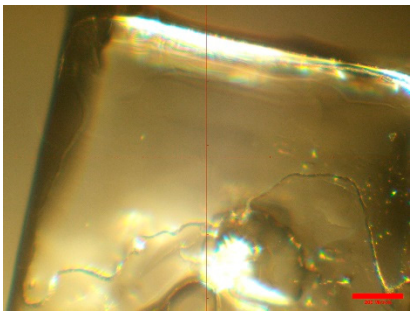

Figure S1: Microscope image of a washed seed crystal, showing the regular shape expected of NaCl crystals. Scale bar (red) is 200 microns.


Figure S2: Fragment of NaCl seed crystal produced through attrition by collision with magnetic stirrer bar, at 25 $^{o}$C and supersaturation S=1 in $H_2O$. Scale bar is 500 microns. Because of their size and irregular shape, and the absence of any nucleation/growth at S=1, we may conclude that the observed crystals are fragments from the added seed. Such fragments are not observed when overhead stirrer agitation is employed.

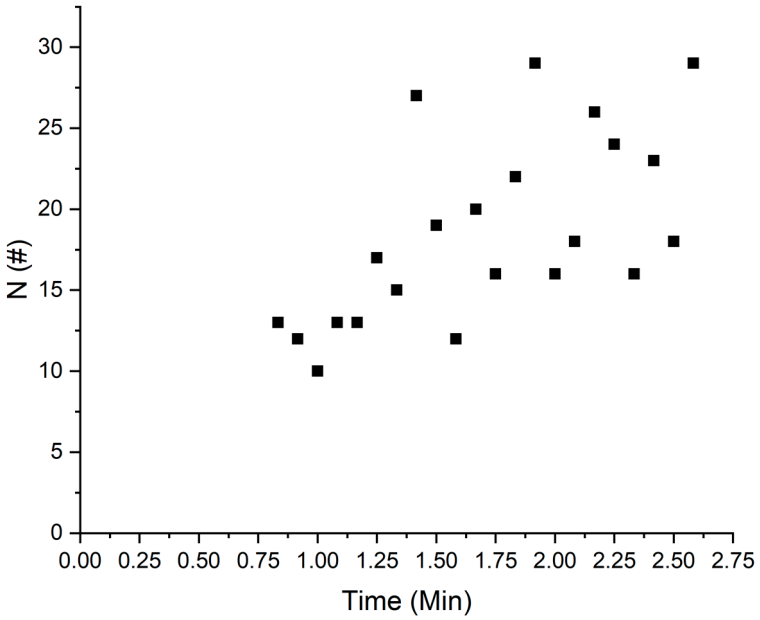


Figure S3: Example of the number of particles visible in images captured by a Crystalline camera. Example from a seeded experiment using an S = 1.01 solution in $H_2O$, agitated using an overhead propeller at 1250 RPM. Time from the beginning of isothermal conditions.

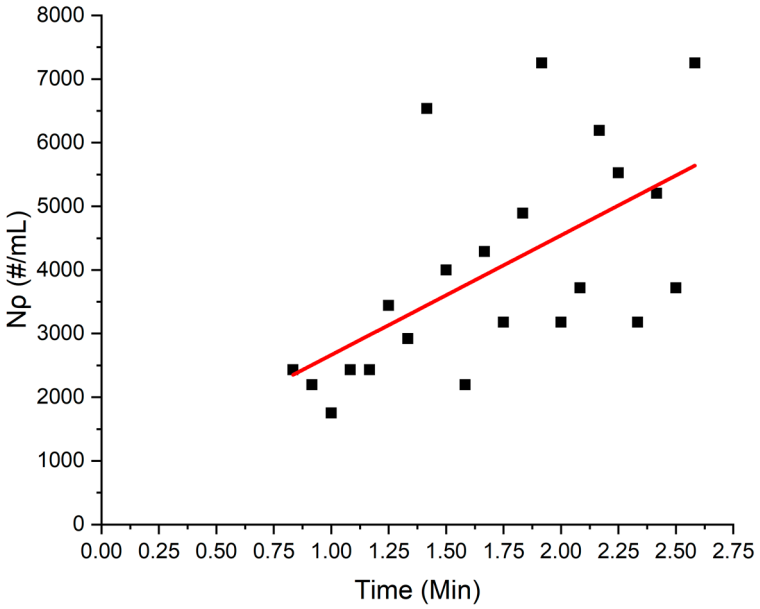


Figure S4: Calculated number concentration of particles in suspension calculated from the number of particles imaged. Example from a seeded experiment using an S = 1.01 solution in $H_2O$, agitated using an overhead propeller at 1250 RPM. The linear fit of points is also shown. Time from the beginning of isothermal conditions.

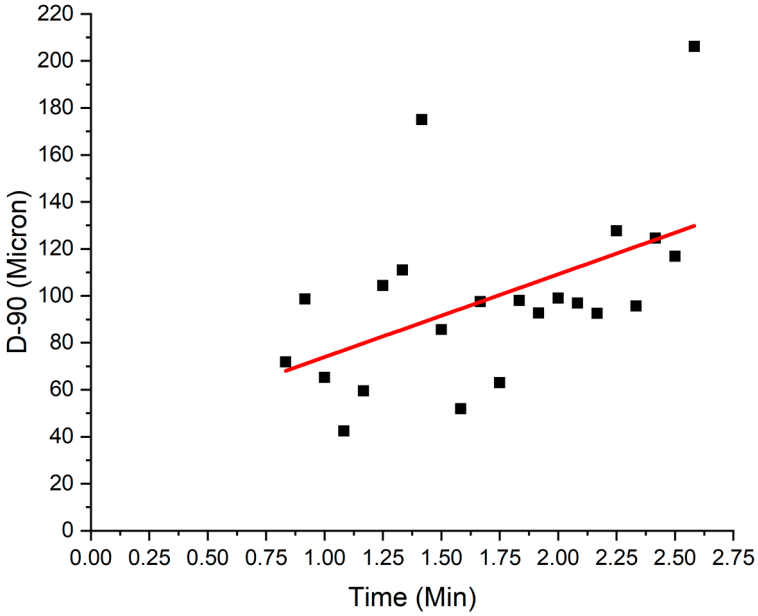


Figure S5: Calculated D-90 from binned particle distributions as determined from the images taken by the internal Crystalline reactor camera. Example from a seeded experiment using an S = 1.01 solution in $H_2O$, agitated using an overhead propeller at 1250 RPM. Linear fit of points is also shown. Time from the beginning of isothermal conditions.

Supplementary Information Section S1: Visual observation of crystal shapes: validation of experimental procedures

The imaging capability of the Crystalline device allows for a visual check that crystallisation detected by transmissivity involves crystals of the expected morphology for the system and conditions used, to ensure results are not influenced by physical impurities, agglomeration, undissolved pre-existing crystals and so on. Figure S6 shows a pair of typical images over time during an isothermal nucleation at 25 °C, demonstrating (once crystallites have grown to a size that allows them to be identified) the expected cubic nature of the nucleated and growing NaCl crystals. It is worth comparing this sequence of bona fide nucleation/growth images with other observations where there is evidence that crystals present are not the result of a simple nucleation/growth process (Figure S7). For example appearance of bands of differing brightness (Figure S7(a)) is typically evidence of incomplete dissolution, local variations in solute concentration creating variations in refractive index; while Figure S7(b) shows an example of large misshapen or rounded solid particles usually accompanied by a large number of smaller particles, resembling the solid material observed when sodium chloride powder first begins to dissolve at the start of the first heating ramp. Where visual checks revealed similar observations to Figure S7 data was excluded from the analysis presented here. Such issues occurred exclusively when overhead stirring was used to agitate the solution, indicating that agitation type also plays a role in dissolution as well as impacting nucleation and growth.

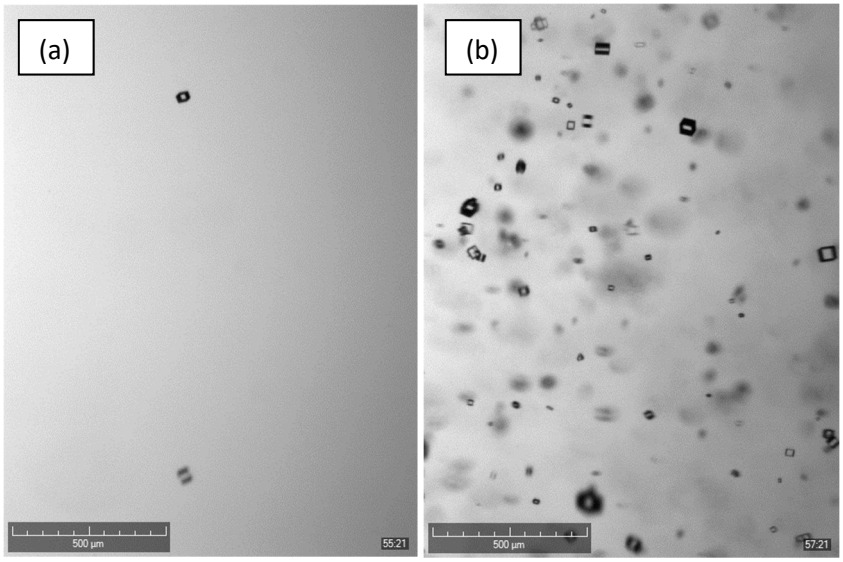


Figure S6. Crystals of NaCl nucleating in a 'bona fide' experiment, in $H_2O$ at S = 1.01 and 25 $^oC$, agitated using a magnetic stirrer bar at a speed of 700 RPM, 3 g-solvent scale. Images are taken by in-situ camera in the Crystalline device. Scale bar is 500 microns. (a) Time from the start of the experiment = 55 minutes 21 seconds; (b) Time = 57 minutes 21 seconds.

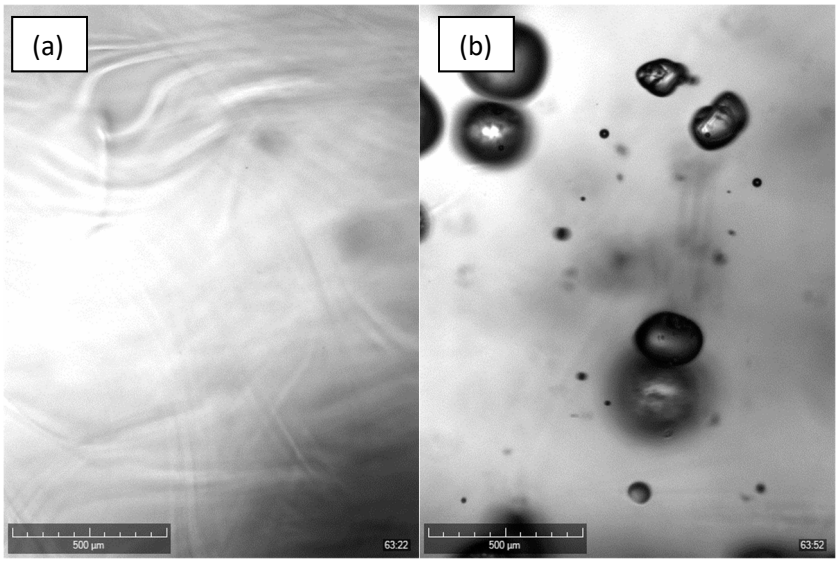


Figure S7. Example of experimental images where delayed dissolution led to irregular behaviour and thus results were excluded. NaCl in $H_2O$ nominally with S = 1.01 at 25 $^oC$, agitated using overhead stirring, at 3 g-solvent scale. Scale bar is 500 microns. (a) Time = 63 minutes 22 seconds from start of experiment; (b) Time = 63 minutes 52 seconds.