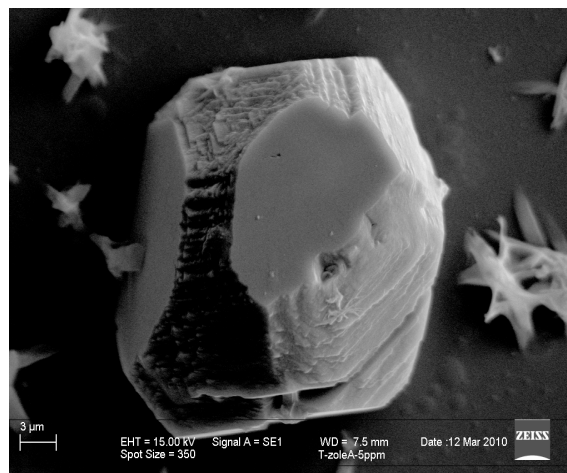


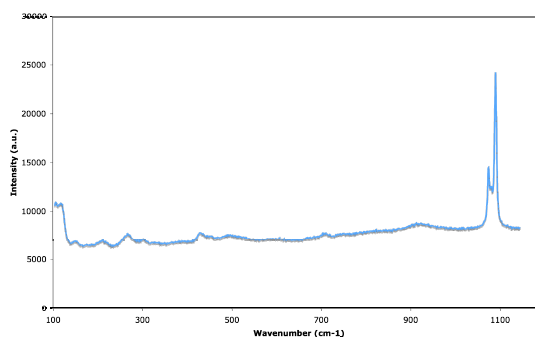
Supporting information

Cleaned glass vials (25 mL) had glass cover slips (cleaned with ethanol and water then dried) added to them prior to preparation for crystallization experiments. The morphology experiments for barium chloride involved the addition of the required volume of the stock tetrazole solution (1000 ppm), the volume made up to 20 mL with ultrapure water and then BaCl₂ stock added (50 µL, 0.1 M) and left to equilibrate to temperature in a Grant waterbath. Once equilibrated to 25 °C Na₂SO₄ stock solution was added to commence the crystallization. The samples were left at temperature for 3 days prior to harvesting the glass cover slips and preparing them for SEM investigation.

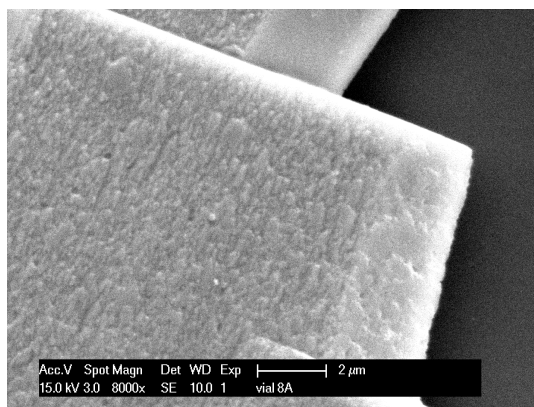
The morphology experiments for calcium carbonate utilised the ammonium carbonate sublimation reaction to release carbon dioxide and is commonly referred to as the diffusion method. The glass cover slips were placed into small beakers (40 mL beakers, 2 glass cover slips added) and once again filled with the required volume of tetrazole stock solution to which was added CaCl₂ solution (1.0 mLs, 0.28 M) to achieve a final Ca²⁺ concentration of 14 mM. Ultrapure water was added to make the final volume of the solution 20 mL. The beaker was then covered with parafilm and several holes punctured into the film. The beakers were evenly spaced in a glass dessicator to which a beaker of ammonium carbonate was added at the centre. The beaker of ammonium carbonate also had parafilm covering it with several punctures in the film. In this way carbon dioxide was slowly released and could be adsorbed by the solutions to form carbonate. The samples were left in the dessicator for 2 weeks prior to harvesting, one cover slip for SEM preparation and one for Raman spectroscopy.



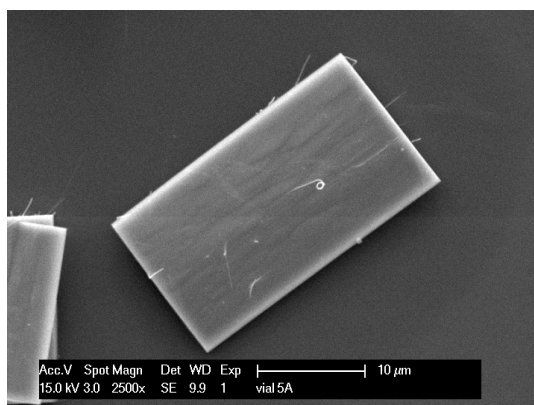
SIFig. 3 Calcite formed in the presence of 1.22 mM mbtet⁻



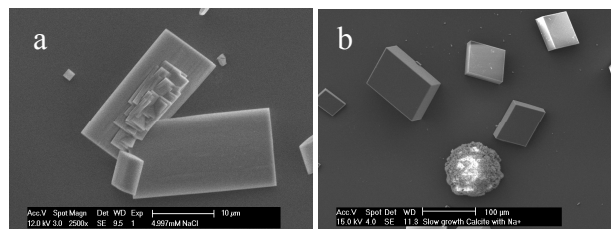
SIFig. 4 Raman spectrum of hexagonal particle formed in the presence of bz tet⁻ confirming the presence of vaterite (Slref1)



SIFig. 1 Close up view of barium sulfate particle, and the (100) face in particular, formed in the presence of ph tet⁻



SIFig. 2 SEM image of barium sulfate in the presence of bz tet⁻ at 2.87 mM



SIFig. 5 (a) Barium sulfate and (b) calcium carbonate grown in the presence of NaCl (NaCl concentration in barium sulfate = 5 mM and calcium carbonate = 3.76 mM)

Slref1 A. Dandeu, B. Humbert, C. Carteret, H. Muhr, E. Plasari, J.-M. Bossoutrot (2006), *Chem. Eng. Technol.* **29**(2) 221-225.