

**Supporting Information**

**Superamphiphilic Chitosan Cryogels for Continuous Flow Separation of Oil-in-Water Emulsions**

Chunpo Gao<sup>a,b#</sup>, Yanan Wang<sup>c#</sup>, Jiasheng Shi<sup>c</sup>, Yanyan Wang<sup>c</sup>, Xiaoli Huang<sup>c</sup>, Xilu Chen<sup>b</sup>, Zhiyong Chen<sup>c\*</sup>, Yunfeng Xie<sup>d\*</sup>, Yanzhao Yang<sup>a\*</sup>

<sup>a</sup>School of Chemistry and Chemical Engineering, Shandong University, Jinan, 250100, People's Republic of China

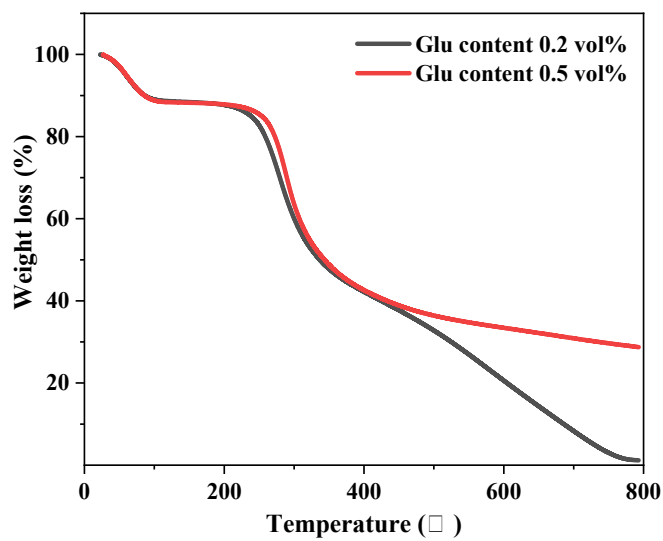
<sup>b</sup>Shandong Hongjitang Pharmaceutical Group CO. Ltd, Jinan 250103, People's Republic of China

<sup>c</sup>Shandong Provincial Key Laboratory of Fluorine Chemistry and Chemical Materials, School of Chemistry and Chemical Engineering, University of Jinan, Jinan 250022, People's Republic of China

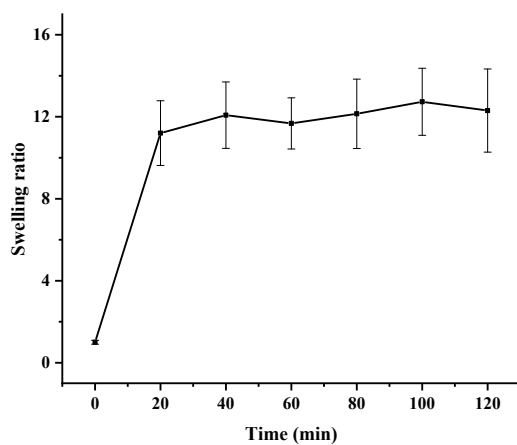
<sup>d</sup>Beijing Key Laboratory of Nutrition & Health and Food Safety, Nutrition & Health Research Institute, COFCO Corporation, Beijing 102209, People's Republic of China

Email: chm\_chenzy@ujn.edu.cn; xieyunfeng@cofco.com; yzhyang@sdu.edu.cn

#Equally contributed to this work



**Figure S1** TGA curves of different cryogels.



**Figure S2** Time dependence of the swelling ratios of the chitosan cryogels with 0.2% crosslinker content.

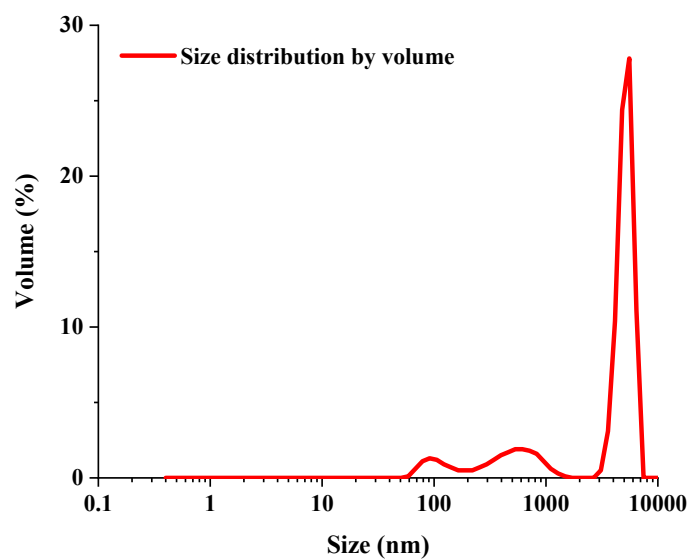
**Table S1.** Separation of 2 mL of surfactant-stabilized toluene-in-water emulsion by chitosan cryogels

Crosslinker Content (vol%)	$W_{STE}$ (g)	$W_{filtrate}$ (g)	Separation efficiency (%)	Percent of Tween 80 in filtrate (%)	$W_{water\ in\ filtrate}$ (g)	Ratio of water weight in filtrate to that in STE (%)
0.2	2.0312	1.9639	98.1	27.7%	1.9636	97.6
	2.0397	1.9378	98.5	40.4%	1.9375	95.9
	2.0455	2.0362	98.2	39.0%	2.0359	99.5
Average Mean Deviation	$2.0388 \pm 0.0072$	$1.9793 \pm 0.0510$	$98.2 \pm 0.2$	$35.7 \pm 7.0$	$1.9790 \pm 0.0510$	$97.7 \pm 1.8$

Note:  $W_{STE}$  is the weight of surfactant-stabilized toluene-in-water emulsions (STE),  $W_{filtrate}$  is the weight of the filtrate,  $W_{water\ in\ filtrate}$  is the weight of water in the filtrate. Concentration of Tween 80 in STE is 1.0 mg/mL. The cryogels are 2 cm thick, and the specification of plastic syringe is 10 mL.

**Table S2.** DLS tests of Tween-80 stabilized toluene-in-water emulsion

	Intensity Mean (nm)	Number Mean (nm)	Volume Mean (nm)
1	794.3	61.11	3554
2	868.1	83.57	3952
3	888.6	97.68	4096
Average Mean Deviation	$850.3 \pm 40.5$	$80.8 \pm 15.1$	$3867.3 \pm 229.2$



**Figure S3** Size distribution of Tween-80 stabilized toluene-in-water emulsion.

**Movie 1** showed the spreading process of water and oil droplets on the surface of the chitosan-glutaraldehyde cryogel sample (glu content, 0.2%).

**Movie 2** showed the spreading process of water and oil droplets on the surface of the pure chitosan slice.

**Movie 3** showed the diffusion process of methylene blue stained water through the chitosan-glutaraldehyde cryogel sample (glu content, 0.2%).