Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Using phenolic polymers to control the size and morphology of calcium carbonate microparticles

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Table S1. M_n and PDI of the phenolic polymers.

Polymers	M_n ($\times 10^4$)	PDI
P1HS	7.2	1.35
P2HS	8.6	1.23
P3HS	8.0	1.20
P4HS	7.0	1.37
P5HS	14.0	1.68

Table S2. Sizes and standard deviations of $CaCO_3$ particles prepared under various conditions.

Polymer	Stirring speed (rpm)	Polymer concentration (mg/mL)	Mean value (μm)	Standard deviation (μm)
P1HS	500	0.1	4.53	0.79
P1HS	500	0.3	2.17	0.42
P1HS	500	0.5	2.03	0.42
P1HS	1000	0.1	2.58	0.55
P1HS	1500	0.1	1.76	0.31
P2HS	500	0.1	6.24	0.70
P2HS	500	0.3	6.00	0.62
P2HS	500	0.5	5.79	0.46
P2HS	1000	0.1	4.52	0.61
P2HS	1500	0.1	3.26	0.49
P3HS	500	0.1	7.45	0.81
P3HS	500	0.3	7.40	0.64
P3HS	500	0.5	5.79	0.60
P3HS	1000	0.1	6.33	0.57
P3HS	1500	0.1	4.09	0.41
P4HS	500	0.1	9.04	0.71
P4HS	500	0.3	6.05	0.91
P4HS	500	0.5	4.98	0.67
P4HS	1000	0.1	4.42	0.65
P4HS	1500	0.1	3.56	0.71
P5HS	500	0.1	7.16	0.65
P5HS	500	0.3	5.72	0.61
P5HS	500	0.5	4.94	0.59
P5HS	1000	0.1	4.42	0.65
P5HS	1500	0.1	3.56	0.71

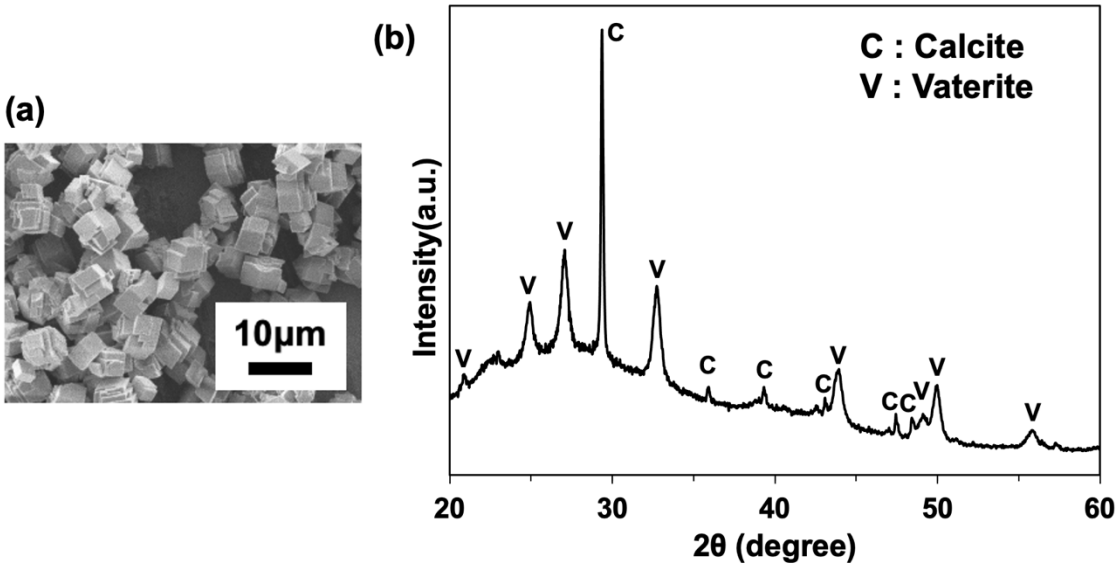

Fig. S1 (a) SEM image and (b) XRD pattern of $CaCO_3$ particles obtained in the absence of phenolic polymers.

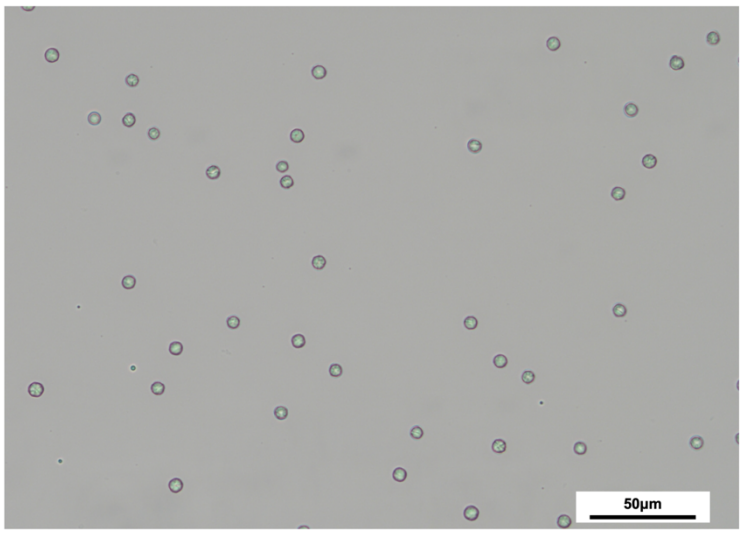

Fig. S2 The optical microscope image of $CaCO_3$ particles synthesized in the presence of P4HS. Stirring speed is 500 rpm.

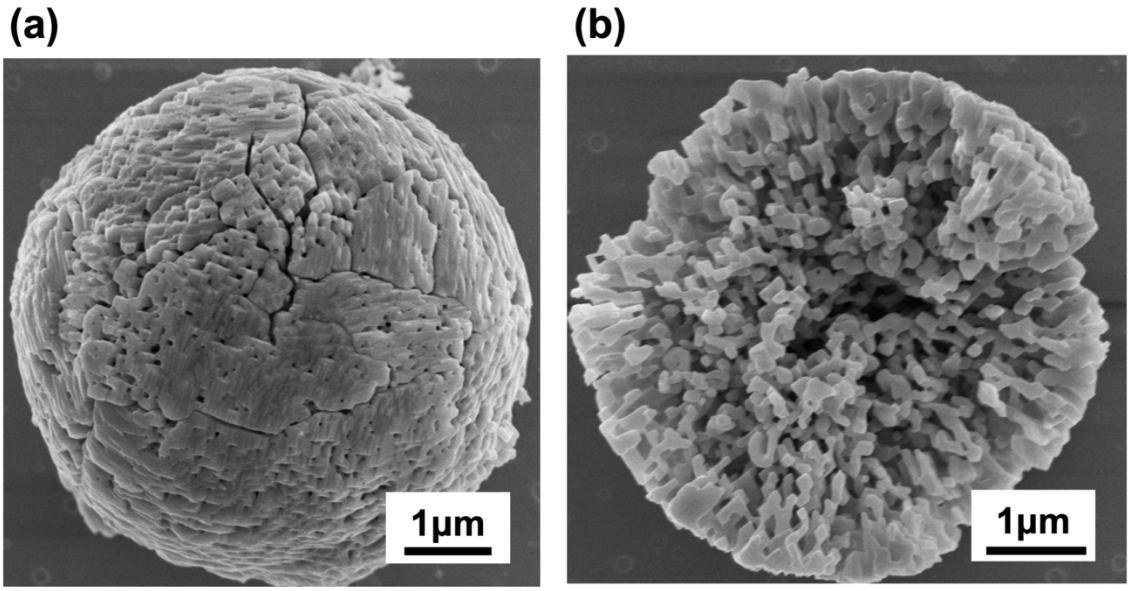

Fig. S3 Magnified SEM images of $CaCO_3$ particles, non-cracked (a) and cracked (b), synthesized in the presence of P4HS. Stirring speed is 500 rpm.

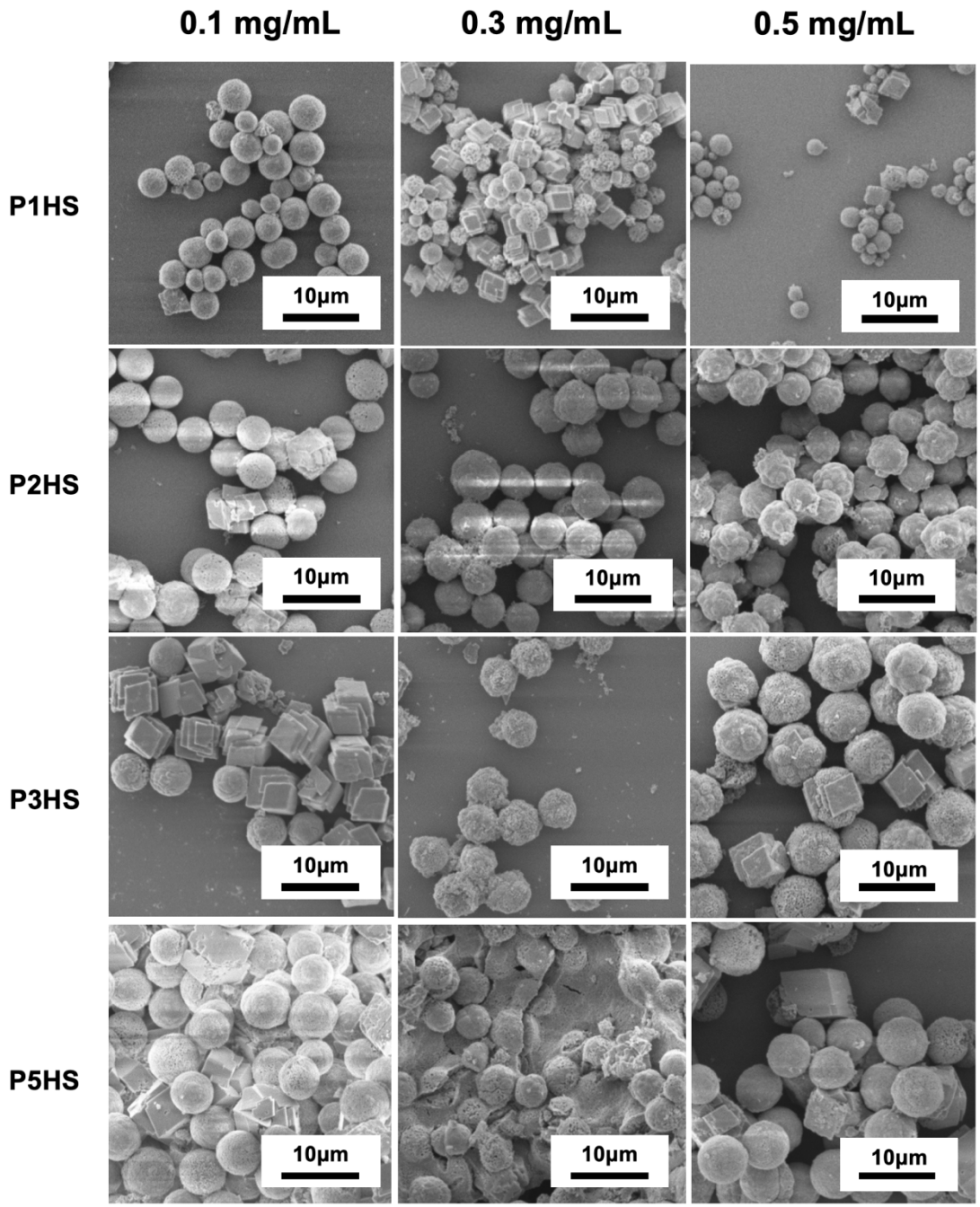

Fig. S4 SEM images of $CaCO_3$ particles obtained in the presence of phenolic polymers. Stirring speed is 500 rpm.

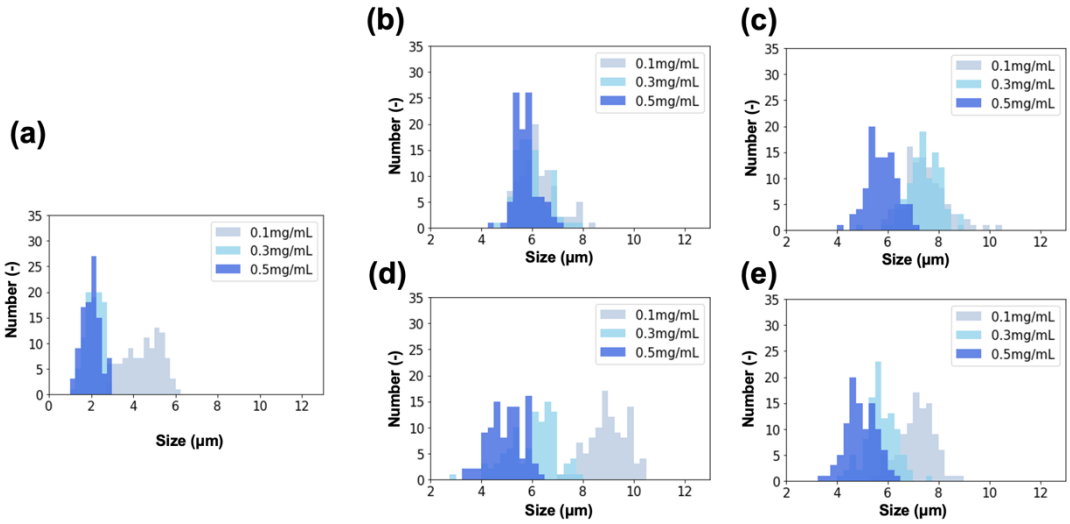

Fig. S5 The size distribution of $CaCO_3$ particles obtained in the presence of phenolic polymers. (a) P1HS, (b) P2HS, (c) P3HS, (d) P4HS, and (e) P5HS. The stirring speed was 500 rpm.

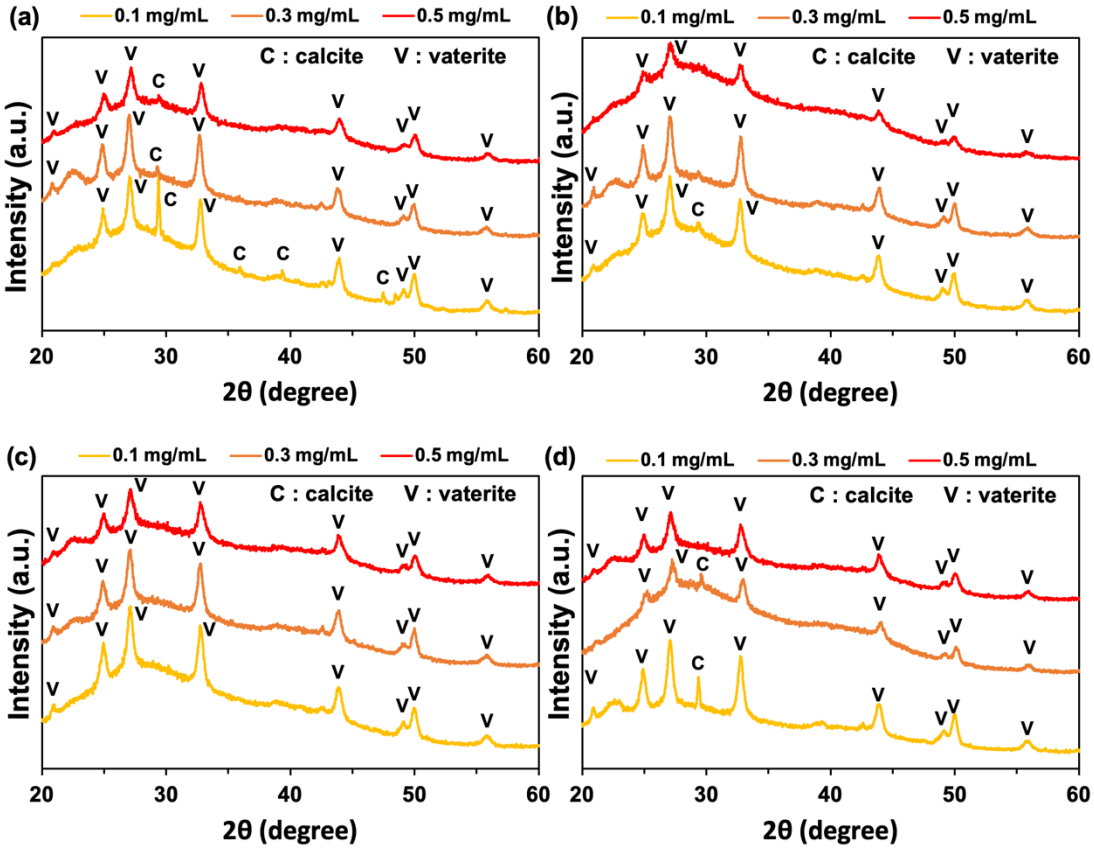

Fig. S6 XRD patterns of $CaCO_3$ particles obtained in the presence of (a) P1HS, (b) P2HS, (c) P3HS, (d) P4HS. The stirring speed was 500 rpm.

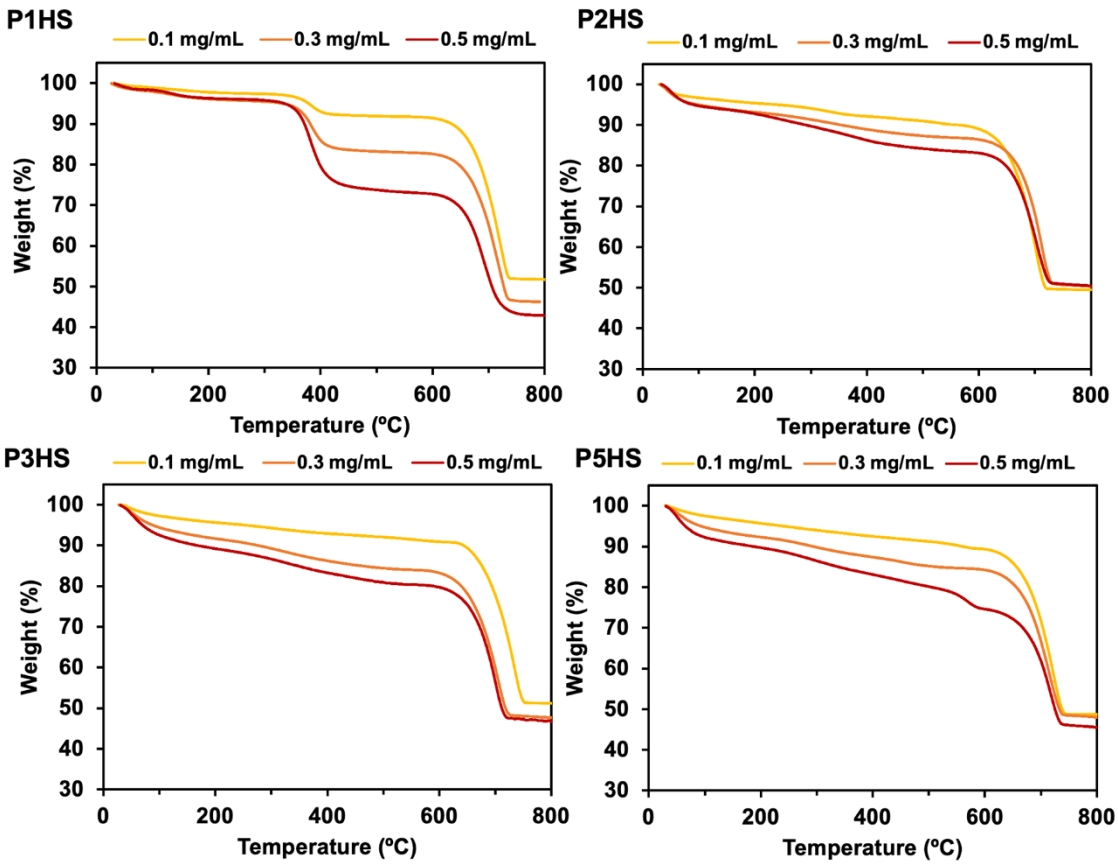

Fig. S7 TGA curves of the $CaCO_3$ particles prepared with P1HS, P2HS, P3HS and P5HS (0.1 mg/mL).

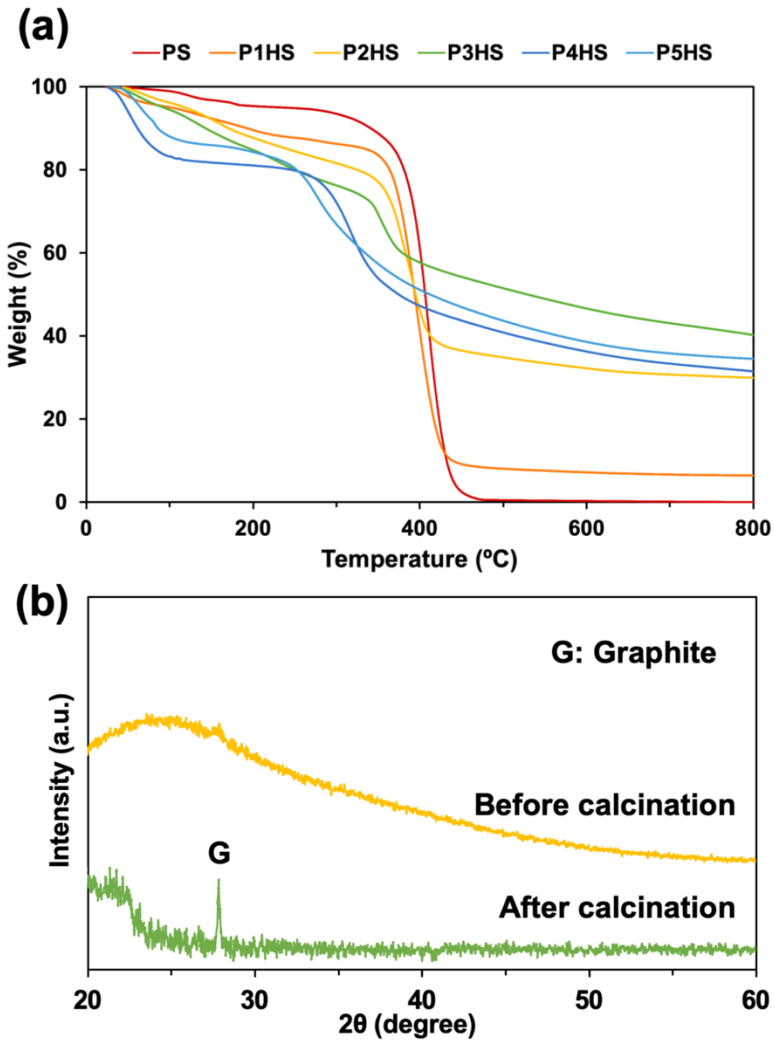

Fig. S8 (a) TGA curves of the five phenolic polymers and polystyrene (PS). (b) XRD patterns of P4HS before and after the calcination at 500ºC for 2h.

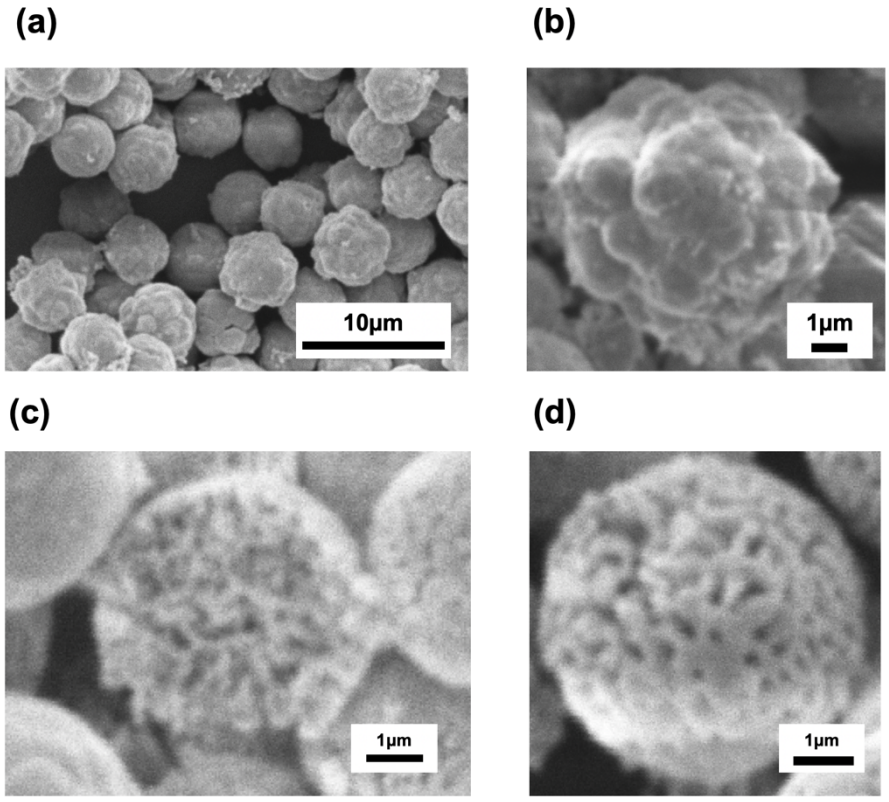

Fig. S9 (a), (b) Magnified SEM images of $CaCO_3$ particles synthesized with P2HS (0.3 mg/mL). (c), (d) Magnified SEM images of $CaCO_3$ particles after calcination synthesized with P5HS (0.1 mg/mL) with a stirring speed of 1000 rpm.

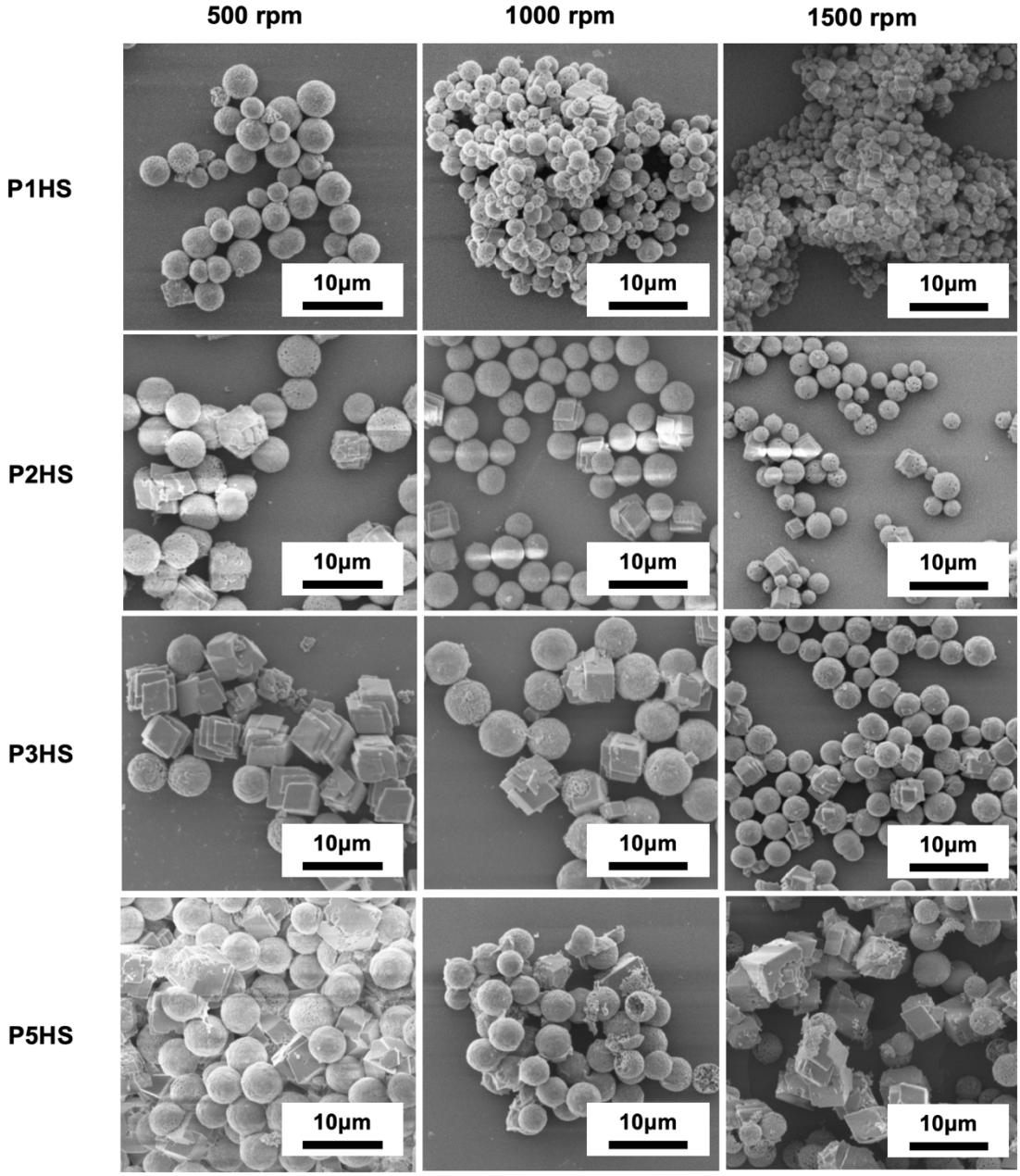

Fig. S10 SEM images of $CaCO_3$ particles obtained in the presence of phenolic polymers.

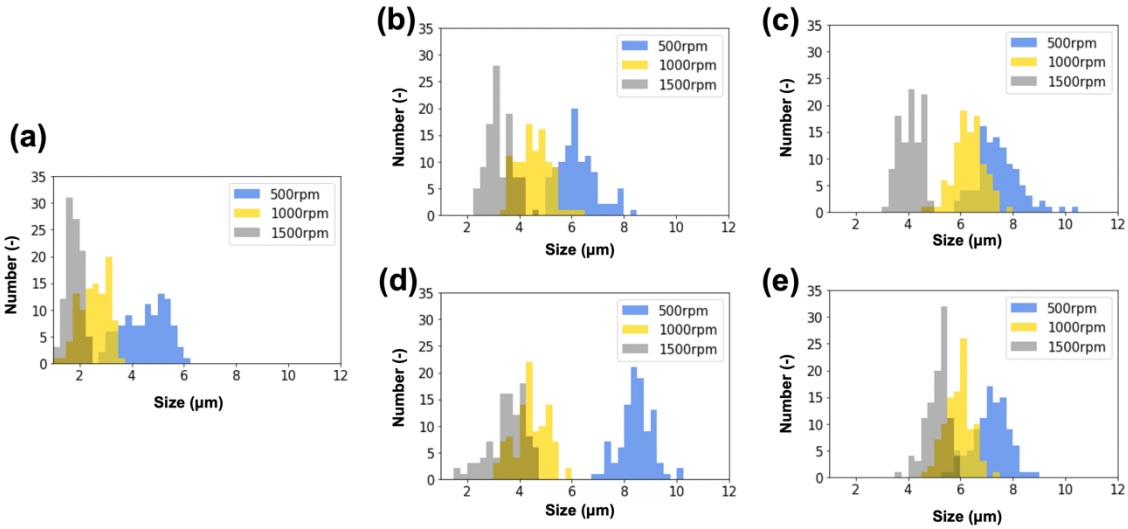

Fig. S11 The size distribution of $CaCO_3$ particles obtained in the presence of phenolic polymers. (a) P1HS, (b) P2HS, (c) P3HS, (d) P4HS, and (e) P5HS. The polymer concentrations were 0.1 mg/mL.

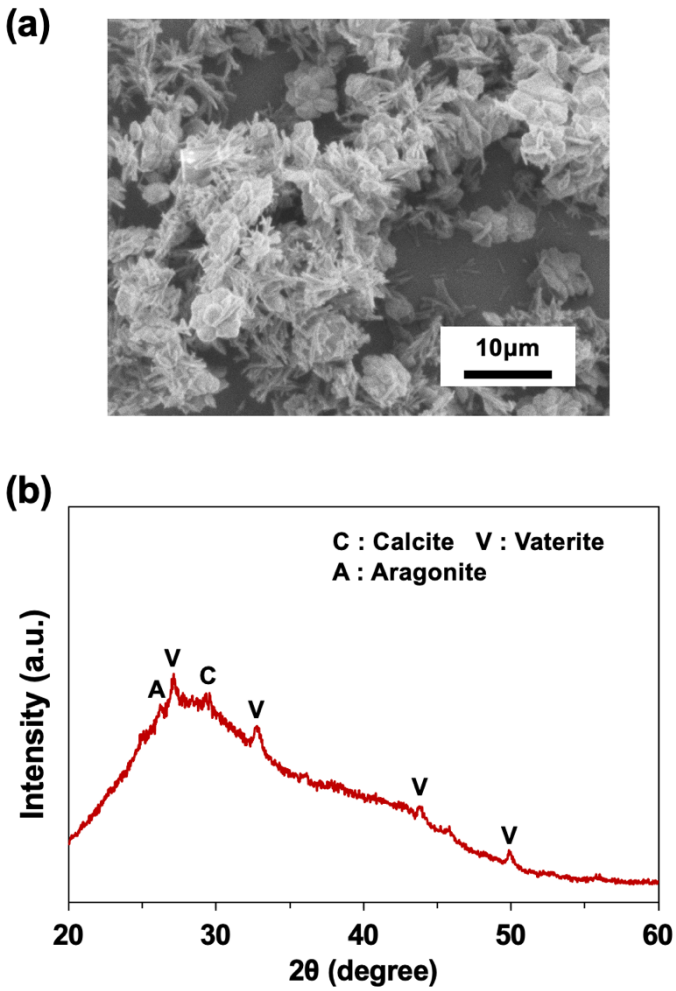

Fig. S12 (a) SEM image and (b) XRD pattern of $CaCO_3$ particles obtained in the absence of polymer at the temperature of 80°C.

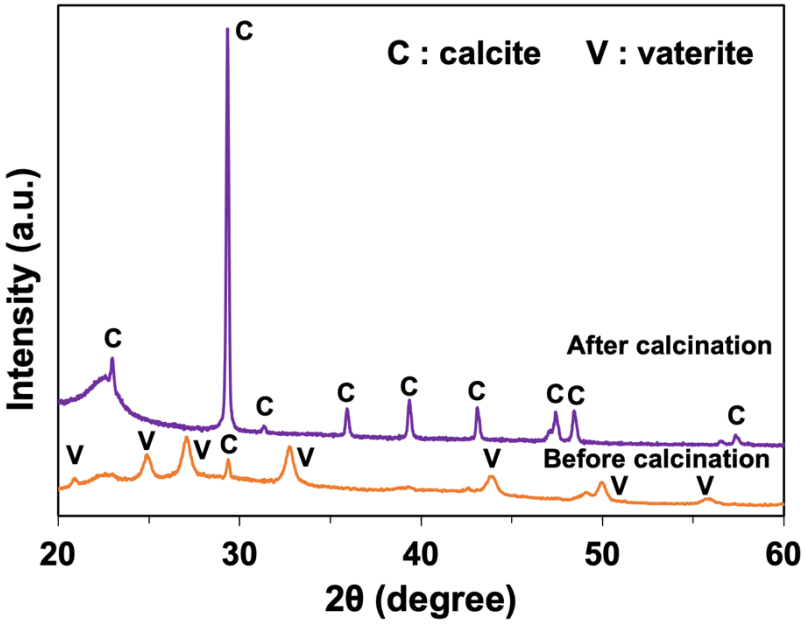

Fig. S13 XRD patterns of $CaCO_3$ particles before and after calcination at 500°C for 2h. The $CaCO_3$ particles were prepared with P4HS.

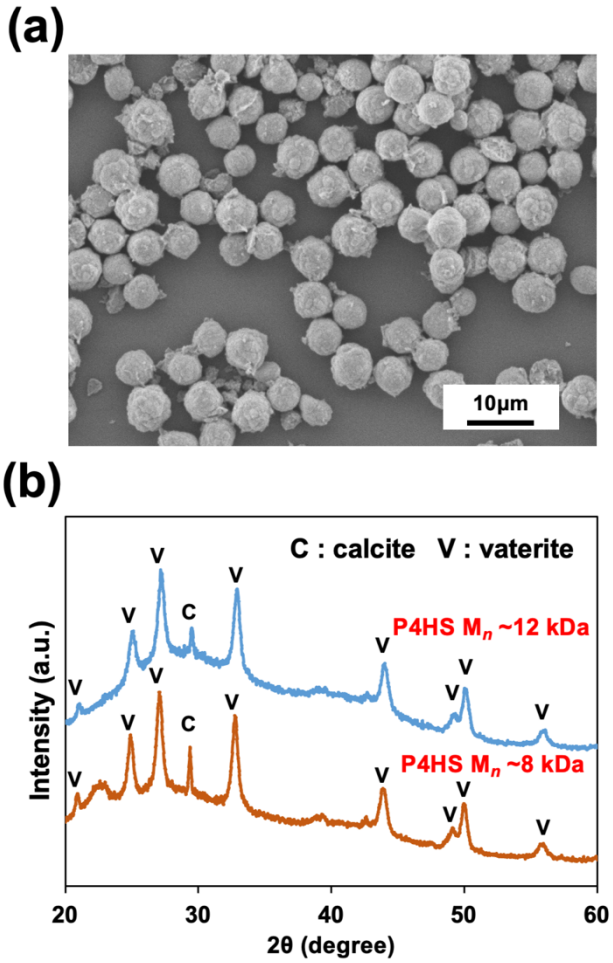

Fig. S14 (a) SEM image and (b) XRD patterns of $CaCO_3$ particles prepared in the presence of P4HS (M_n ~12kDa). The data for M_n ~8 kDa is the same as Fig. 1c but also shown here for comparison.

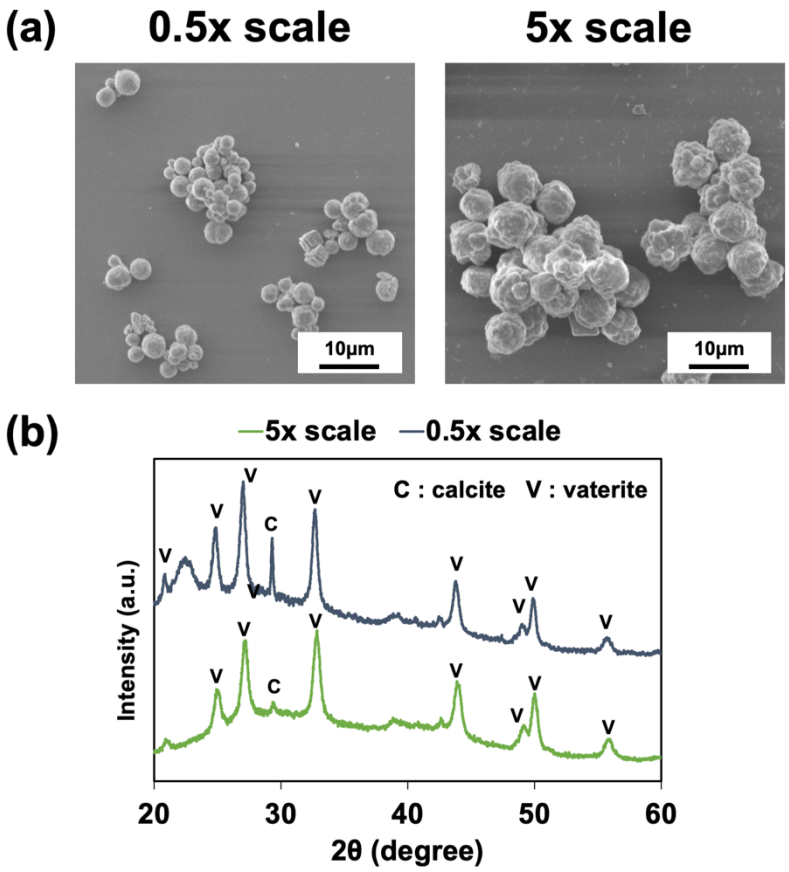

Fig. S15 (a) SEM images and (b) XRD patterns of $CaCO_3$ particles prepared in the presence of P4HS at different scale of reaction.