

Supplementary Material (ESI) for Lab on a Chip
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Electronic supplementary information for

**On-chip characterization of cryoprotective agent mixtures using an
EWOD-based digital microfluidic device**

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Setup for mapping phase change behavior of CPA mixtures

Fig. S1 shows the experimental setup for mapping phase change behaviors of the mixtures. The EWOD platform, where an array of DMSO-PBS mixtures had been generated, was placed on a temperature-controlled microscope stage (MDBCS 196, Linkam). During the process, the DMSO-PBS mixture droplets were imaged using a microscope (MVX 10, Olympus) equipped with a CCD camera (PIXIS, Princeton Instruments). The recorded time-lapse images were further analyzed to determine the phase change temperatures during freezing and thawing.

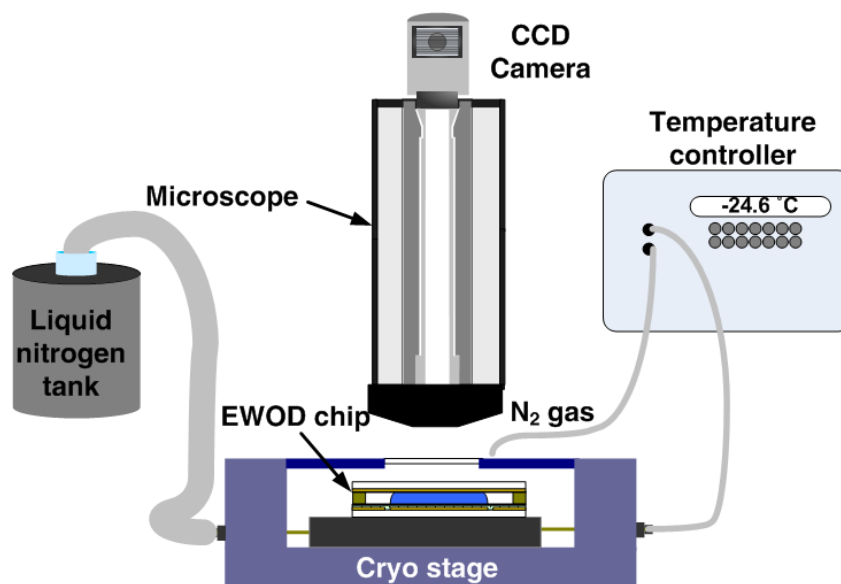


Fig. S1 Experimental setup for mapping phase change behavior of CPA mixtures on the EWOD platform

Differential scanning calorimeter (DSC) experiments

To compare the phase change temperatures of DMSO-PBS mixtures using EWOD, Differential scanning calorimeter, DSC (Q200, TA instruments) experiments were conducted with 8~9 mg of each sample in a standard aluminum sample pan. The sample was cooled to -120 °C at 10 °C/min and hold for 10 min. After cooling, the sample was warmed up to -30 °C at 10°C/min and additionally warmed at a slower warming rate (1 °C/min) which more closely approximates thermodynamic equilibrium.

Fig. S2 shows the obtained DSC thermograms of DMSO-PBS mixtures during freezing and thawing. The exothermic peak which represents heat release of ice crystal growth during are observed at 1X PBS, 12.5% and 25% DMSO-PBS mixture. The peak of supercooled eutectic crystallization is observed at 1x PBS only and there is no peak at 50% DMSO-PBS during cooling. During warming, the endothermic peak representing ice melting is observed at 1X PBS,

12.5% and 25% DMSO-PBS mixture, and the peak representing eutectic melting is observed at 1X PBS. Also there is no observed peak at 50% DMSO-PBS mixture.

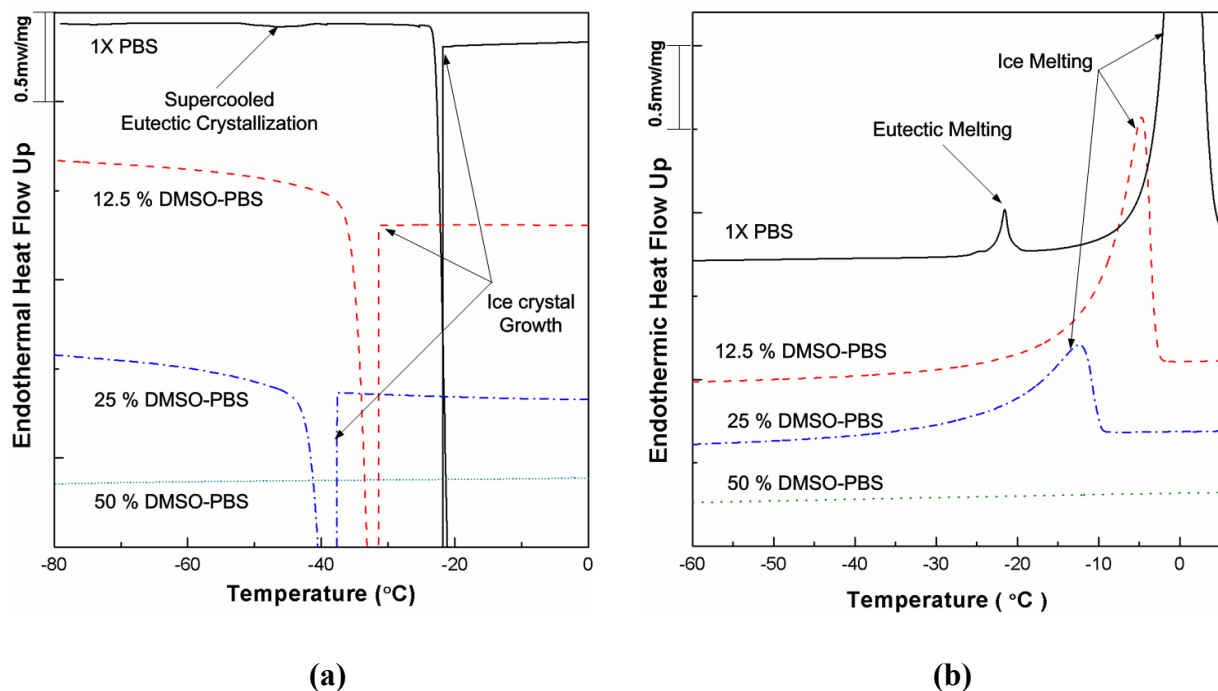


Fig. S2 DSC thermograms of DMSO-PBS mixtures (a) during freezing and (b) during thawing.

Reference

1. Y. J. Chang, K. Mohseni and V. M. Bright, *Sensors and Actuators A*, 2007, 136, 546-553.