Supporting Information

Naturally Occurring and Biomimetic Synthesized Calcite Spherulites

Shitao Wu, Justine I. Blake, Li Guo and Wuzong Zhou

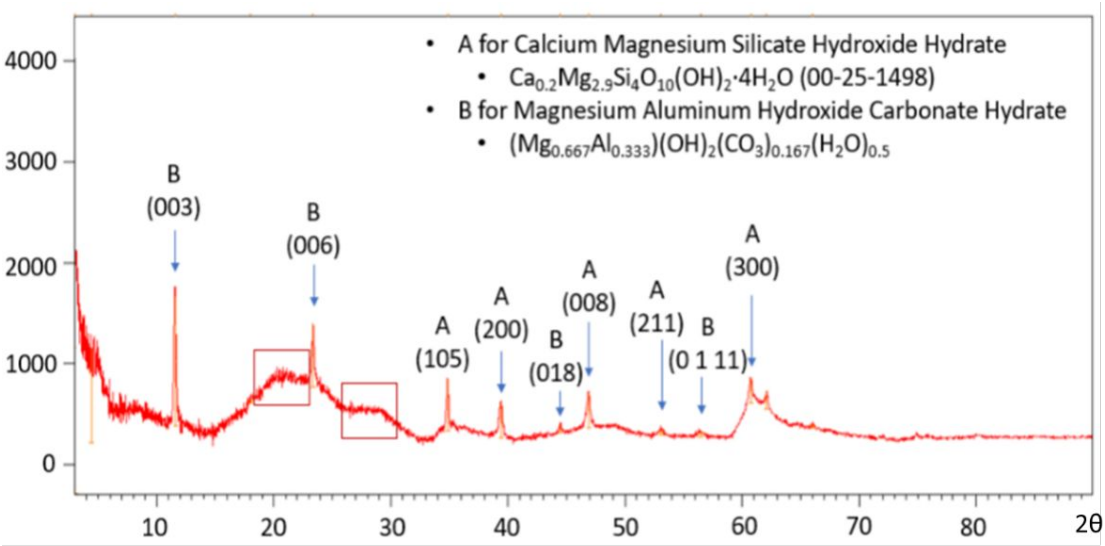


Figure S1. XRD pattern from a dried stevensite specimen.

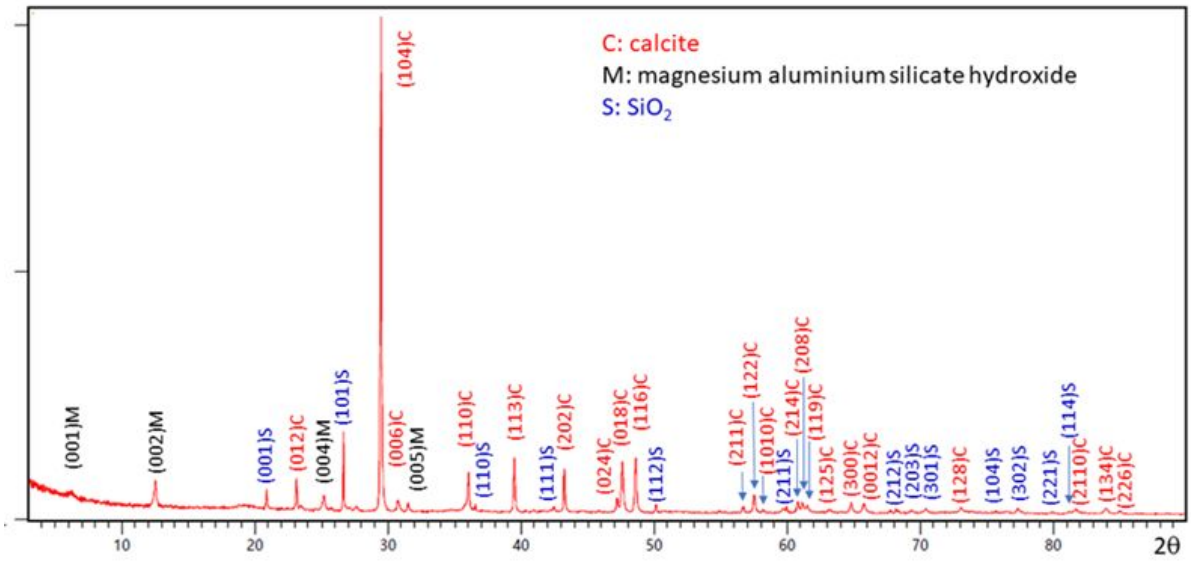


Figure S2. A typical XRD pattern from natural rock sample containing many calcite spherulites.

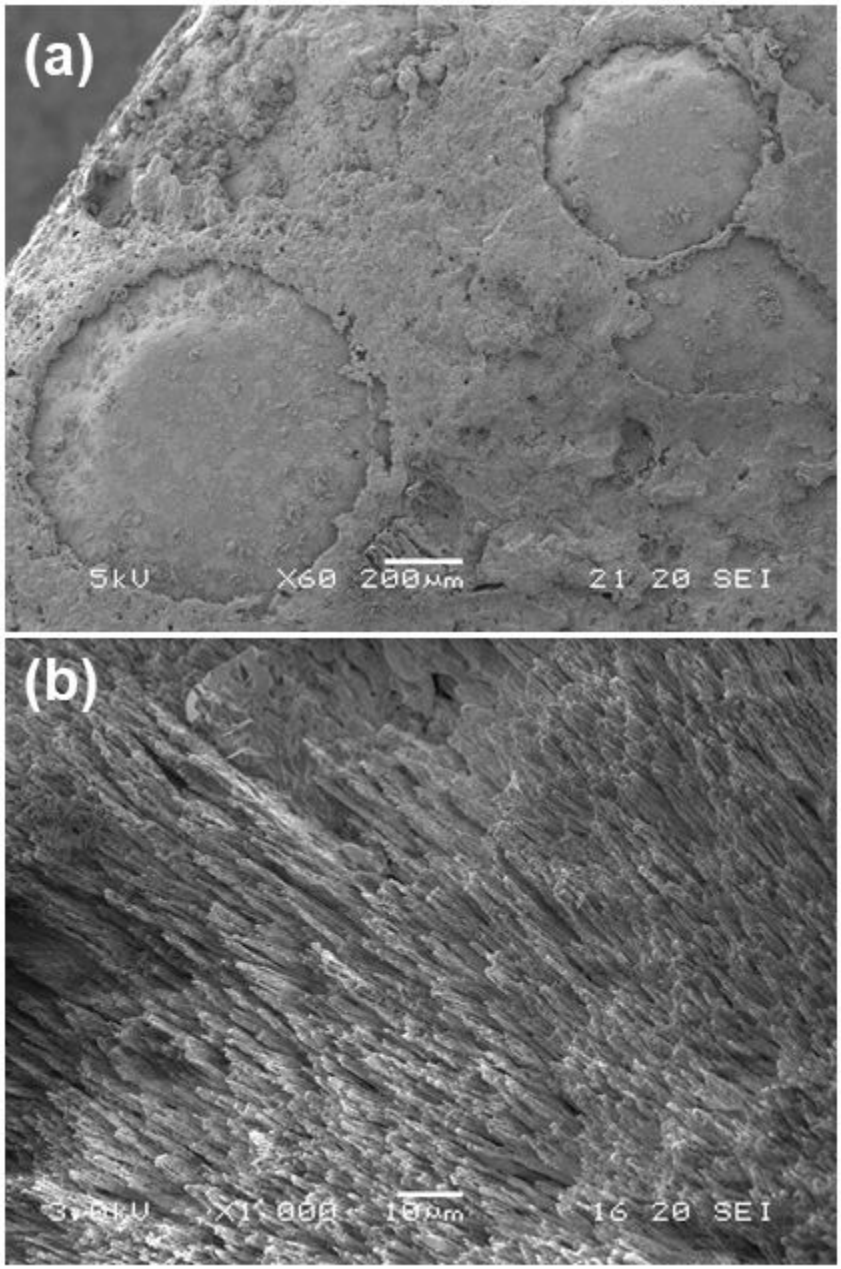
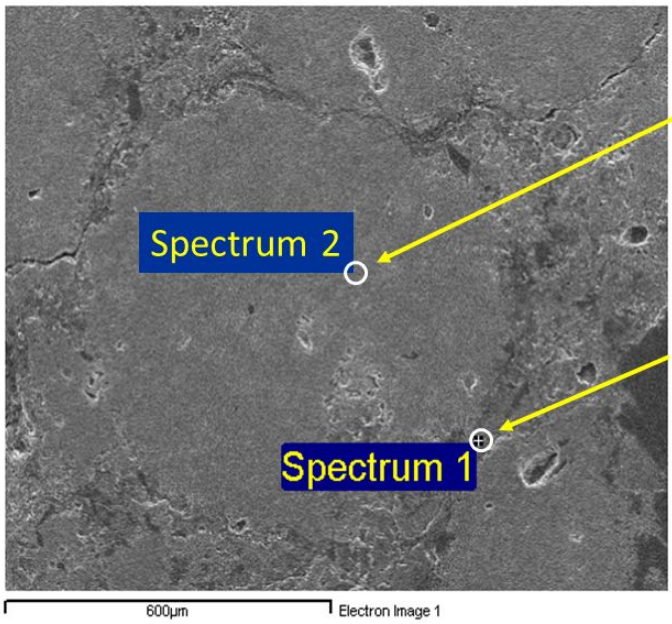


Figure S3. (a) SEM image of a rock sample with two spherulite exposing to the surface. (b) SEM image of a spherulite surface after acid treatment, revealing the microrods.



Element	Weight%	Atomic%
C K	11.27	18.45
O K	51.48	63.28
Ca K	37.24	18.27
Totals	100.00	

Element	Weight%	Atomic%
C K	63.02	74.78
O K	20.16	17.97
Al K	2.27	1.20
Si K	7.74	3.93
K K	1.77	0.65
Ca K	1.17	0.41
Ti K	1.78	0.53
Fe K	2.09	0.53
Totals	100.00	

Figure S4. EDX point analysis of a spherulite with a thin C-rich surface layer.

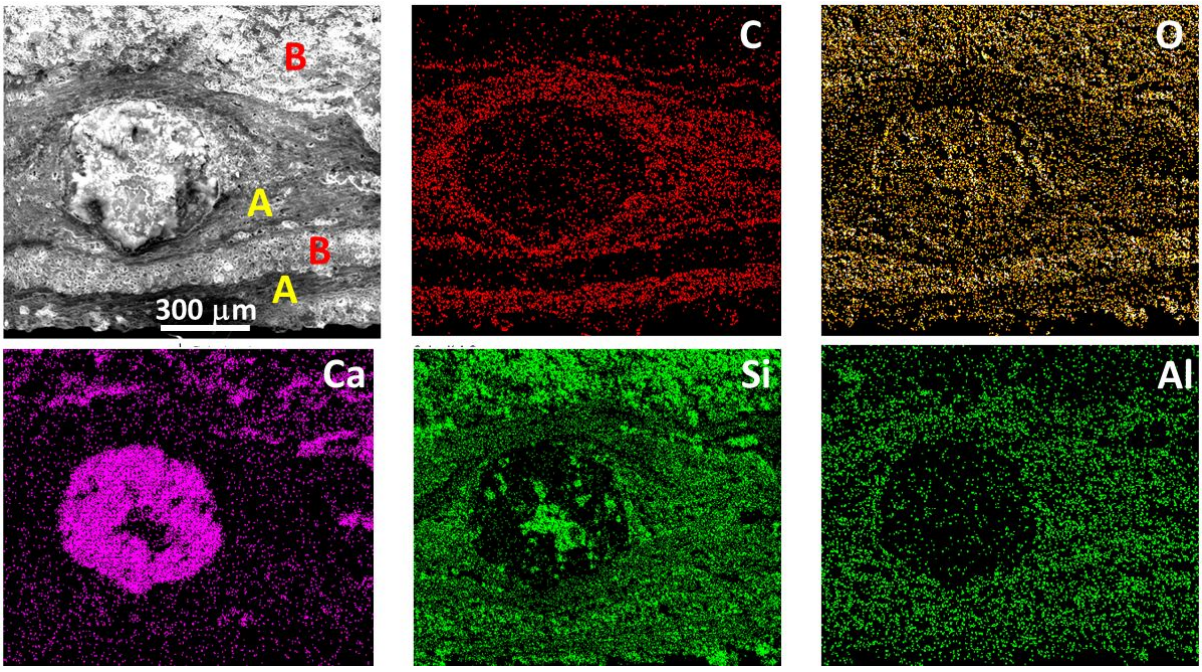


Figure S5. EDX elemental mapping of a spherulite with its surroundings. Top-left picture is a SEM image of the area. The spherulite is covered by two layers, A is C-rich and O-poor. B is mainly silicate.

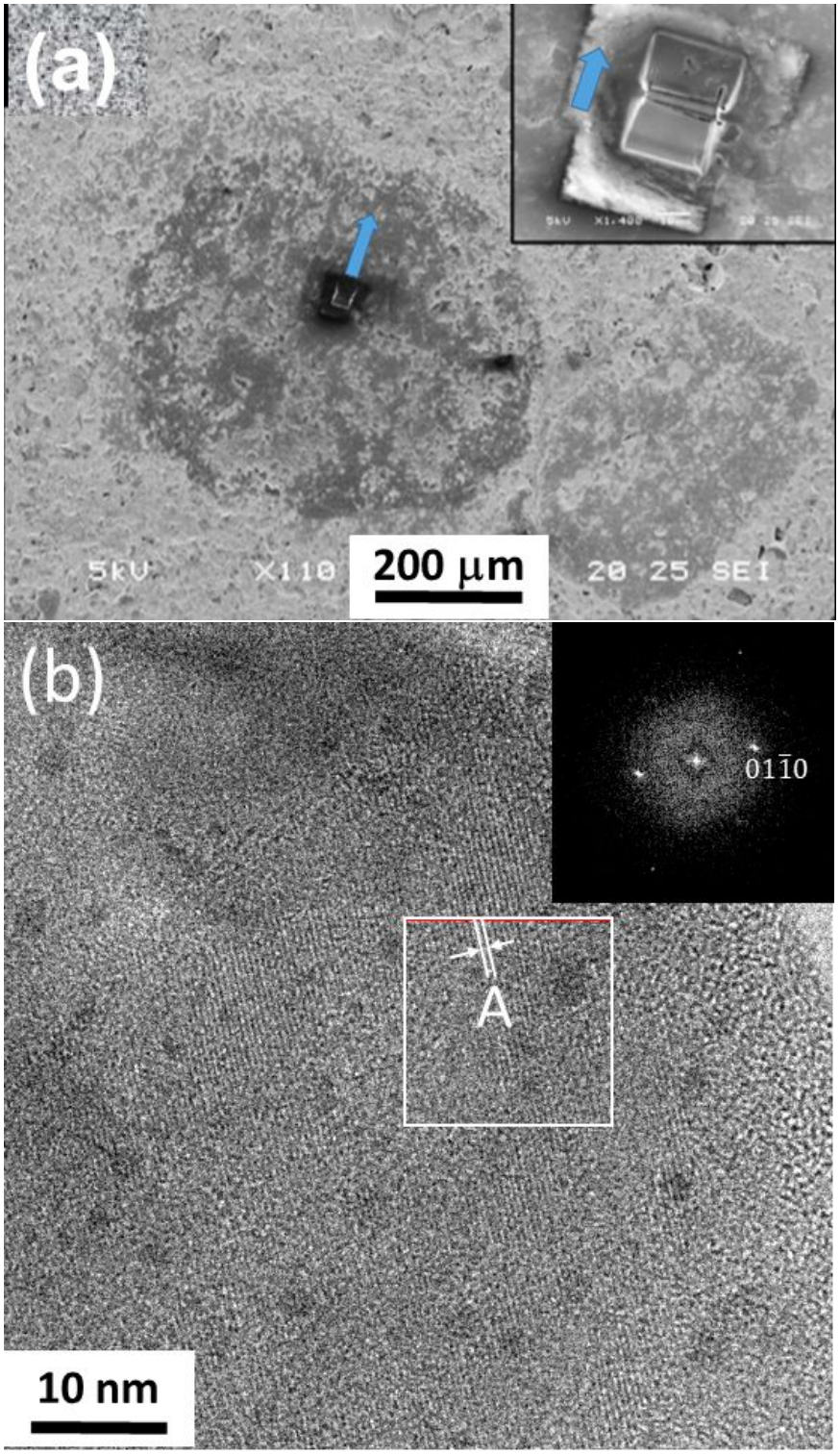


Figure S6. (a) SEM image of a naturally occurring spherulite showing the location of FIB cutting. The resulted specimen plate is normal to the radial direction. (b) The corresponding HRTEM image of an edge of a microrod, showing many separated nanocrystallites. The fringes "A" are indexed to (01-10) of the calcite structure.

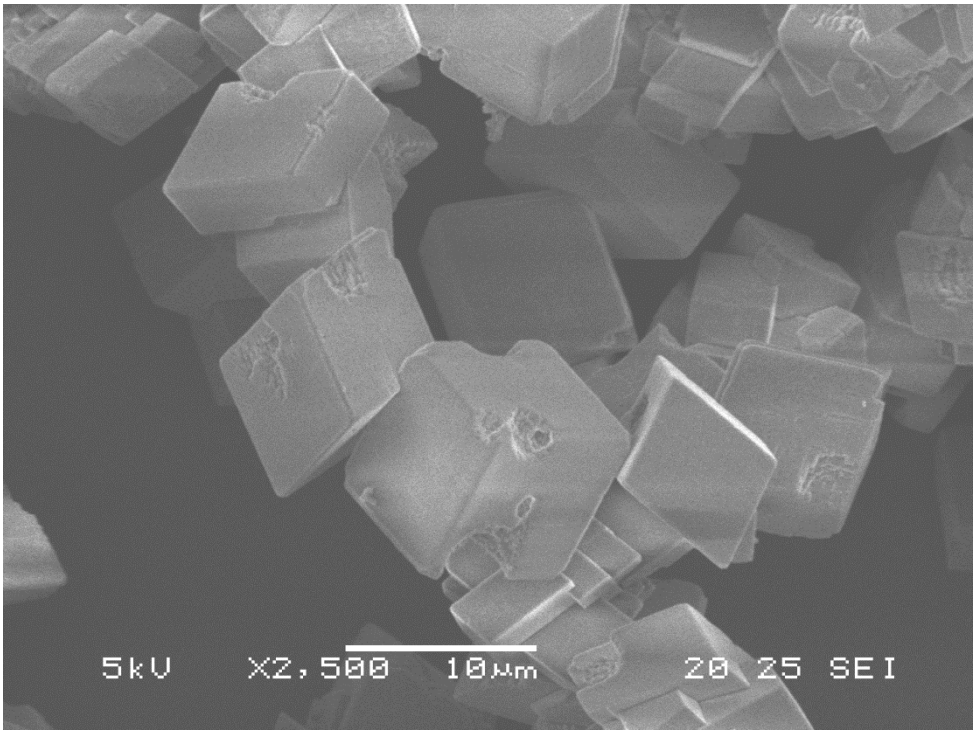


Figure S7. SEM image of rhombohedral crystals in group 1 via a simple mixture of 5.0 mmol $CaCl_2$ and Na_2CO_3 solutions. The reaction time is 7 days.

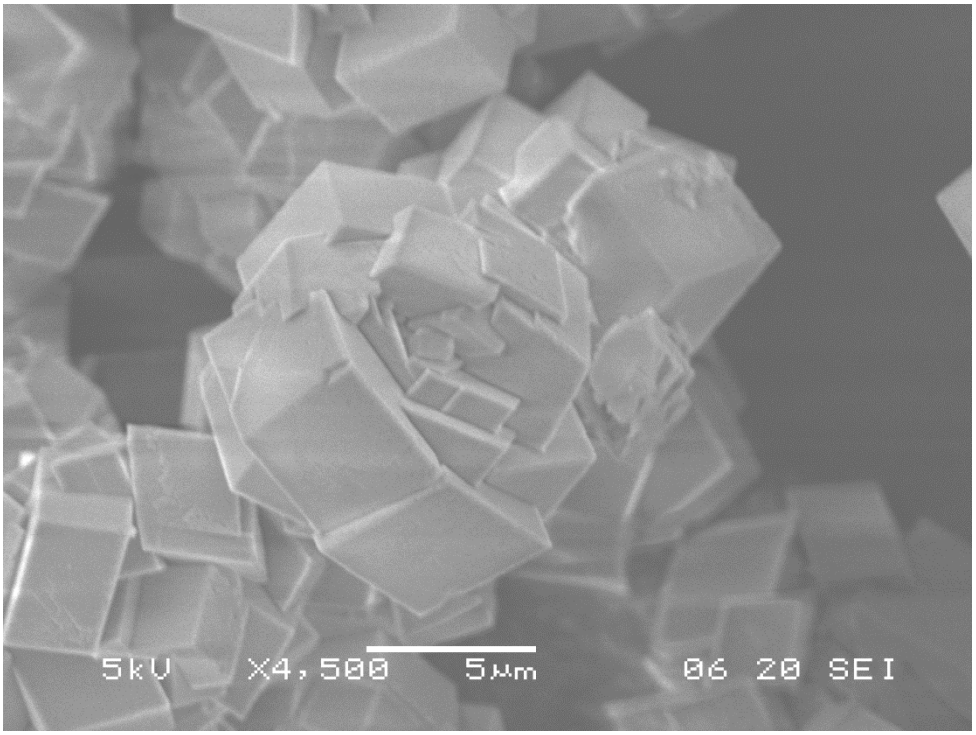


Figure S8. SEM image of rhombohedral crystals in group 2 via a mixture of 5.0 mmol $CaCl_2$ and a stevensite suspension, followed by addition of 5.0 mmol Na_2CO_3 solution. The reaction time is 72 h.

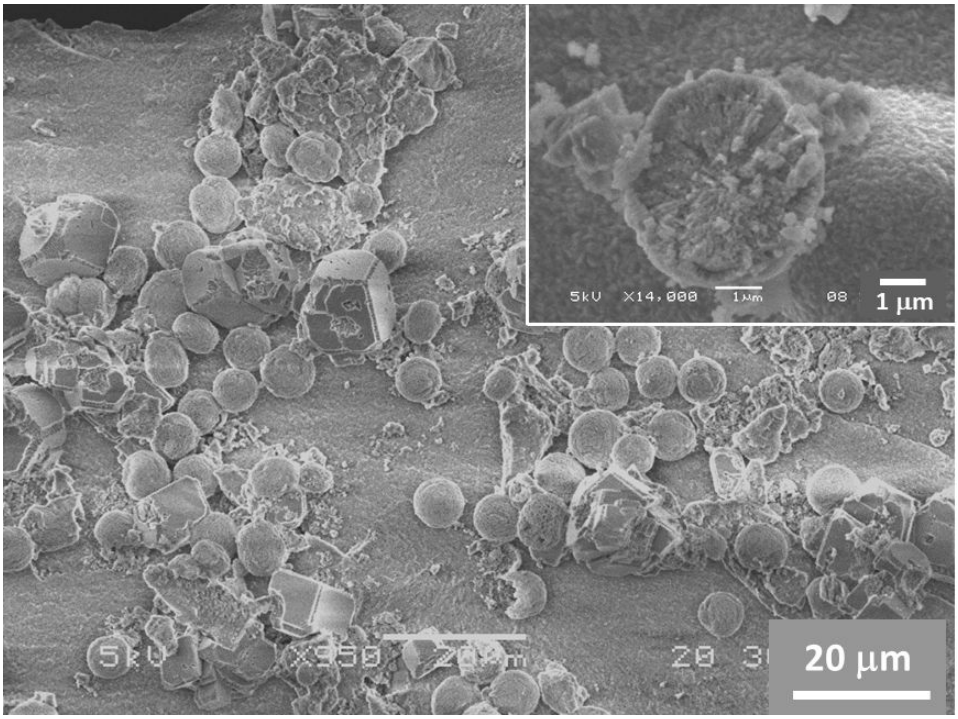


Figure S9. SEM image of a specimen in Group 4 with reaction time of 3 h, showing a mixture of bulk crystals and spherulites. The inset is a SEM image of cross section of a spherulite with the reaction time of 30 min.

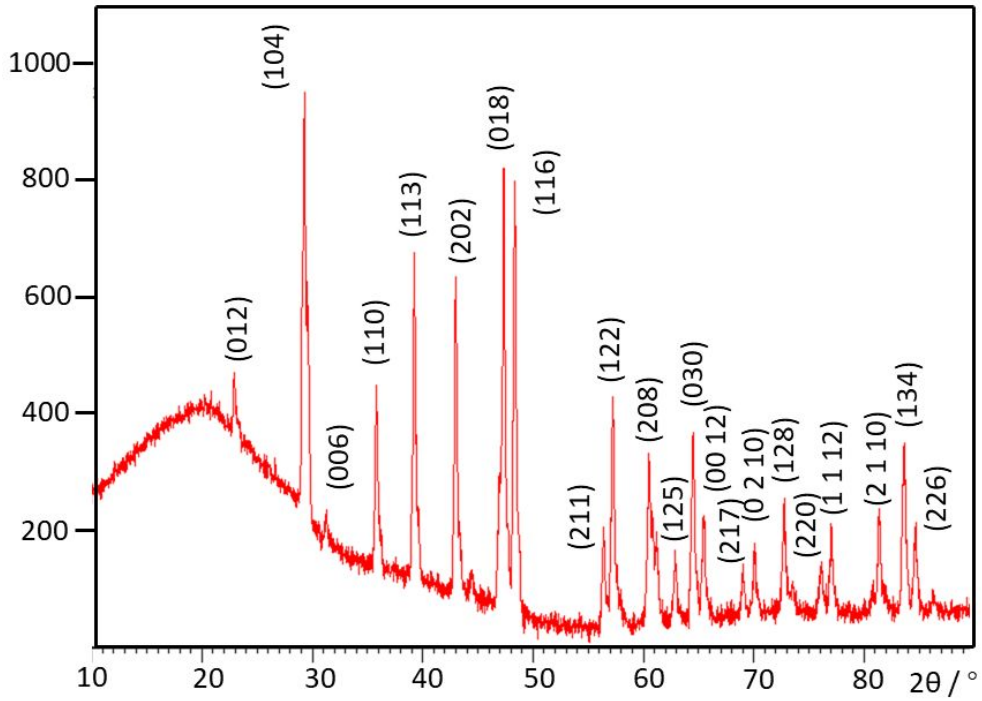


Figure S10. PXRD pattern of Group 6 sample with reaction time of 30 min. The diffraction peaks are indexed to the rhombohedral structure of calcite. The sample also contains a large amount of alginate.

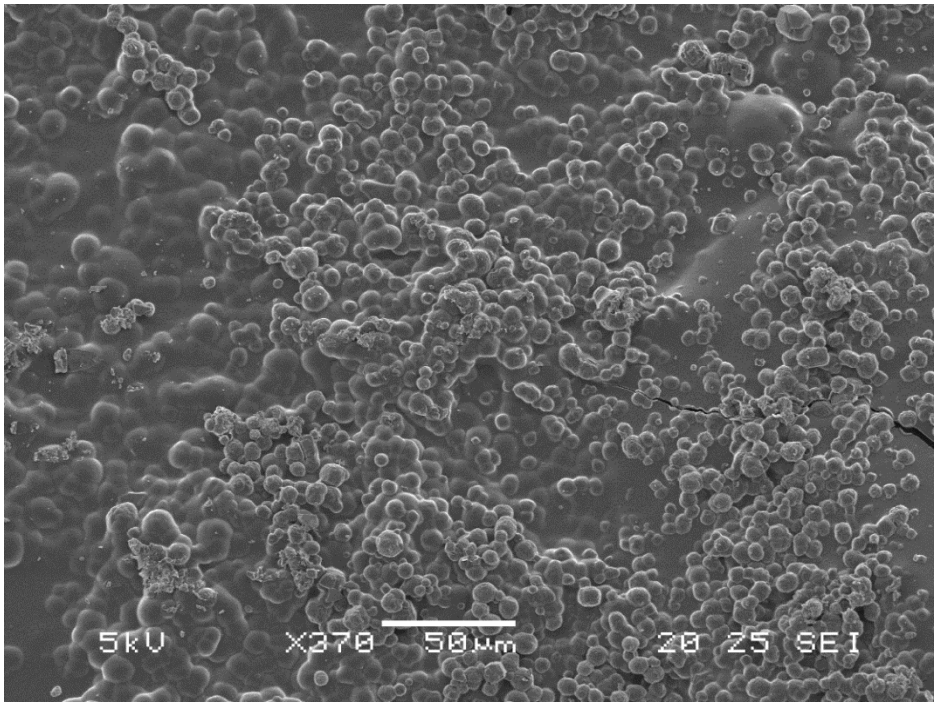


Figure S11. SEM image of a specimen in Group 7 with reaction time of 6 days, showing a high stability of the spherulites.

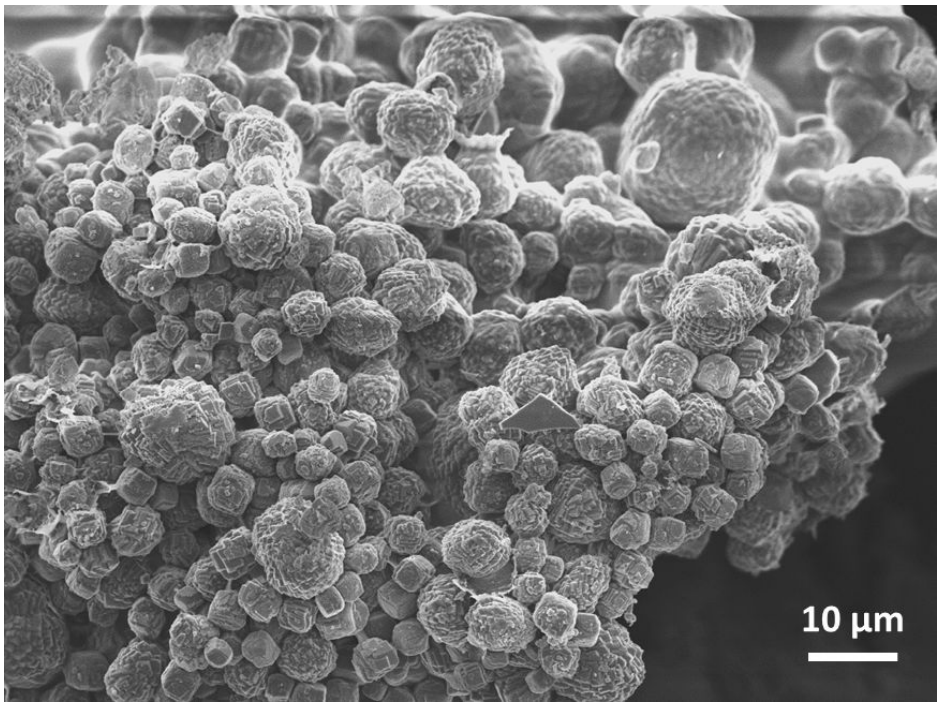


Figure S12. SEM image of a specimen in Group 8 with a reaction time of 1 h.

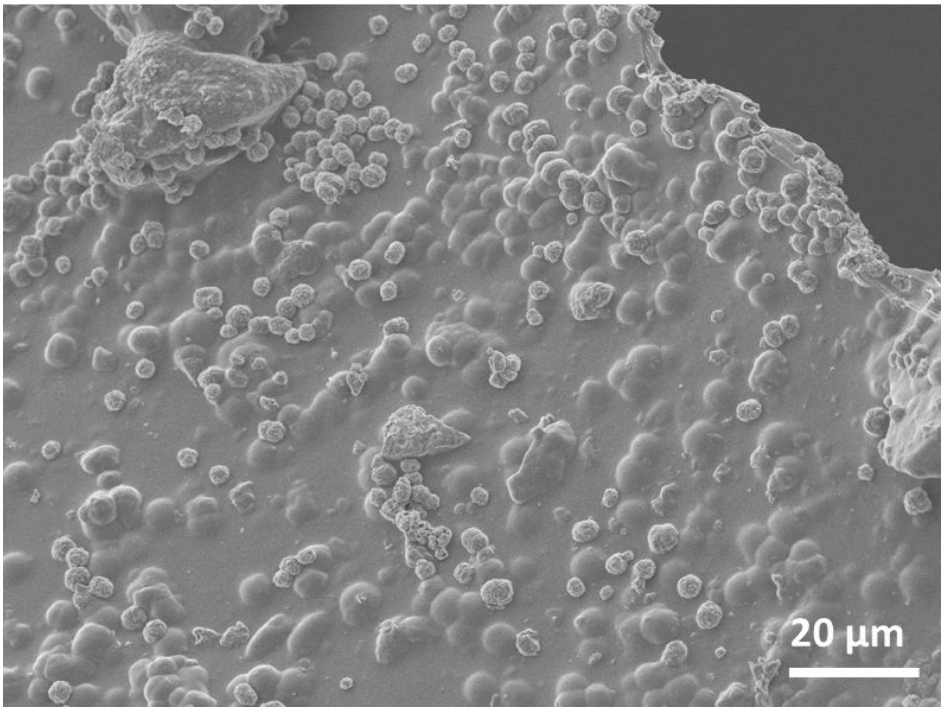


Figure S13. SEM image of a specimen in Group 9 with a reaction time of 1 h.

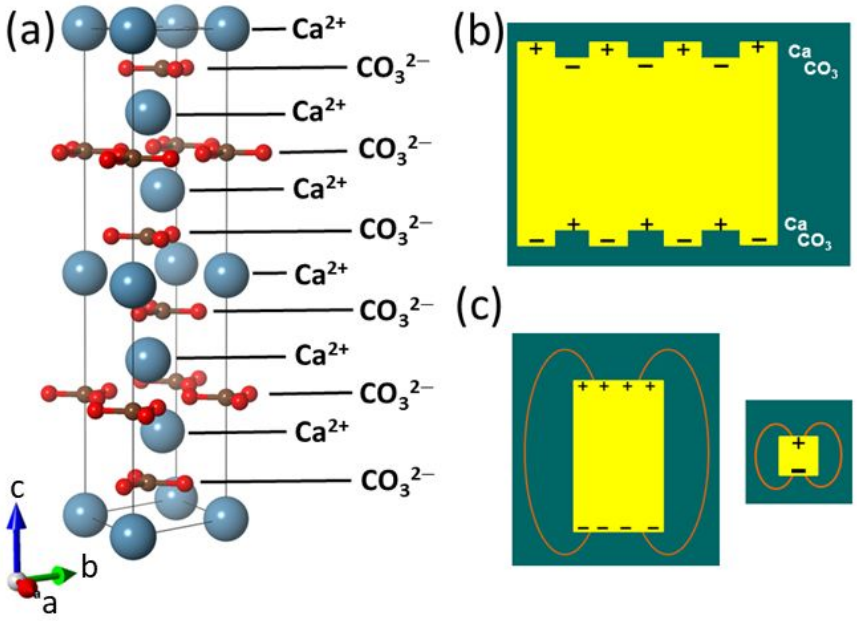


Figure S14. Schematic drawing of (a) the structure of calcite, showing alternative layers of Ca^{2+} and CO_3^{2-} along the c axis, (b) a large crystal with uneven {0001} surfaces, (c) large and small crystals with charge separation to form a dipolar field.