# Evaporating Organic Liquid Droplets on Nonwetting Surfaces

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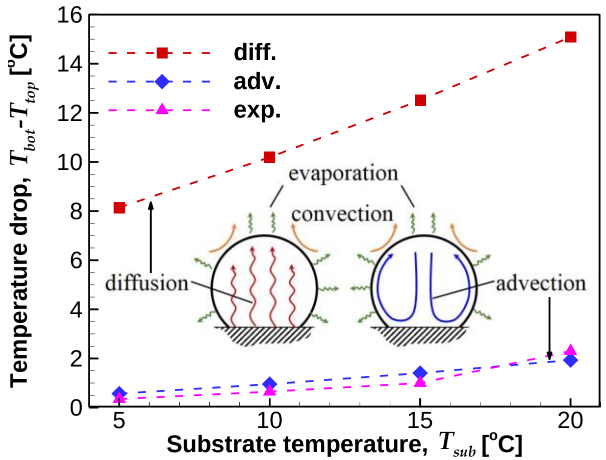
## Objective

Investigate the flow fields and thermal energy transport inside organic liquid droplets evaporating on a nonwetting substrate.

## Approach

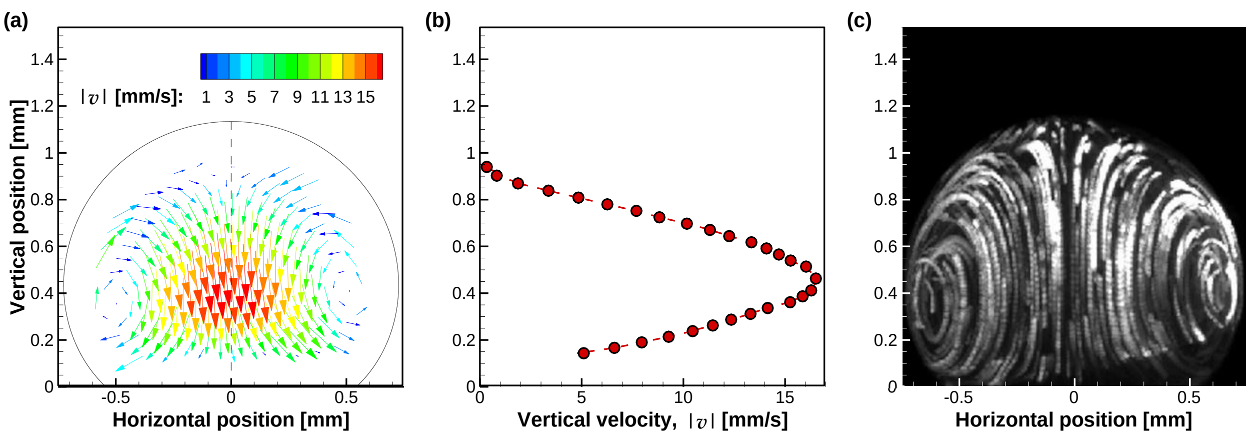
- Use particle image velocimetry to measure the velocities inside the droplet.
- A reduced-order finite volume model is used to characterize the evaporation of the droplet.




**Comparison between the experimental values of the average temperature drop inside the droplet, the predictions from the thermal diffusion and the thermal advection models. The inlay shows the transport mechanisms included in the two models.**

## Impact

- Establish that Marangoni convection is the driving mechanism for organic liquid droplet on nonwetting substrate.
- Show that advection (as opposed to thermal diffusion) is a dominant mechanism in the internal thermal energy transport.
- Develop a reduced-order model that accurately captures the evaporative behavior of the droplet by incorporating the thermal transport inside the droplet.




**(a) Velocity vector field (from PIV analysis) within a 1.34 μL droplet on a substrate fixed at 10 °C, and (b) the centerline vertical velocity taken along the y-axis at x = 0. (c) A streakline image is obtained from superimposing images of the tracer particles.**

## Selected Publications

- Chandramohan, A.; Dash, S.; Weibel, J.A.; Chen, X.; Garimella, S. V. Marangoni Convection in Evaporating Organic Liquid Droplets on a Nonwetting Substrate. *Langmuir*, **2016**, *32* (19), pp 4729–4735

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