Supporting Information

Ultrasmall Single Micelle@Resin Core-Shell Nanocarriers as Efficient Cargo Loading Vehicle for *in vivo* Bioimedical Applications

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Section S1. Characterization

Transmission electron microscopy (TEM) was performed using a FEI Tecnai G² Spirit at an acceleration voltage of 120 kV. The photoluminescence spectra were measured in a FLS920 fluorescence spectrometer (Edinburgh Instruments, U. K.) UV–vis spectra were collected on a Shimadzu UV-2550 double-beam spectrophotometer using 1 cm quartz cell. Dynamic light scattering (DLS) measurements were performed at 25 and 80 °C for the core-shell NCs and micelles formed by surfactants (in solution) respectively, using a Malvern Zetasizer Nano ZS90 laser-scattering particle meter. Cytotoxicity of the NCs was detected by the WellScan MK3 system from Labsystems Dragon. Fluorescence images were taken with a CRi Maestro Ex *In vivo* imaging system (Cambridge Research & Instrumentation, Inc. Woburn, MA, USA).

Section S2. Chemicals and reagents

All materials were of analytical grade and used as received without any further purification. F108, F127 and fluorescein were purchased from Sigma-Aldrich Company Ltd. (USA). Resorcinol, formaldehyde (37 wt%), ammonia aqueous solution (NH₄OH, 25 wt%), cyclopentanol and 1,2,4-trimethylbenzene were purchased from Shanghai Chemical Reagent, Inc. of the Chinese Medicine Group. Near-infrared cyanine dye, indotricarbocyclohexen-µ-(chloro) cyanine iodide (Cy7-Et) was synthesized as previously reported method.¹ RPMI-1640 medium was purchased from HyClone Company Ltd. (USA). Matrigel was purchased from Shanghai QCBIO Science & Technologies Co.Ltd (Shanghai, China). CHO cell line was a gift kindly provided by Institute of Biochemistry and Cell Biology, Shanghai Institute for Biological Sciences, Chinese Academy of Sciences. Tca-8113 cell line was purchased from the Cell Bank of Type Culture Collection of the Chinese Academy of Sciences (Shanghai, China).



Figure S1. Plot of absorbance vs. concentration for Cy7-Et.



Figure S2. The cryo-TEM image of the synthesis medium using F108 as surfactant for the

formation of single micelles.



Figure S3. The photograph of the Tyndall effect when using a laser focused on the colloid solution (highly diluted compared to the one shown in Figure S3) of Micelle_{F108}@RFR coreshell NCs.



Figure S4. The photograph of the Tyndall effect when using a laser focused on the colloid solution of the Micelle_{F108}@RFR core-shell NCs that have been stored for 90 days.



Figure S5. TEM images of the samples obtained at different synthesis conditions using F108 as surfactant with (A) ammonium concentration of 0.05 M, (B) temperature at 60 °C, (C) ammonium concentration of 0.16 M) and (D) temperature at 95 °C.



Figure S6. TEM images of the samples obtained at variable resorcinol (R) and formaldehyde (F) concentrations on the basis of $Micelle_{F108}$ @RFR core-shell NCs: 42 mM R + 84 mM F (A), 49 mM R + 98 mM F (B), 55 mM R + 110 mM F (C) and 65 mM R + 130 mM F (D).



Figure S7. TEM image of Micelle_{F127}@RFR core-shell NCs.



Figure S8. Molecular structure of fluorescein (A) and cyanine 7 (B).



Figure S9. UV-vis absorption spectra of Micelle_{F108}-fluorescein@RFR core-shell NCs (a), fluorescein (b), Cy7-Et (c) and Micelle_{F108}-Cy7-Et@RFR core-shell NCs (d) respectively.



Figure S10. (A) Photo-bleaching experiment of the $Micelle_{F108}$ -Cy7-Et@RFR core-shell NCs (a) and Cy7-Et, (B) $Micelle_{F108}$ -fluorescein@RFR core-shell NCs (a), fluorescein (b) in aqueous solution with 60W filament lamp as an excitation source.



Figure S11. Particle size distributions determined by DLS for $Micelle_{F108}$ -Cy7-Et@RFR (a) and $Micelle_{F108}$ -TMB@RFR (b) core-shell NCs in aqueous solution.



Figure S12. The TEM images of the sample $Micelle_{F108}$ -fluorescein@RFR (A) and $Micelle_{F108}$ -Cy7-Et@RFR (B) core-shell NCs.



Figure S13. Fluorescence image of tongue squamous cell carcinoma-bearing mice after introtumoral njection with $Micelle_{F108}$ -Cy7-Et@RFR core-shell NCs. Yellow circle points to the tumor.

Reference

 Samanta, A.; Vendrell, M.; Das, R.; Chang, Y. T. Chem. Commun. 2010, 46, 7406-7408.