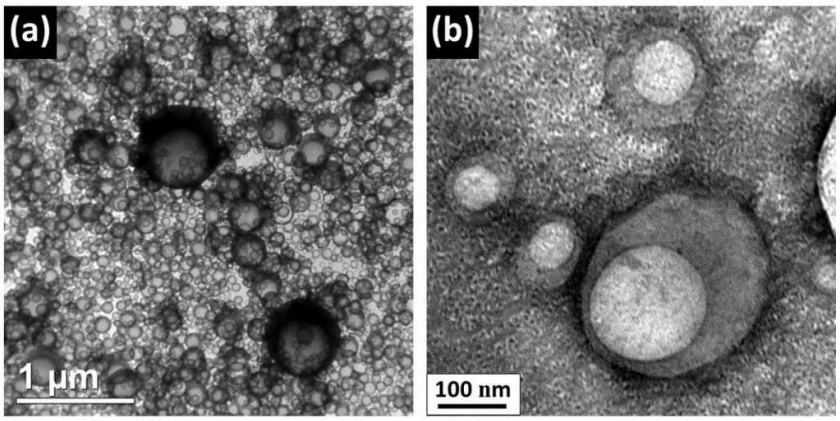

Figure S2. TEM images of (a) large SC-HSN at a lower stirring rate; (b) QD/Py@SC-HSN.

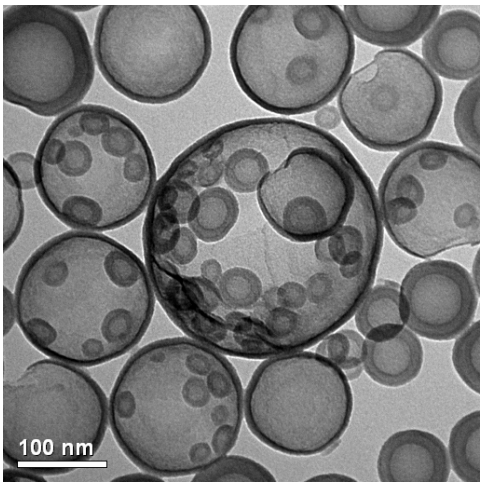

Figure S3. TEM images of MC-HSN after the aging and washing processes.

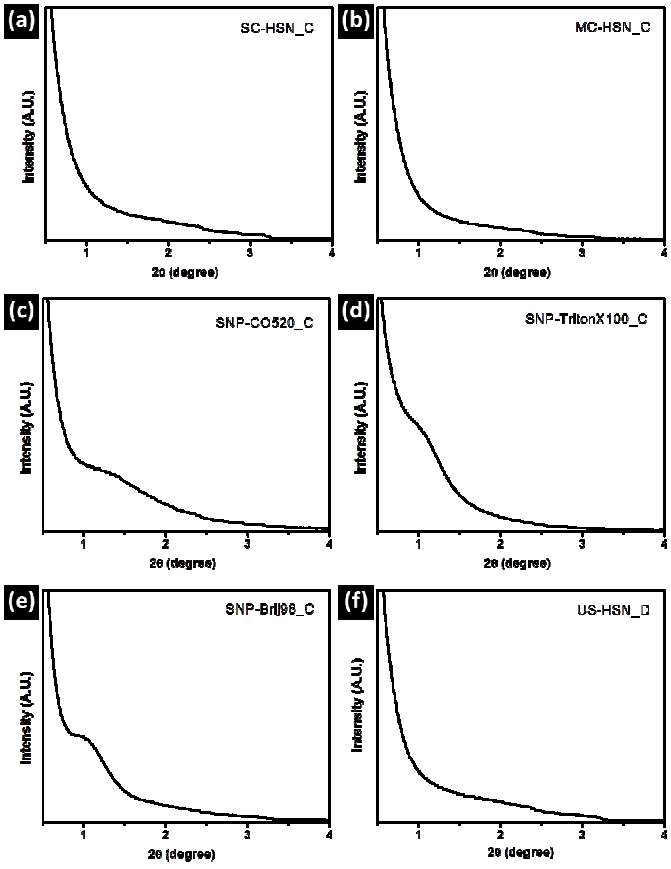

Figure S4. Small-angle XRD patterns of (a) SC-HSN_C; (b) MC-HSN_C; (c) SNP-CO520_C; (d) SNP-TritonX100_C; (e) SNP-Brij98_C; (f) US-HSN_D.

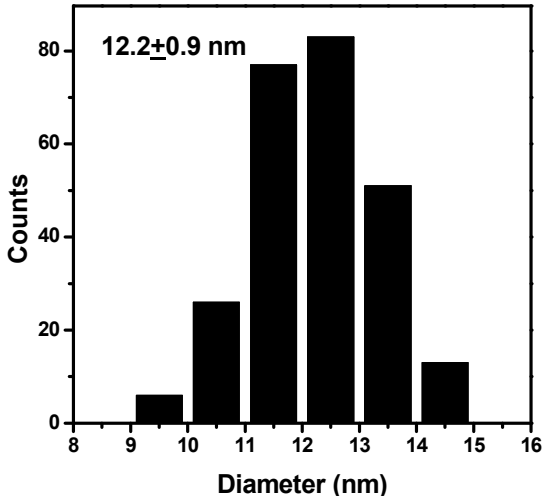

Figure S5. Size distribution histogram determined by TEM micrograph of US-HSN.

To investigate the effects of molecular weight of the stabilizer on the structure of the emulsion, we performed additional experiment. Another nonionic surfactant polyethylene-block-poly(ethylene glycol) (PE-b-PEG), with the same HLB value as that of CO-520 (HLB=10) but having higher molecular weight (Mn~920) than that of CO-520 (Mn~441), were used to replace CO-520 in the synthesis. As shown in the following TEM images (Figure S6), the obtained silica nanoparticles (designated as SNP-PE-b-PEG) are smaller but with similar bi-continuous structure as those formed with CO-520.

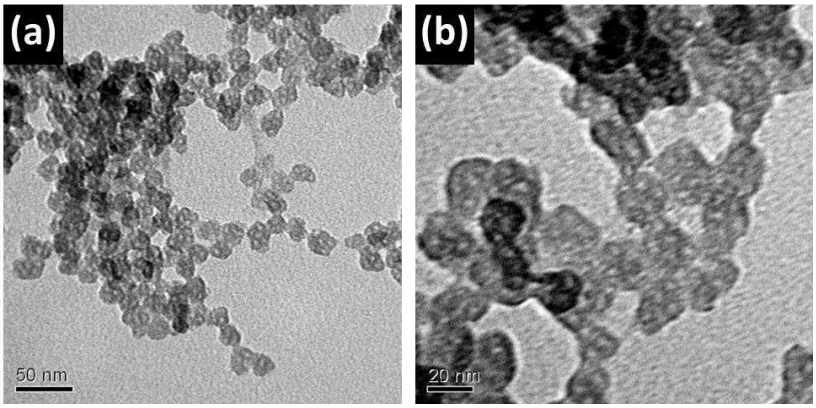

Figure S6 TEM images of SNP-PE-b-PEG.

Viability analysis of nanopartilces on HeLa cells was evaluated according to the following process. The results show that the RhB/Coconut oil@SC-HSNs, synthesized using coconut oil as oil phase, have essentially no cytotoxic effect on HeLa cells.

Cell viability assay:

2×10^4 HeLa cells per well were seeded in 96-well plates and incubated in a DMEM medium supplemented with 10% serum for 24 hr. After that, the cells were incubated with 100 μg/mL of RhB/Coconut oil@SC-HSNs suspension for 4 h, followed by incubation with WST-1 reagent (Clontech) for another 2 hr at 37 °C. The yellow-color formazan dye generated by the live cells was proportional to the number of live cells and the absorbance at 450 nm was measured, with a reference wavelength of 650 nm, using a microplate reader (Bio-Rad, model 680).

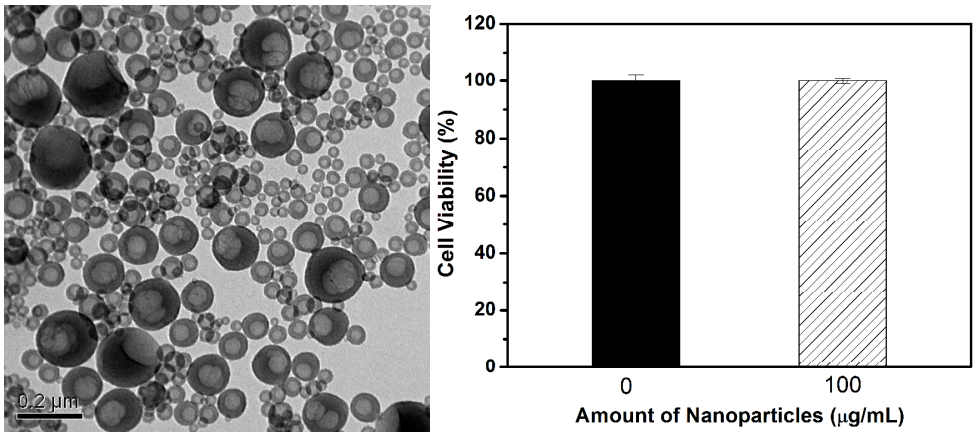

Figure S7 Left figure: TEM image of RhB/Coconut oil@SC-HSNs. Right figure: cytotocixicy assay of HeLa cells treated with 100 μg/mL of RhB/Coconut oil@SC-HSNs.