

Supplementary Information

Solute effects on dynamics and deformation of emulsion droplets during
freezing

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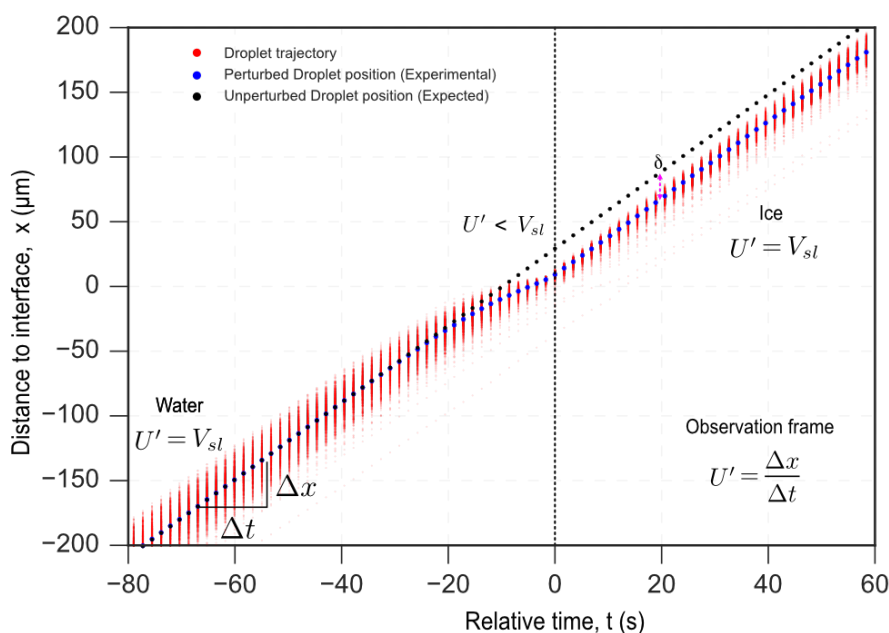


Figure S1: **Measurement of interaction time and apparent droplet velocity U' in the observation frame.** In the observation frame, far from the solid-liquid interface in water the droplet moves at the imposed growth rate $U' = Dx/Dt = V_{sl}$, as the droplet approaches the interface it gets repelled $U' \neq V_{sl}$, and as the droplet is engulfed in the ice it doesn't get repelled anymore, thereby recovering $U' = V_{sl}$. The interaction time is the total duration over which a droplet gets repelled by the solidification interface. Relative time is zero when the front edge of the droplet hits the solidification front. Experimental conditions for which the curve was recorded: $V_{sl} = 3 \mu\text{m} \cdot \text{s}^{-1}$, $G = \nabla T = 10^4 \text{ K} \cdot \text{m}^{-1}$, Droplet size $R_1 = 7.2 \pm 0.4 \mu\text{m}$. © (2020) S. Tyagi *et al.* (10.6084/m9.figshare.14815083) CC BY 4.0 license <https://creativecommons.org/licenses/by/4.0/>.

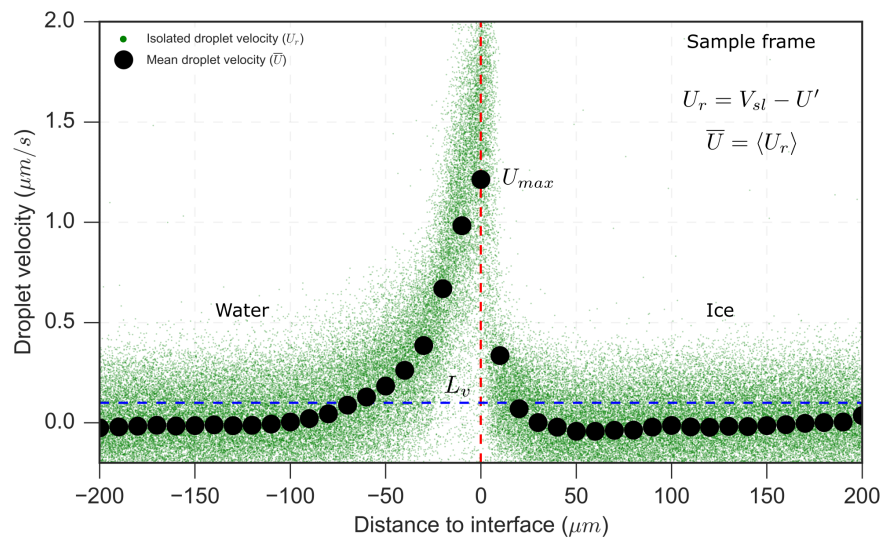


Figure S2: **Deducing the isolated droplet velocity U_r and the mean droplet velocity \bar{U} in the sample frame.** In the sample frame, the isolated droplet velocity U_r is zero far from the interface, it increases and reaches a maximum when the droplet gets repelled by the interface and subsequently, reduces to zero as the droplet is engulfed in the ice. Experimental conditions for which the curve was recorded: $V_{sl} = 3 \mu m \cdot s^{-1}$, $G = \nabla T = 10^4 K \cdot m^{-1}$, Droplet size $R_1 = 7.2 \pm 0.4 \mu m$. © (2020) S. Tyagi *et al.* (10.6084/m9.figshare.14815083) CC BY 4.0 license <https://creativecommons.org/licenses/by/4.0/>.