

Supporting Information

Ultrafast and continuous synthesis of phase change nanocapsules by salt-accelerated microwave-assisted polymerization

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Tables and Figures

Table S1. The table of factors and levels in orthogonal experiment.

Levels	Factors			
	NaCl amount (wt%)	Temperature (°C)	Reaction time (min)	Microwave Power (W)
1	0.8	50	10	500
2	1.0	60	20	600
3	2.0	70	30	700

Table S2. NanoPCMs synthesis conditions and corresponding morphologies

No.	NaCl amount (wt%)	Temperature (°C)	Reaction Time (min)	Microwave power (W)	Particle Size ^a		DLS ^b	
					<i>D</i> (nm)	PDI	<i>D_h</i> (nm)	PDI
S ₁	0.8	50	10	500	—	—	—	—
S ₂	1.0	50	20	700	168.6	—	2901.0	0.20
S ₃	2.0	50	30	600	84.3	—	531.6	1.00
S ₄	0.8	60	20	600	211.7	—	629.4	0.39
S ₅	1.0	60	30	500	97.8	—	331.5	0.13
S ₆	2.0	60	10	700	144.5	—	442.6	0.32
S ₇	0.8	70	30	700	145.7	—	739.7	0.61
S ₈	1.0	70	10	600	210.1	—	441.4	0.38
S ₉	2.0	70	20	500	9000.0	—	1104.0	1.0
S ₁₀	1.0	60	10	600	95.4	—	520.7	0.15
S ₁₁	0	60	720	600	—	—	—	—
S ₁₂	0	70	420	600	149.2	—	628.0	0.09
S ₁₃	1.0	70	720	—	185.6	—	285.5	0.29
S ₁₄	0	70	720	—	6440.0	—	1269.0	0.75

^a Measured by ImageJ software. D

^b Determined by DLS.

Table S3. Orthogonal table influence factor.

Test number	NaCl Content (wt%)	Temperature (°C)	Time (min)	Microwave Power (W)	E (%)
S ₁	0.8	50	10	500	—
S ₂	1.0	50	20	700	3.57
S ₃	2.0	50	30	600	14.69
S ₄	0.8	60	20	600	48.70
S ₅	1.0	60	30	500	51.28
S ₆	2.0	60	10	700	49.27
S ₇	0.8	70	30	700	32.74
S ₈	1.0	70	10	600	49.45

S ₉	2.0	70	20	500	36.77
K1	81.44	18.25	98.72	88.04	
K2	104.29	149.25	89.04	112.84	
K3	100.73	118.96	98.70	85.58	
k1	27.15	6.08	32.91	29.35	
k2	34.80	49.75	29.68	37.61	
k3	33.58	39.65	32.90	28.53	
R	7.65	43.67	3.23	9.08	
Degree of factors	Temperature > Microwave Power > NaCl Content > Time				
Best level	1.0	60	10	600	
Best group	NaCl Content 1.0wt% - Temperature 60 °C - Time 10 min- Microwave Power 600 W				

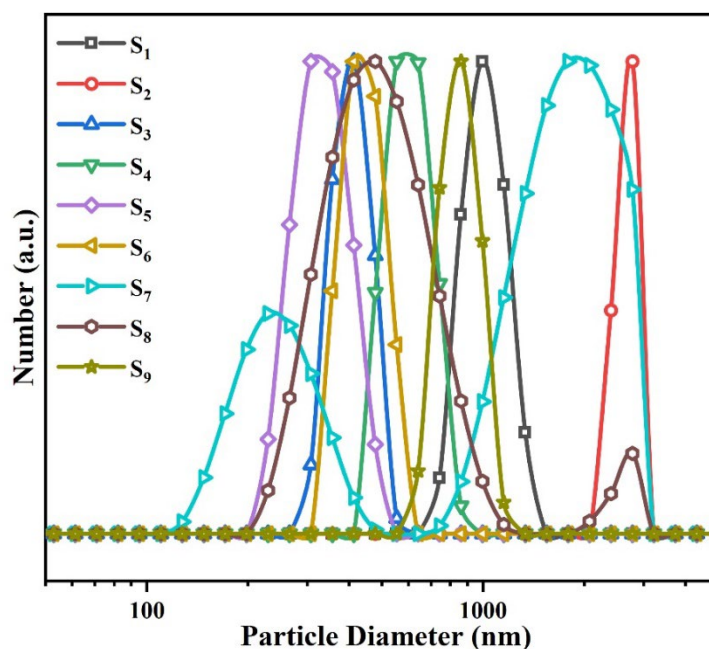


Fig. S1 DLS profiles of the S₁-S₉ NanoPCMs.

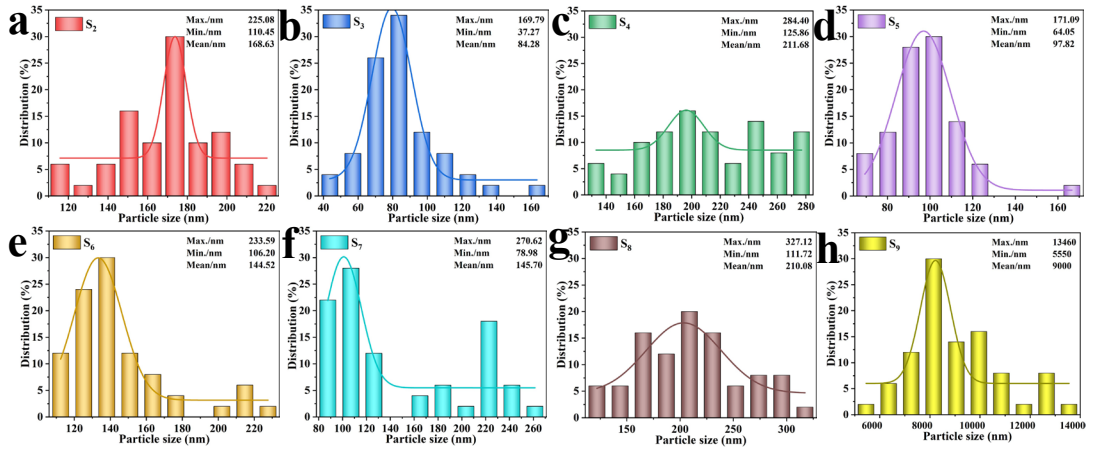


Fig. S2 Measure the particle size statistics of S₂-S₉ by image software.

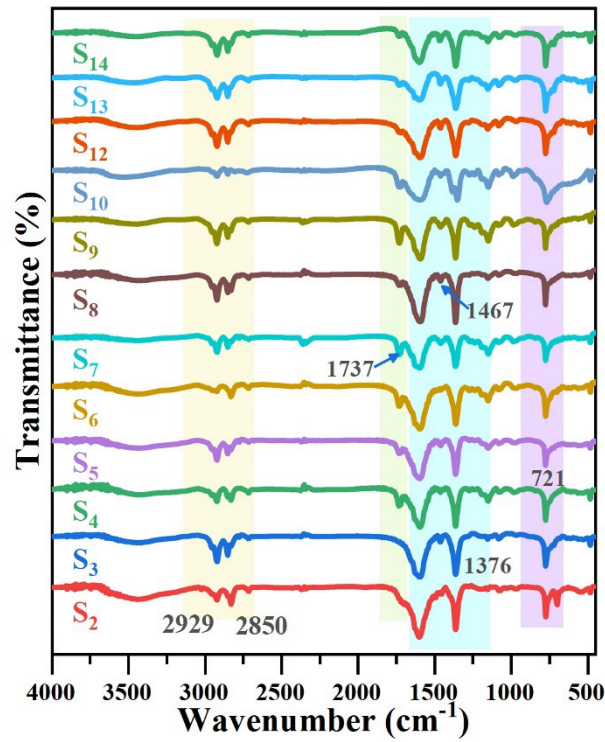


Fig. S3 FTIR spectra of NanoPCMs.

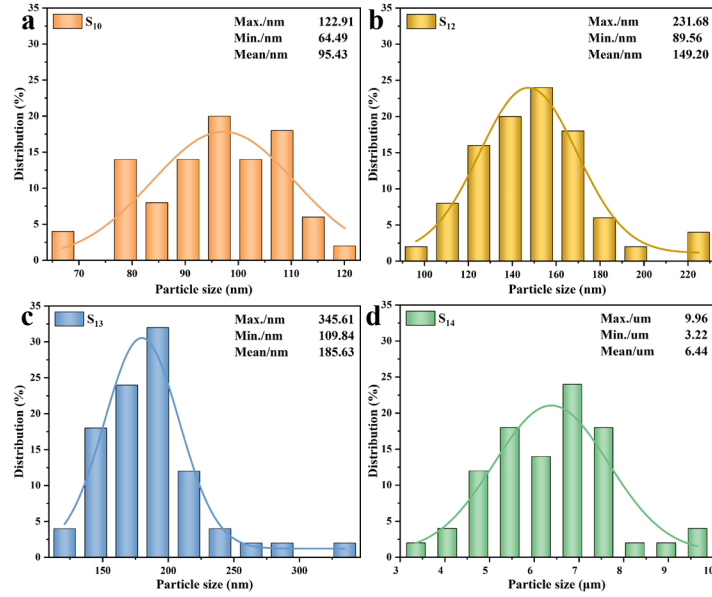


Fig. S4 Measure the particle size statistics of S₁₀, S₁₂, S₁₃ and S₁₄ by image software.

Table S4. Thermal properties of *n*-oct, S₁₀, S₁₂, S₁₃ and S₁₄.

Sample	Melting		Crystallization						ΔH_c (J/g)	R (%)	E (%)
	T_{mo} (°C)	ΔH_m (J/g)	α peak		β peak		γ peak				
			T_{coa} (°C)	ΔH_{ca} (J/g)	T_{cob} (°C)	ΔH_{cb} (J/g)	$T_{co\gamma}$ (°C)	$\Delta H_{c\gamma}$ (J/g)			
<i>n</i> -oct	20.9	226.3	26.1	227.9	—	—	—	—	227.9	—	—
S ₁₀	24.0	115.7	26.0	28.3	—	—	19.2	23.0	114.9	51.1	50.8
S ₁₂	25.8	106.2	26.0	35.9	19.1	3.6	10.6	13.3	109.2	46.9	47.4
S ₁₃	25.6	93.7	25.5	45.5	17.8	0.1	10.6	5.8	94.7	41.4	41.5
S ₁₄	26.0	97.9	26.0	48.7	—	—	10.0	7.7	99.2	43.3	43.3

T_{mo} : onset of melting point; ΔH_m : melting enthalpy; T_{coa} : onset of α crystallization point; T_{cob} : onset of β crystallization point; $T_{co\gamma}$: onset of γ crystallization point; ΔH_{ca} : α crystallization enthalpy; ΔH_{cb} : β crystallization enthalpy; $\Delta H_{c\gamma}$: γ crystallization enthalpy; ΔH_c : crystallization enthalpy.

Table S5. Thermal stability of *n*-oct, S₁₀, S₁₂, S₁₃ and S₁₄.

Sample	First step		Second step		T_e (°C)	W_{Re} (%)
	T_{10} (°C)	W_1 (%)	T_{20} (°C)	W_2 (%)		
<i>n</i> -oct	149.6	99.3	—	—	220.5	0.7
S ₁₀	208.8	62.5	386.4	30.0	511.9	7.5
S ₁₂	195.2	45.7	387.1	40.6	505.5	13.7
S ₁₃	199.2	49.1	397.6	36.0	506.8	14.9
S ₁₄	194.6	55.6	392.1	34.3	507.6	10.1

T_{10} : fastest decomposition temperature of the first mass loss; T_{20} : fastest decomposition temperature of the second mass loss; W_1 : mass percentage content of the first mass loss; W_2 : mass percentage content of the second mass loss; T_e : endpoint of the degradation temperature; W_{Re} : residual mass fraction.