Supplementary information for the manuscript titled:

"A carboxymethyl chitosan coated medium-chain fatty acid nanoliposome: its structural and compositional characterizations, stability and *in vitro* release investigation"

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SI-Material and methods

Atomic force microscopy (AFM): Tapping mode was applied for sample preparation. Properly diluted liposome samples were loaded onto the mica and dried under room temperature, and then the sample was placed on AJ-III (AFM, Shanghai AiJian Co., China). Probe with Si_3N_4 material and a spring constant of 0.58 N/m.

Turbidity determination: Dilute the liposomes with PBS buffer ten times, and then measure the absorbance at 288 nm using a spectrophotometer at room temperature.

pH determination: Liposomes were measured at room temperature using Delta 320 pH meter.

Differential scanning calorimetric (DSC): Samples were weighed and placed in the pan, press and seal the pan with lid. The heating rate is 10℃/min, the initial equilibrium temperature is 20℃, the end temperature is 200℃, and the nitrogen flow rate is 20-30 mL/min.

SI-Results and Discussion

1. **AFM**

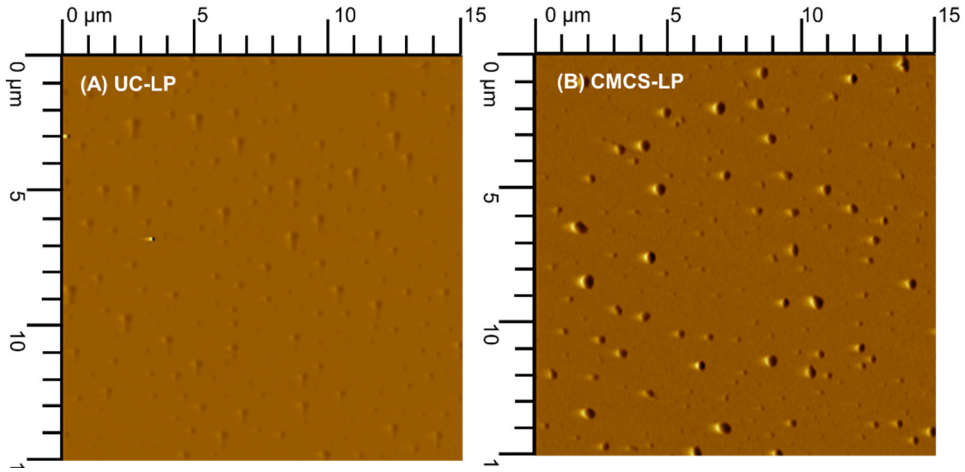

Figure S1. AFM figures of the UC-LP and CMCS-LP.

Round particles were observed, for Figure SI-1(A), the UC-LP has both small particles below 100 nm and some are larger than 100 nm, Figure SI-1 (B) showed more homogenous particles with the average size around 100 nm.

2. **Turbidity and pH**

Table S1. Turbidity of liposome UC-LP and CMCS-LP

Samples	UC-LP	CMCS-LP
Turbidity (T)	0.840±0.012	0.865±0.019
pH	7.51±0.05	7.38±0.06

Turbidity（T）is positively correlated to the particle size, slightly higher turbidity of CMCS-LP than UC-LP indicates a little bigger vesicle size. The pH of both liposomes is with the range of the PBS applied for the preparation of the liposomes.

3. Appearance of the samples during storage

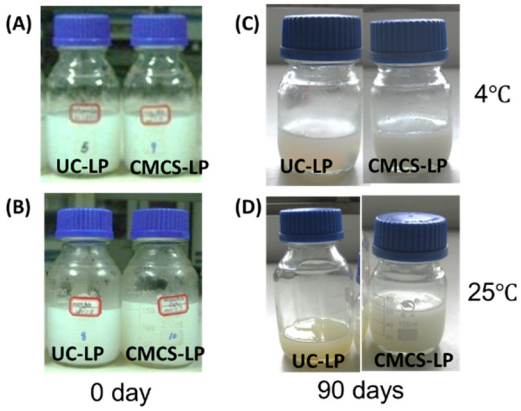

Fig. S2 Pictures of UC-LP and CMCS-LP before and after storage at different temperatures. (A) Day 0 of 4℃ storage samples; (B) Day 0 of 25 ℃ samples; (C) Day 90 of 4℃ storage samples; (D) Day 90 of 25℃ storage samples.

4. Differential scanning calorimetry (DSC)

The T_m of UC- LP and CMCS are 51.14℃ and 114.18℃，respectively, with the CMCS-LP is 139.34 ℃. The results indicate a higher stability of the CMCS-LP than that of the UC-LP.

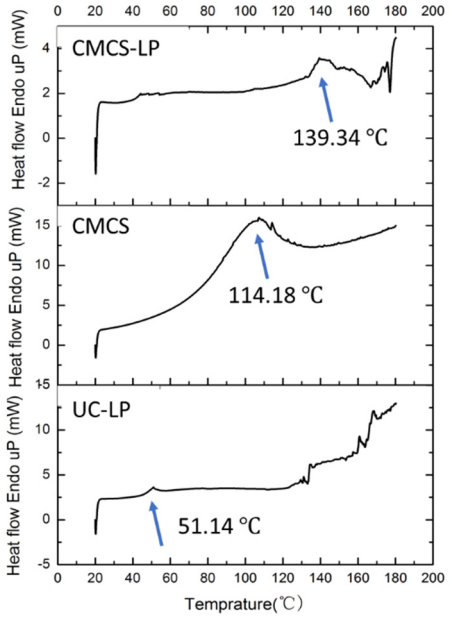

Fig. S3 DSC curves of UC-LP, CMCS and CMCS-LP.