Supporting information

A novel delivery system – liquid crystal emulsion containing HSO crystal

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Contents

UV-vis absorption spectra of vitamin E under different concentrations and its standard curve

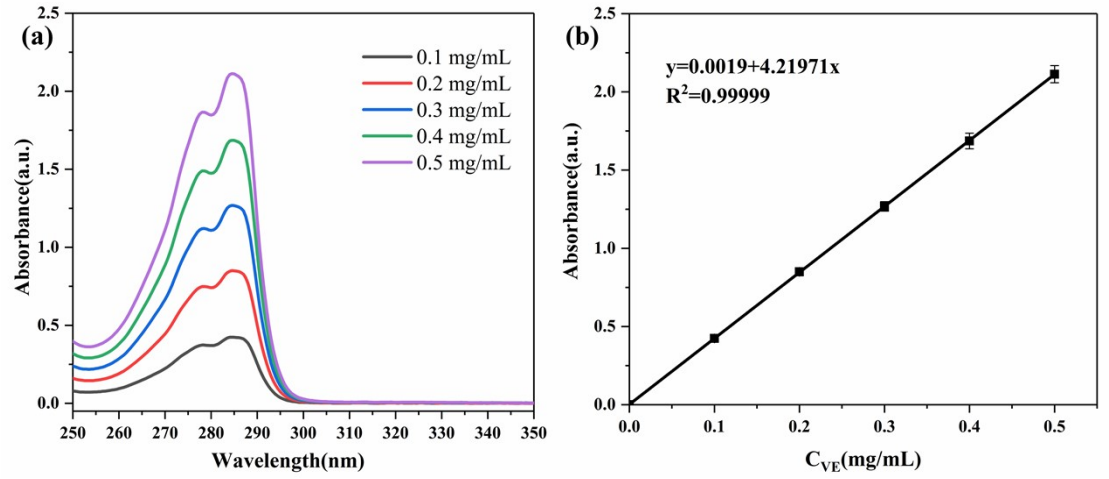

Fig. S1. (a) UV-vis absorption spectra of vitamin E in ethanol under different concentrations; (b)the standard curve based on UV-vis absorption of vitamin E under different concentrations. Data are presented as the mean ± standard deviation (n = 3).

The standard curve can be obtained by measuring a series of standard substances with known components. A series of vitamin E solutions (0.1-0.5 mg/mL) were prepared using ethanol as the solvent, and the UV-vis absorption at the corresponding concentration was measured with a UV spectrophotometer at 284.5nm (as shown in Fig. S1a). According to the experimental and linear fitting results, the function between the UV-vis absorption and the concentration of vitamin E was obtained as follows:

$$Absorp=4.21971\times C_{VE}+0.0019,\ R^2=0.9999 \quad (1)$$

The standard curve in Fig. S1b was used to calculate the release of vitamin E in vitro release test.

Optical image of liquid crystal emulsion

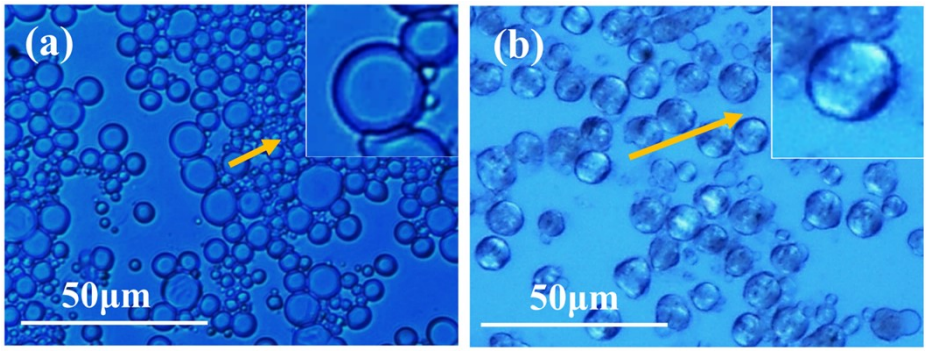

Fig. S2. Optical microscopic image of the liquid crystal emulsion with (a) and without (b) HSO crystal.

The droplet sizes distribution of liquid crystal emulsions

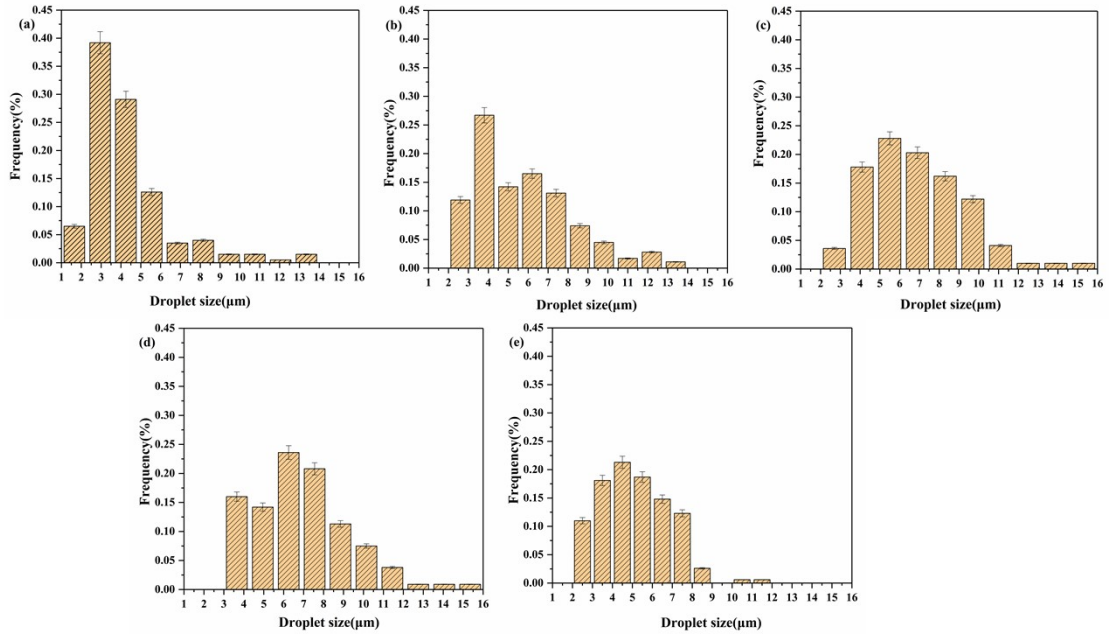

Fig. S3. The droplet sizes distribution of liquid crystal emulsions. (a) sample 1, (b) sample 2, (c) sample 3, (d) sample 4 and(e) sample 5.

Structural changes of liquid crystal emulsion during cooling course

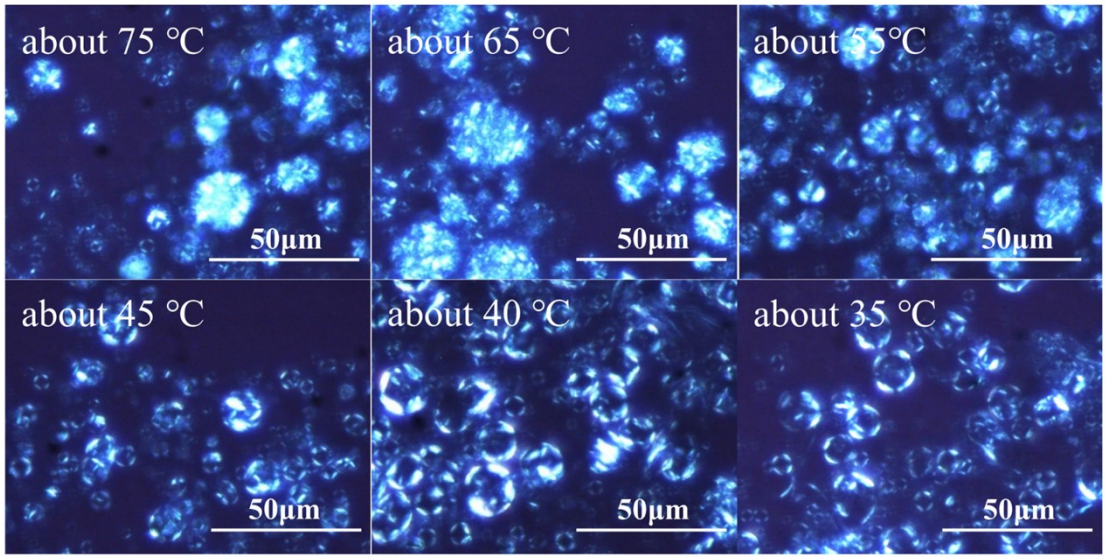

Fig. S4. PLM observations of liquid crystal emulsions under cooling at about 75 ℃, 65 ℃, 55 ℃, 45 ℃, 40 ℃ and 35 ℃.

The forming process of liquid crystal structure during cooling was observed. The emulsion after homogeneous process was then stirred at room temperature to cool down, and the samples were taken for polarizing observation. It can be seen that the liquid crystal structure was not observed at the interface of droplets at high temperatures. With the decrease of temperature, the liquid crystal texture gradually appeared at the interface. It has confirmed that the liquid crystal structure on the oil-water interface gradually formed during cooling. The system containing HSO presented perfect liquid crystal texture.

The cumulative release of vitamin E from four emulsion samples at different time points

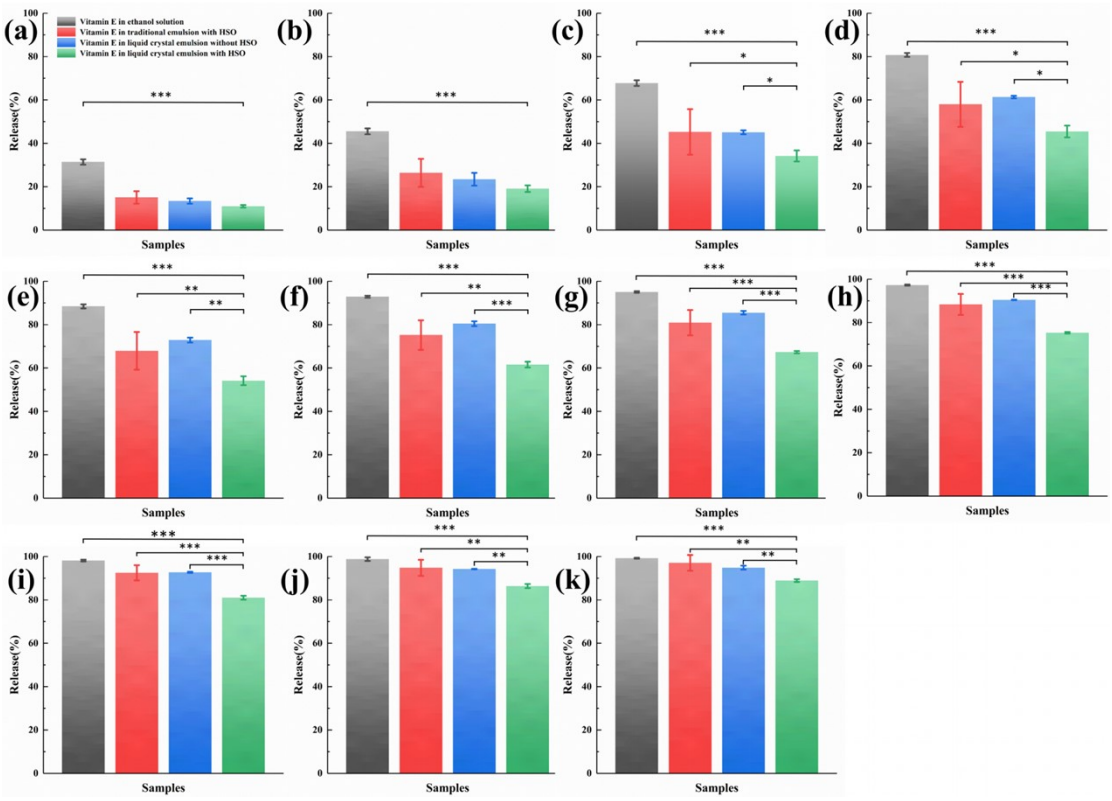

Fig. S5. The cumulative release of vitamin E from four emulsion samples at different time points. (a)0.5 h, (b)1 h, (c)2 h, (d)3 h, (e)4 h, (f)5 h, (g)6 h, (h)8 h, (i)10 h, (j)14 h, (k)24 h. *P< 0.05, **P<0.01, ***P<0.001.

The compositions of samples for *in vitro* release studies

Table S1. The compositions of samples for control experiment *in vitro* release studies.

Samples	Emulsifier		Oil phase			Water phase		
VE in ethanol solution	\	\	Ethanol	\	Vitamin E (VE)	\	\	\
VE in traditional emulsion with HSO	Tween -80	Span-80	HSO	GTCC	Vitamin E	U21	NaOH	Water