Electronic Supplementary Material (ESI) for Soft Matter.

Thermal Marangoni bubbles

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Supplementary Information

Influence of the temperature on the oil properties

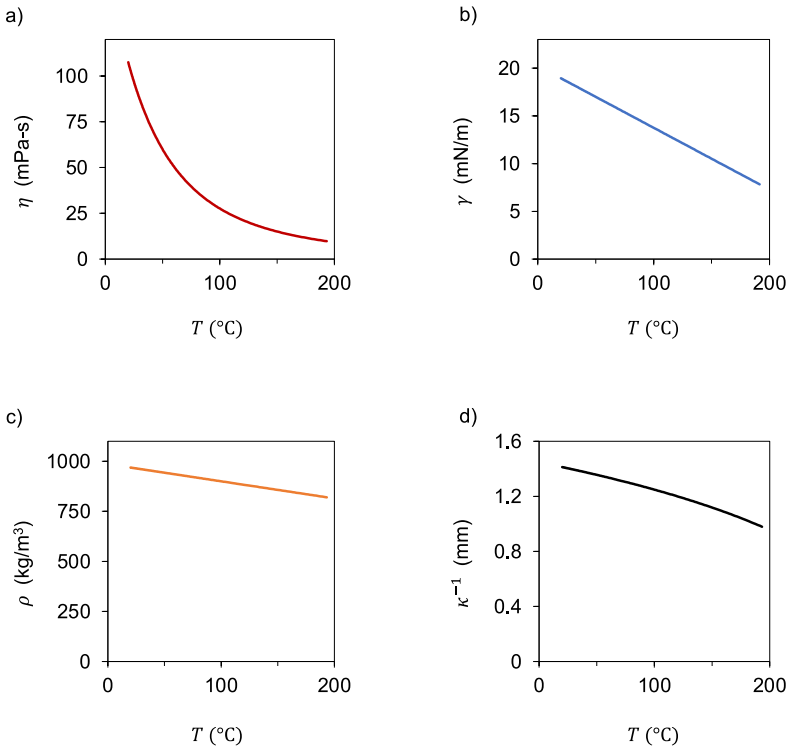

Figure S1. a), b), c) Viscosity η, surface tension γ and density ρ of the silicone oil used in our experiments, as a function of the oil temperature *T*. **d)** We also display the temperature variation of the capillary length $\kappa^{-1} = (\gamma/\rho g)^{1/2}$ deduced from the plots in **b** and **c**. In the explored range of temperature (between 50°C and 150°C), κ^{-1} decreases by 20%, while the viscosity falls by a factor ~7.

Influence of the wire

Herein, we question the influence of the pinning wire used to hold the bubbles in place (figure 1b). The experiment described in the main text is reproduced with free bubbles. As shown in figure S2, the bubble, viewed from above with an infra-red camera, dwells on the oil bath for at least a few seconds, a lifetime much longer than expected for bubbles floating on a pure liquid bath without temperature gradients. The thermographs also reveal the existence of cooler tears of oil falling along the bubble from its North pole, as observed with pinned bubbles. The wire retains slightly more oil that here; more interestingly, it allows us to quantify the volume accumulated in each drip, without altering the essence of the thermal bubbles.

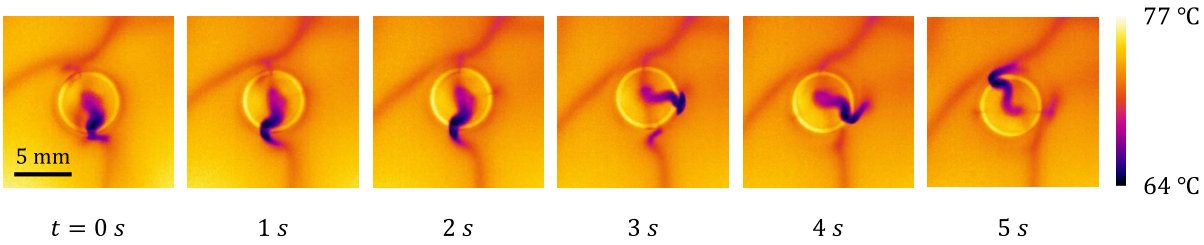

Figure S2. Snapshots of a free bubble (base diameter of 5.4 mm) sitting on a hot bath of silicone oil and viewed from the top. The bubble is obtained after injecting air in a bath whose surface temperature is 71°C. Observations are similar to that made when the bubble is pinned by a wire (figures 1 and 2 in the accompanying paper). Bubbles have a long lifetime, their North pole is cooler than their equator, and oil regularly drips along them. However, the volume of the drips is harder to measure than with the device in figure 1, making this experiment more qualitative than in the accompanying paper.

Movie caption

Infra-red video of a thermal Marangoni bubble with a radius R = 7 mm. The movie is played in real time and it shows the bubble from the top. The bubble is obtained after injecting air inside a heated bath of silicone oil whose surface temperature is 125°C; as the injected, millimetric bubbles reaches the bath surface, they gather into a hemispherical, centimetric bubble that lives for 20 seconds. The movie also evidences a temperature differential between the North pole of the bubble and its equator, whose mean value is ΔT = 47°C.