

Supplementary Information

Nonclassical Pathway to Biomimetic Strained SrSO_4 Crystals

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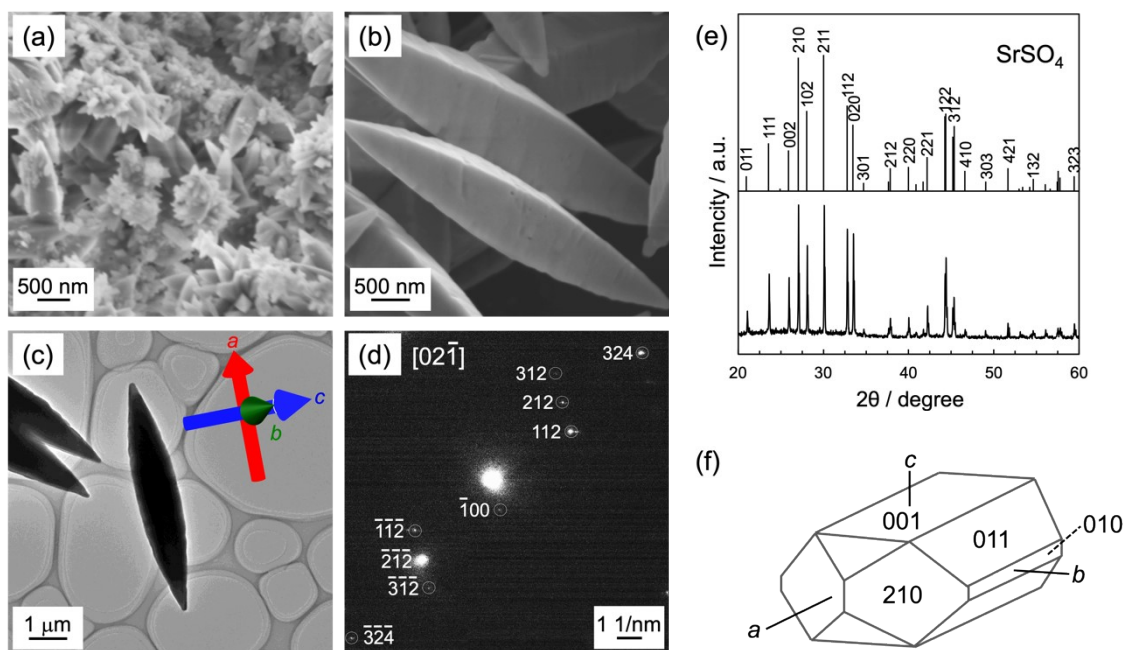


Fig. S1 SEM (a, b) and TEM (c) images and SAED (d) and XRD patterns (e) of products by mixing Na_2SO_4 and SrCl_2 without additives. The initial products (a) and crystals after a reaction over 15 min (b, c). ICDD#00-005-0593 for SrSO_4 (orthorhombic, $a = 0.8359$ nm, $b = 0.5352$ nm, $c = 0.6866$ nm). A schematic illustration of a geological SrSO_4 crystal with a tabular (001) habit and common crystallographic orientation (f). We reproduced the image from an illustration in ref. #1.

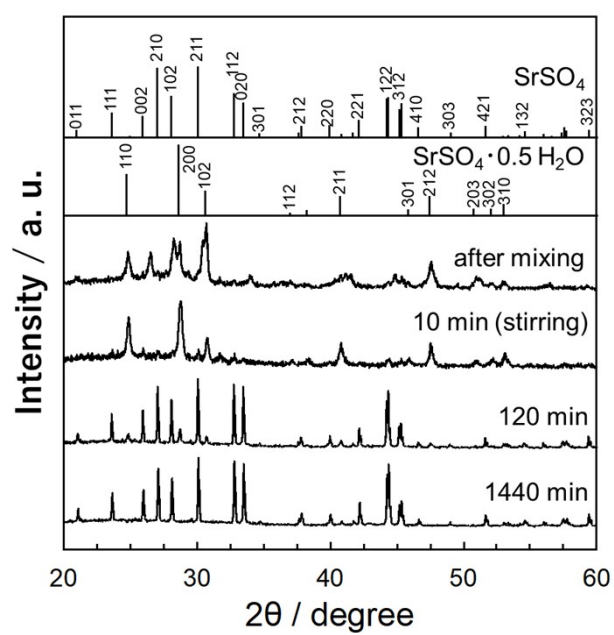


Fig. S2 XRD patterns of products by mixing SrCl_2 and Na_2SO_4 solutions with PAA (69 mmol/dm^3) with Miller indices. ICDD#00-048-0965 for $\text{SrSO}_4 \cdot 0.5\text{H}_2\text{O}$ (hexagonal, $a = 0.7188 \text{ nm}$, $c = 0.6593 \text{ nm}$), ICDD#00-005-0593 for SrSO_4 (orthorhombic, $a = 0.8359 \text{ nm}$, $b = 0.5352 \text{ nm}$, $c = 0.6866 \text{ nm}$).

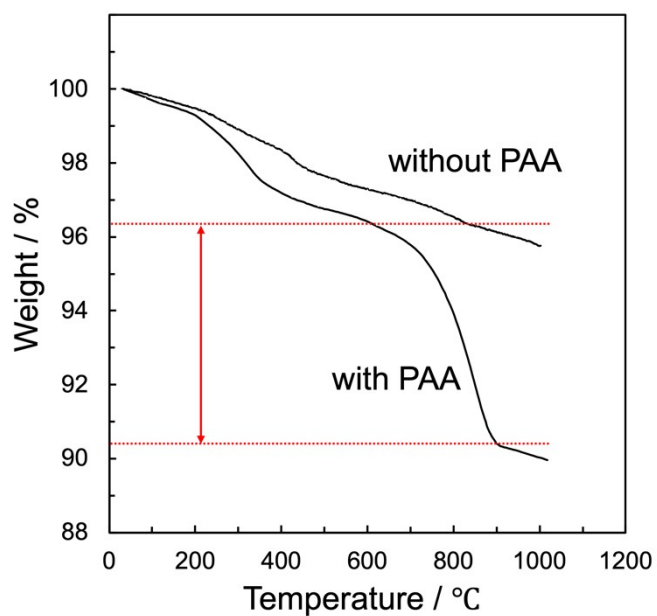


Fig. S3 TG curves of products obtained by mixing SrCl_2 and Na_2SO_4 solutions with (35 mmol/dm^3) and without PAA. A weight loss in the product without PAA is ascribed to water contained inside the crystals.

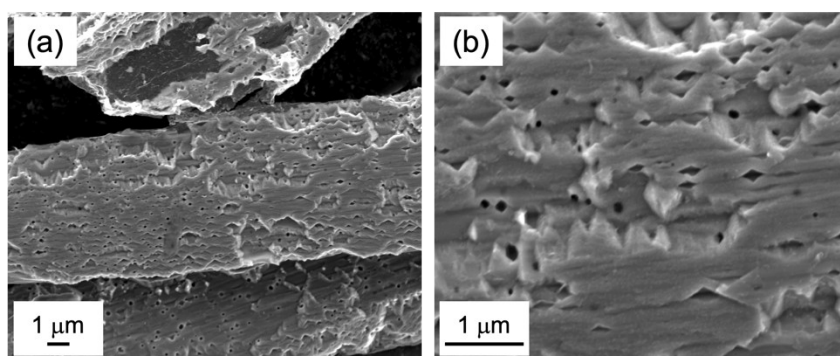


Fig. S4 SEM images (a, b) of SrSO_4 spines of acantharian skeletons.

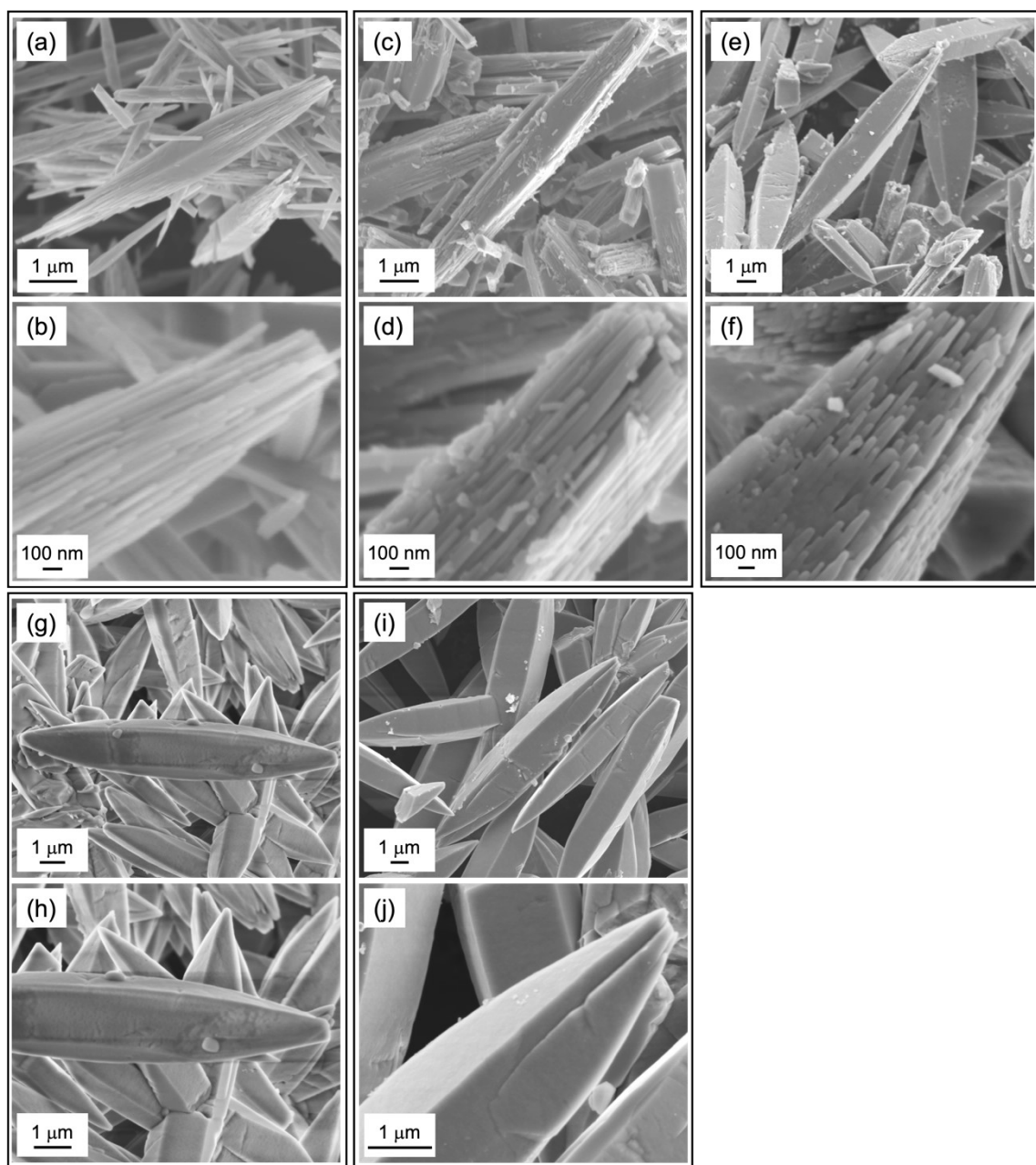


Fig. S5 SEM images of products in supersaturated solution containing various concentrations of PAA. (a, b) 17, (c, d) 35, (e, f) 69, (g, h) 104, and (i, j) 138 mmol/dm³.

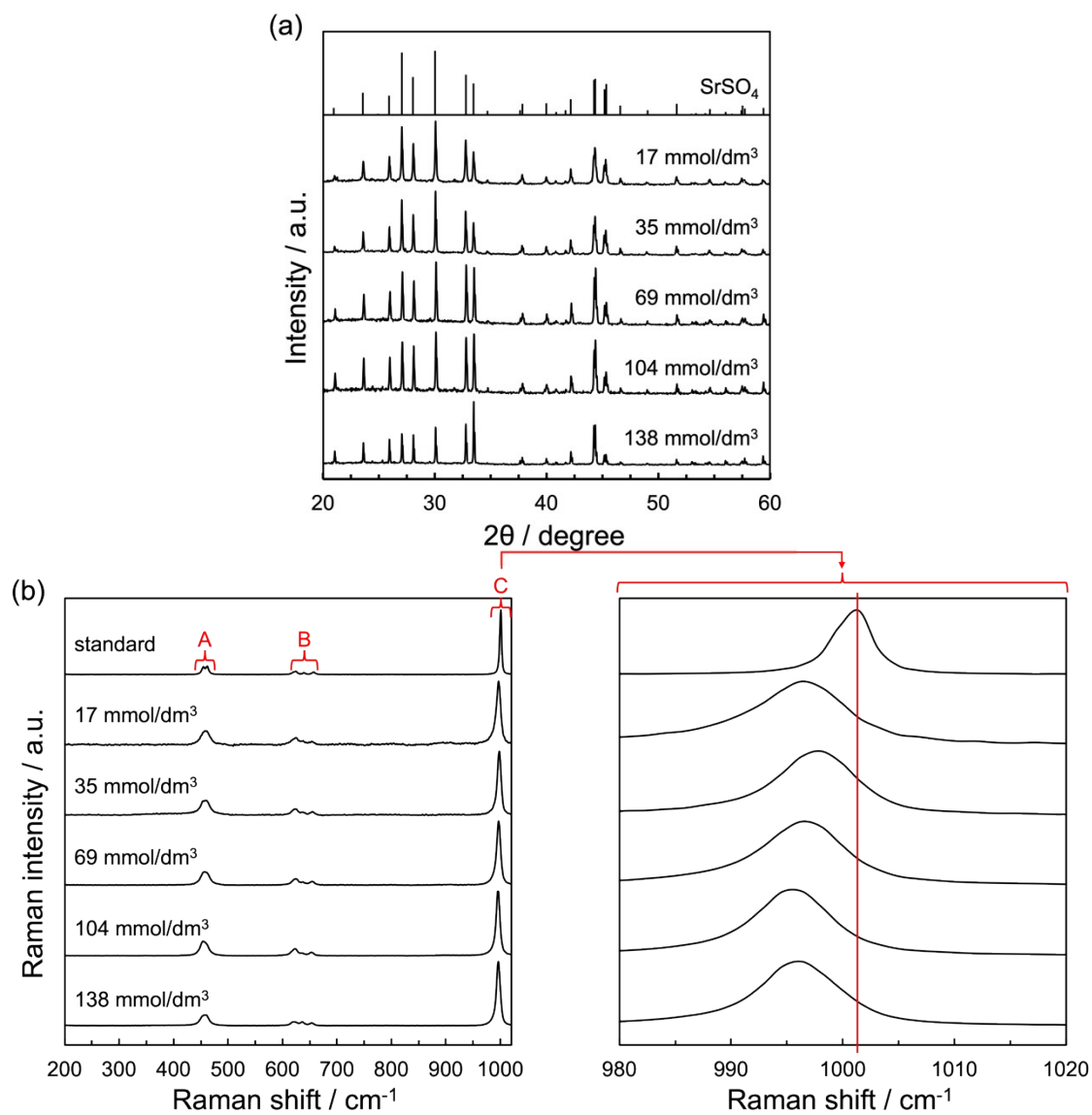


Fig. S6 XRD patterns (a) and Raman spectra (b) of products in supersaturated solution containing various concentrations of PAA. The Raman signals A, B, and C are assigned to the S-O symmetric stretching vibration, the S-O double expansion and stretching vibration, and the S-O asymmetric stretching vibration, respectively.²

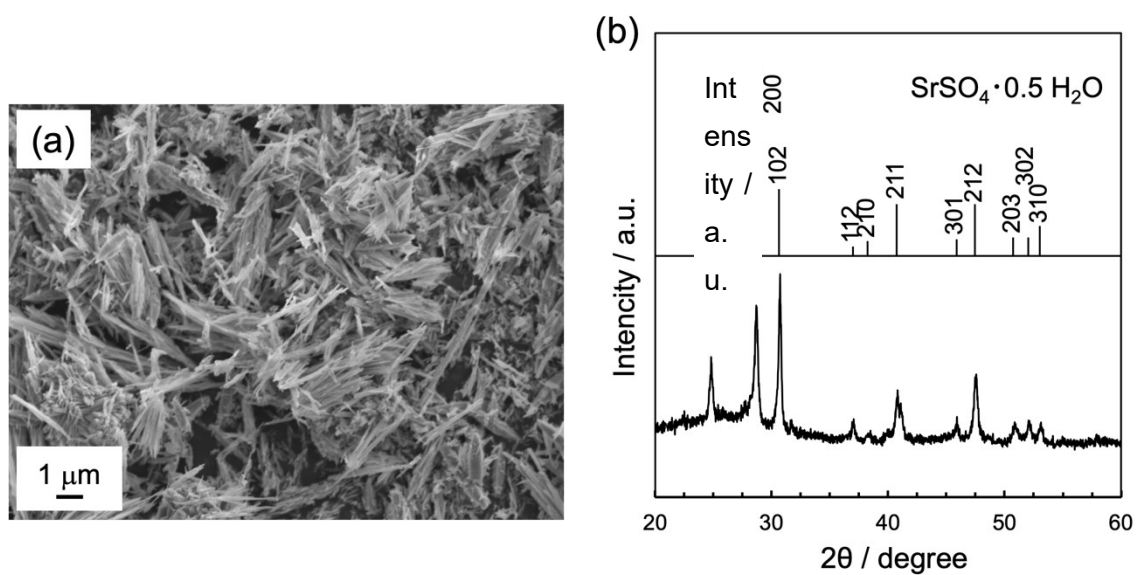


Fig. S7 SEM image (a) and XRD pattern (b) of the product in a supersaturated solution at pH 12. We adjusted the pH value by addition of NaOH aq. (0.1 mol/dm^3).

References

1. N. P. Hughes, C. C. Perry, O. R. Anderson and R. J. P. Williams, *Proc. Royal Soc. B*, 1989, **238**, 223–233.
2. A. A. Kaminskii, L. Bohatý, P. Becker, H. Rhee, H. J. Eichler, O. Lux and V. V. Koltashev, *Appl. Phys. B Lasers Opt.*, 2011, **105**, 363–378.