Supplementary Material (ESI) for Lab on a Chip

Supplementary Material for

Nucleation and solidification in static arrays of monodisperse drops

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Supplementary Video Captions

Supplementary Video 1. Nucleation and solidification in drops of pure water near -37.4 °C. This real-time video shows sequential images of drop freezing from one second before to ten seconds after the drop depicted in Figure 3A froze (column H, row 8). Additional drops freeze in order of C7, O6, N8, I3, N4, J5, F6, C2 and then I4. Columns are spaced by 50 μm, rows are spaced by 75 μm. Video is in real time with crossed-polarizers. Drops are dispersed in FC-40.

Supplementary Video 2. Nucleation and solidification in drops of 10 % w/w glycerol in water near -41.8 °C. This real-time video shows sequential images of drop freezing from one second before to ten seconds after the drop depicted in Figure 3B froze (column G, row 3). Additional drops freeze in order of F0, M0, C4, A6, M3, J4, D6, C0, J1, I1 and then D0. Columns are spaced by 50 μm, rows are spaced by 75 μm. Video is in real time with crossed-polarizers. Drops are dispersed in FC-40.

Supplementary Video 3. Nucleation and solidification in drops of 20 % w/w glycerol in water near -47.1 °C. This real-time video shows sequential images of drop freezing from one second before to ten seconds after the drop depicted in Figure 3C froze (column C, row 5). Additional drops freeze in order of I1 and then A0. Columns are spaced by 50 μm, rows are spaced by 75 μm. Video is in real time with crossed-polarizers. Drops are dispersed in FC-40.

Supplementary Video 4. Nucleation and solidification in drops of 30 % w/w glycerol in water near -59.0 °C. This real-time video shows sequential images of drop freezing from one second before to ten seconds after the drop depicted in Figure 3D froze (column F, row 1). Additional drops freeze in order of H1, G3b, A0, H2, C1 and then both K6 and N7 in the same frame.

Columns are spaced by 50 μm, rows are spaced by 75 μm. Video is in real time with crossed-polarizers. Drops are dispersed in FC-40.

Supplementary Video 5. Nucleation and solidification in polydisperse drops of 10 % w/w glycerol in water. This high speed video (8.13 kHz, displayed 1000 times slower) includes six segments derived from a longer image sequence of the experiment described in Figure 4, where time elapsed from the image in (**a**) is displayed before each segment. These segments capture freezing in five large drops and just after the nucleation event itself in one smaller drop. In all cases, a coarsening of the solid-liquid interface and a darkening of the solid phase is consistent with the formation of dendrites. Drops are dispersed in FC-40.

Graphical Abstract. From high-speed cryo-microscopic video of static arrays of monodisperse drops, we measure the dynamics of nucleation and solidification in deeply-supercooled aqueous solutions of glycerol.