

# Thermocapillary flows in pure water drops

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We report the first, to the best of our knowledge, experimental observation of thermocapillary convective flows, i.e. Marangoni, in evaporating pure water drops. The flows were induced by locally heating the substrate directly below the drop center and visualized via infrared thermography. Laser heating induced a temperature gradient on the drop surface which resulted in surface tension gradient and in turn to thermocapillary flow. The thermocapillary flows manifested as twin vortices recirculating liquid. In addition, the vortices were found to merge and split in an oscillatory manner in order for the droplet to compensate for the non-uniform, one-sided cooling. Further experimentations with hanging drops, combined with calculation of the non-dimensional Bond number, verified the origin of the vortices to be Marangoni. Lastly, parameters such as heating power and location were found to allow control of the flow patterns and hence of the evaporation process.