

February 2013



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ORDER OUT OF CHAOS, THE AMAZING WORLD OF CRYSTALS IN FOOD

Fancy
some
candy?

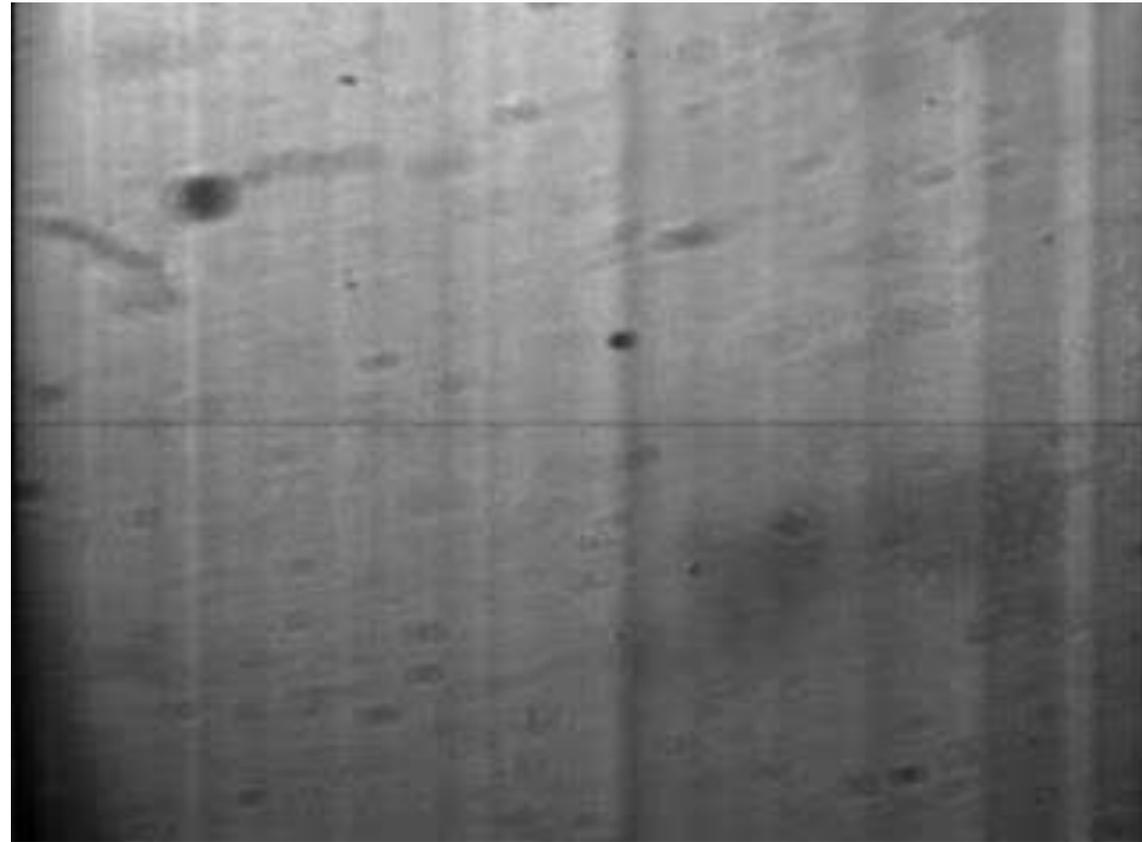


Malcolm Povey, University of Leeds

Precisely what causes ice to nucleate is still a bit of a puzzle.

In this experiment, performed by Rachel Chow when a PhD student with me at Leeds, together with the group at Gottingen, a single bubble is suspended in an acoustic field which also causes the bubble to oscillate.

Eventually the oscillating bubble surface causes nucleation of ice in this dilute sugar solution which is slightly supercooled.



We use ultrasound to determine crystal in emulsions



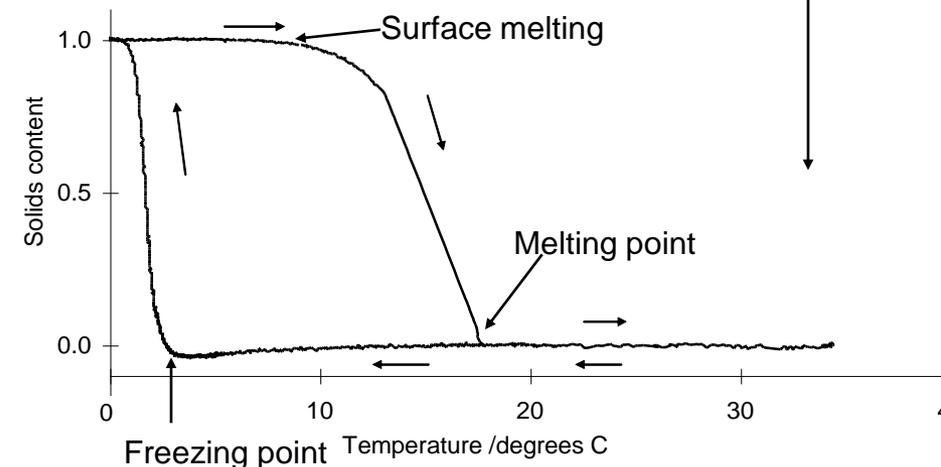
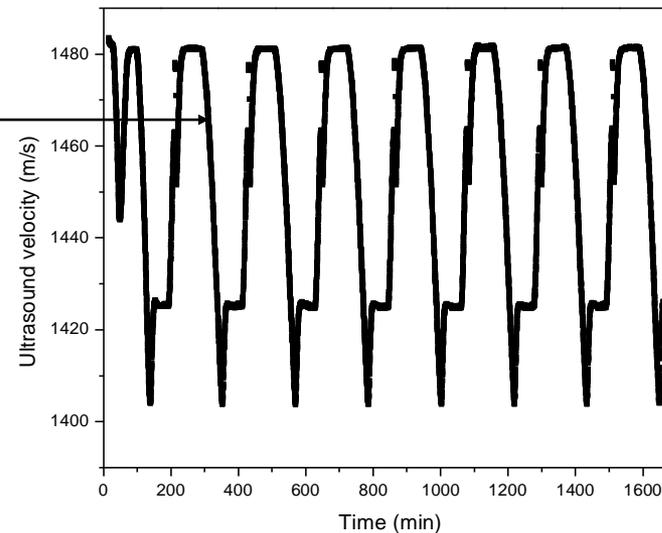
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Velocity of sound measured against time as the emulsion is cycled from 0C to 40C. The n-hexadecane emulsions are very stable.

Volume fraction occupied by solid material can be calculated from the velocity measurements.

Solid content in the dispersed phase (20 %v/v) can be determined from the sound velocity with an accuracy of 1% and precision ten times better than that. This scales with volume fraction.

Our first requirement – a stable, monodisperse emulsion. Use 130 nm, n-hexadecane in water, with 1% Tween 20.

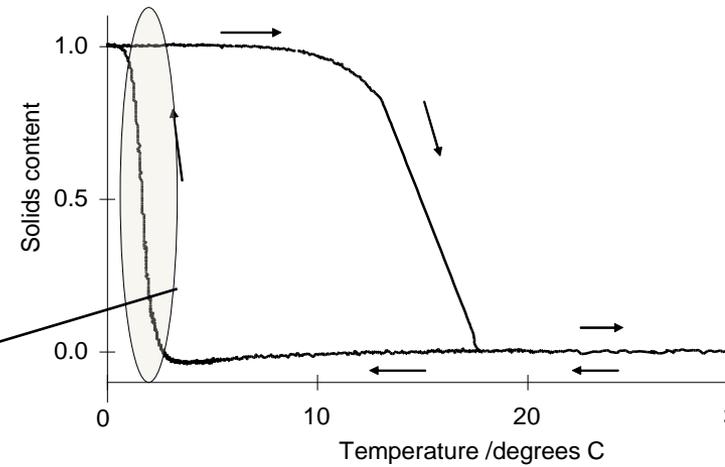
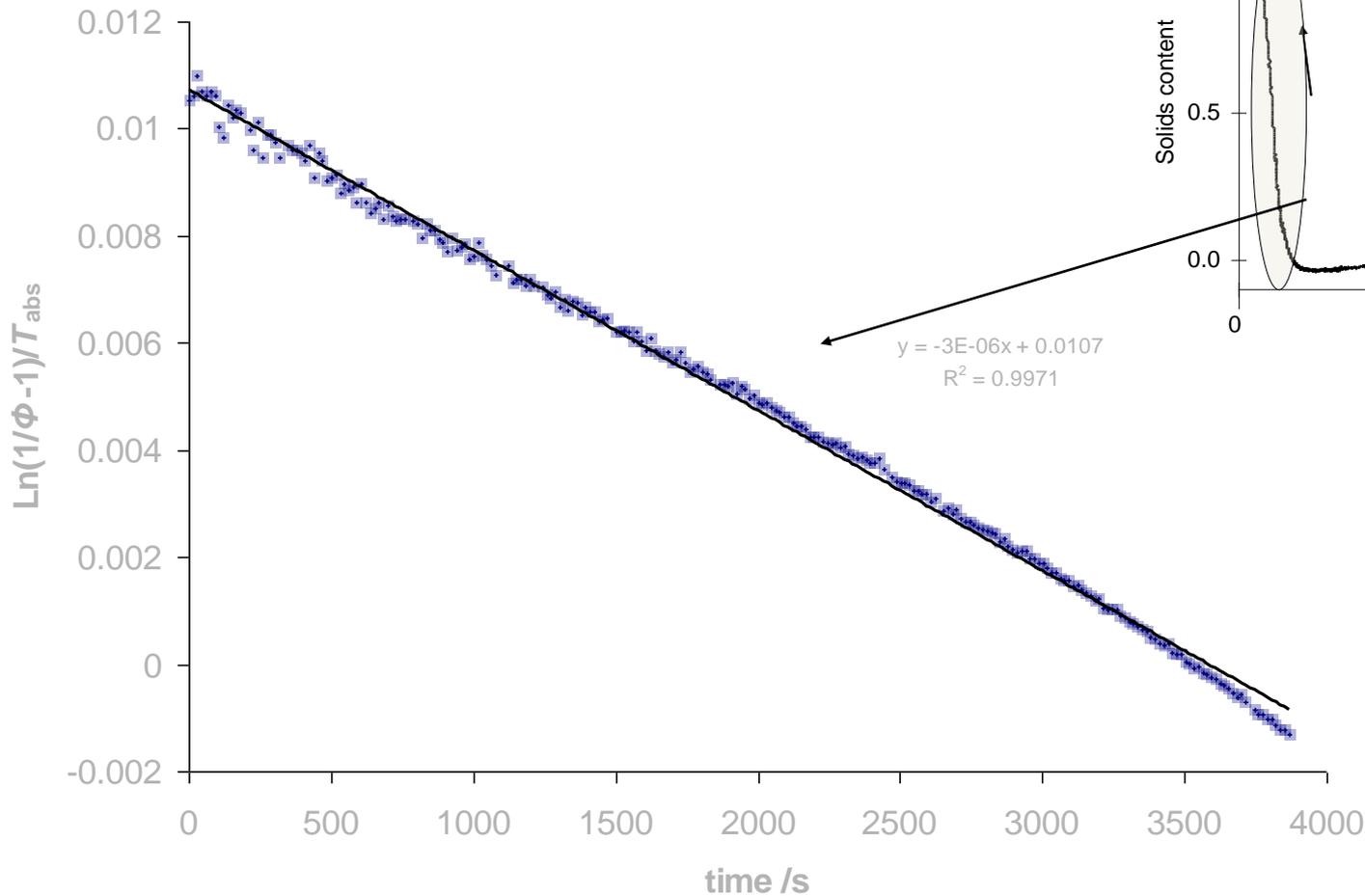


$$v = 1/\sqrt{\kappa \cdot \rho}$$

Determine the kinetics



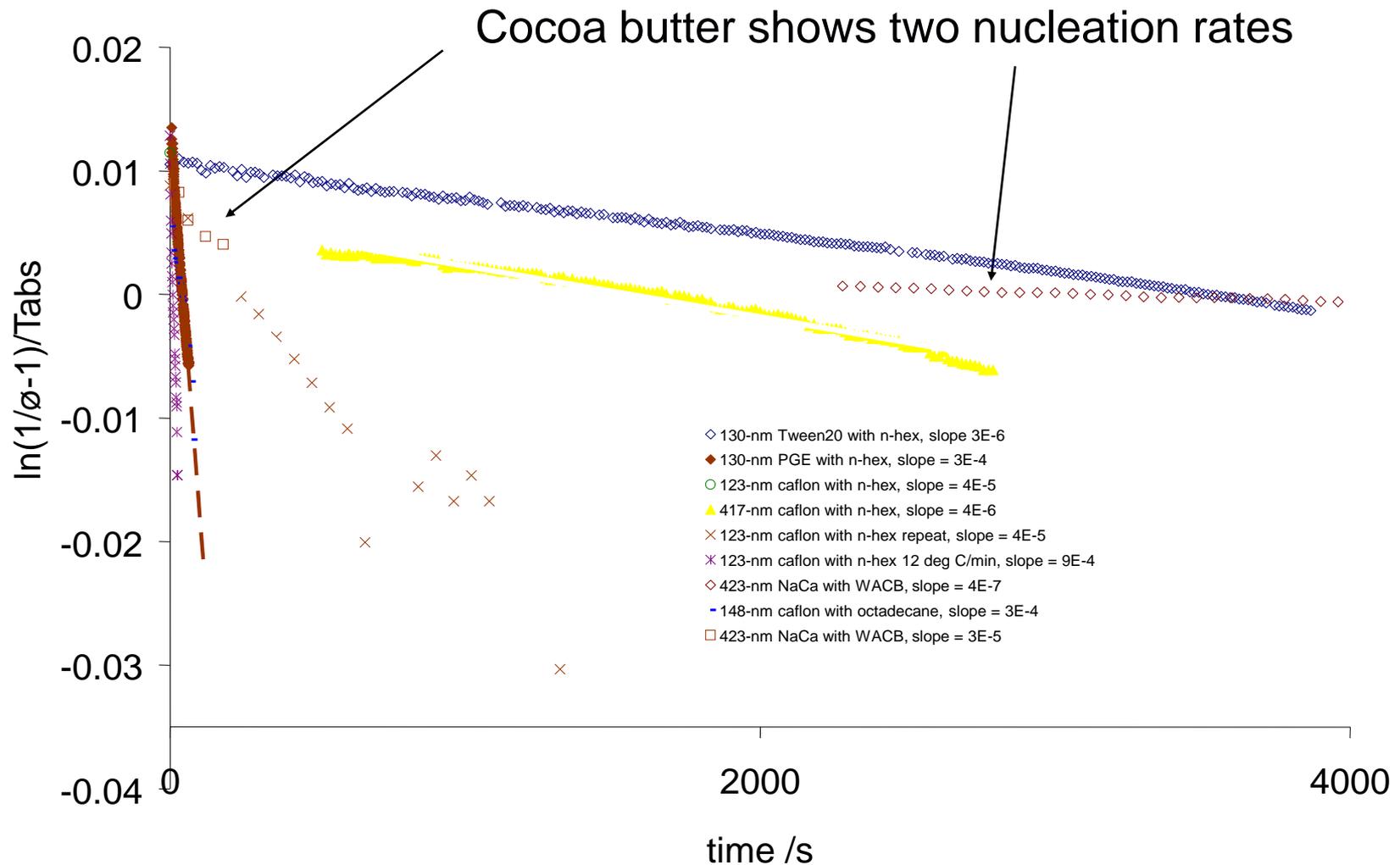
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Cocoa butter emulsion nucleation



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Enjoy your meal!



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For more information see www.food.leeds.ac.uk/mp.htm



All these foods
contain crystals