Electronic Supplementary Material (ESI) for RSC Advances.

SUPPORTING INFORMATION

Facile Preparation of Hybrid Vesicles loaded with Silica Nanoparticles via Aqueous Photoinitiated Polymerization-Induced Self-Assembly

Jianbo Tan[*, †, ‡], Dongdong Liu[†], Xuechao Zhang[†], Chundong Huang[†], Jun He[†], Qin Xu[†], Xueliang Li[†], Li Zhang[* †, ‡]

[†]*Department of Polymeric Materials and Engineering, School of Materials and Energy, Guangdong University of Technology, Guangzhou 510006, China*

[‡]*Guangdong Provincial Key Laboratory of Functional Soft Condensed Matter, Guangzhou 510006, China*

**Corresponding authors: tanjianbo@gdut.edu.cn, lizhang@gdut.edu.cn*

ADDITIONAL RESULTS

Determination of the loading efficiency of silica nanoparticles

Before and after centrifugation-redispersion cycles, the weight remaining can be defined in eqs 1 and 2, respectively:

$$WR_{before}(\%) = \frac{m(silica)_e + m(silica)_{free}}{m_{polymer} + m(silica)_e + m(silica)_{free}} \times 100\% \quad \text{(S1)}$$

$$WR_{after}(\%) = \frac{m(silica)_e}{m_{polymer} + m(silica)_e} \times 100\% \quad \text{(S2)}$$

Where WR_{before} is the weight remaining of the sample before centrifugation-redispersion cycles, WL_{after} is the weight remaining of the sample after centrifugation-redispersion cycles, m $(silica)_e$ is the weight of encapsulated silica nanoparticles, m $(silica)_{free}$ is the weight of free silica nanoparticles, and $m_{polymer}$ is the weight of polymer. The loading efficiency can be expressed by eq 3:

$$\text{Loading efficiency}(\%) = \frac{m(silica)_e}{m(silica)_{free} + m(silica)_e} \times 100\% = \frac{\frac{1}{WR_{before}} - 1}{\frac{1}{WR_{after}} - 1} \times 100\% \quad \text{(S3)}$$

This calculation assumes that all free silica nanoparticles have been removed via nine centrifugation-redispersion cycles.

Table S1. TGA data of silica nanoparticles, purified and unpurified $mPEG_{113}$-$PHPMA_{365}$ hybrid vesicles prepared via aqueous photo-PISA of HPMA at room temperature in the presence of 2.0 g silica sol.

	target composition	HPMA concentration (w/w %)	initial silica sol content (g)	monomer conversion (%)[c]	weight remaining (%)	loading efficiency (%)[b]
1	SiO_2/$mPEG_{113}$-$PHPMA_{365}$[a]	25	2.0	98	18.1	-
2	SiO_2/$mPEG_{113}$-$PHPMA_{365}$[b]	25	2.0	-	9.3	46.4

[a]Unpurified hybrid vesicles, [b]purified hybrid vesicles after nine centrifugation-redispersion cycles, [c] monomer conversion was determined by ^{1}H NMR measurement in DMSO-d_6, [d] the loading efficiency was determined by eq S3.

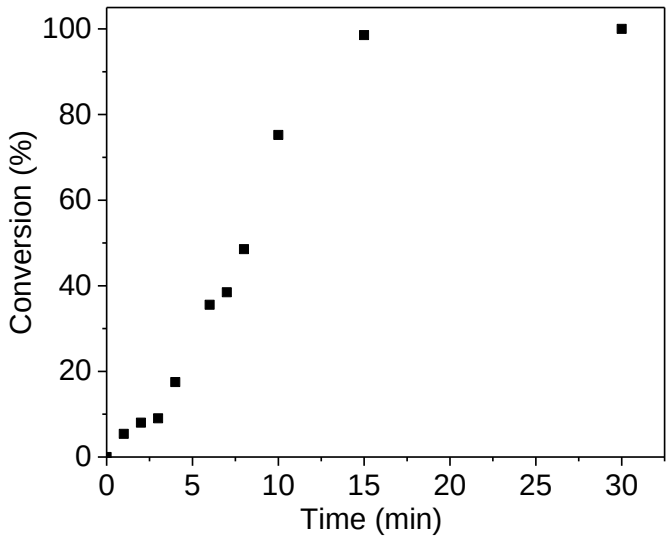

Figure S1. Polymerization kinetic for photoinitiated (25 °C) PISA of HPMA in water using $mPEG_{113}$-CEPA as the macro-RAFT agent at a 10% w/w HPMA concentration with the target DP of 200.

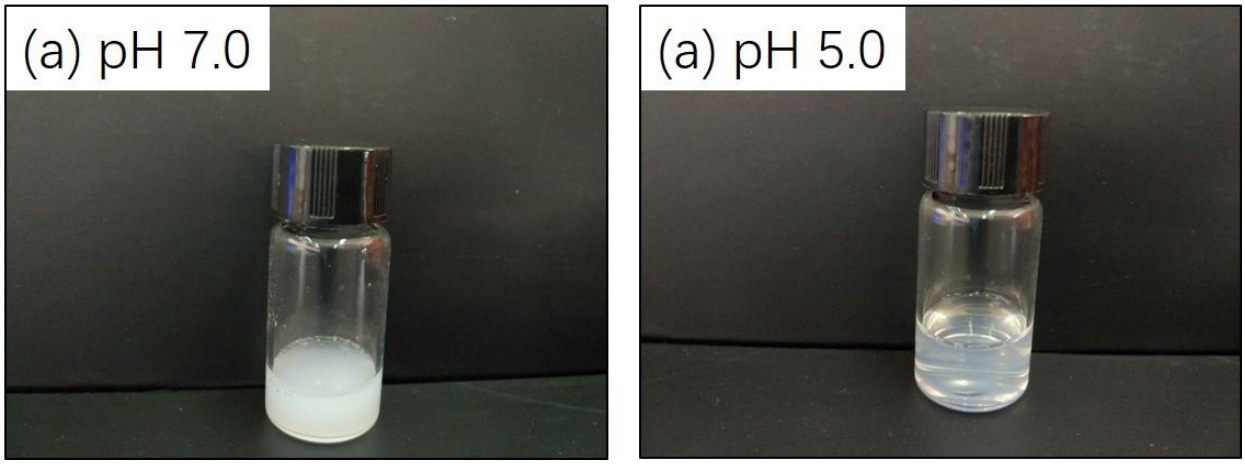

Figure S2. (a) Digital photo of the dispersion of sample Figure 7a at pH 7.0, (b) Digital photo of the dispersion of sample Figure 7a at pH 5.0.

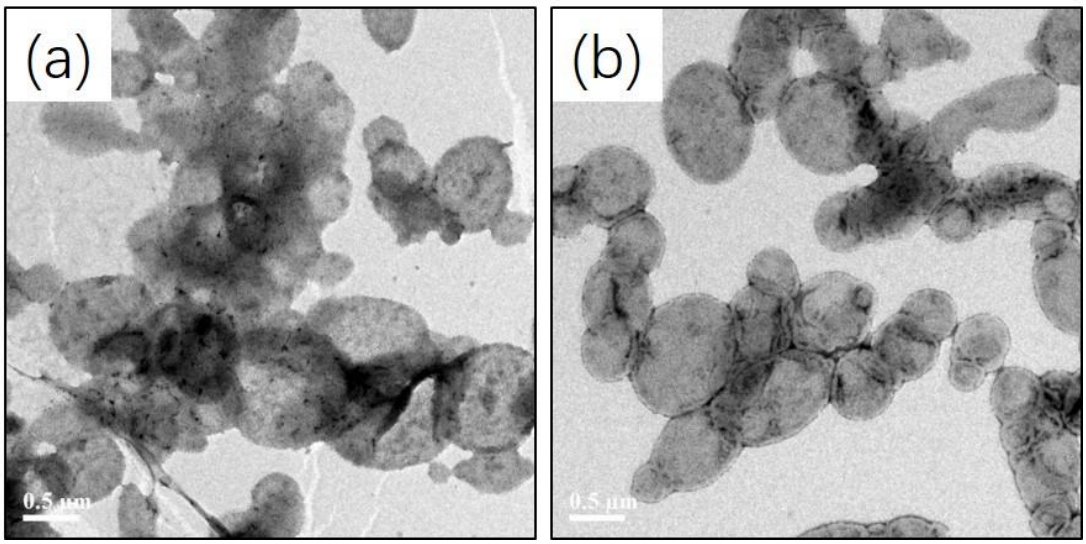

Figure S3. (a) TEM image of $mPEG_{113}$-$PHPMA_{365}$ hybrid vesicles prepared by aqueous photo-PISA of HPMA in the presence of 4.0 silica sol, (b) TEM image of sample (a) after bubbling with CO_2.