Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Active Volatile Drops on Liquid Baths[1] BENJAMIN REICHERT, JEAN-BENOT LE CAM, ARNAUD SAINT-JALMES, GIUSEPPE PUCCI, Institut de Physique de Rennes, INSTITUT DE PHYSIQUE DE RENNES TEAM — We demonstrate the self-propulsion of a volatile drop on the surface of a liquid bath. Our system allows for direct probing of both the surface and the liquid bulk. Experimental characterization of both the temperature field on the drop surface and of hydrodynamic flows allows us to rationalize the system behavior. Evaporative heat pumping is converted into directed motion driven by thermocapillary stresses, which emerge on the drop surface as a result of a symmetry breaking of the drop temperature field. The dependence of the drop speed on the activity source, i.e. the evaporation flux, is derived with scaling arguments and captures the experimental data. Since the evaporation flux is limited by heat transfer in the bath, we also show that the system activity can be tuned by varying the bath viscosity. While the drop motion is two-dimensional, rationalizing the three-dimensional hydrodynamic flows in our system can provide insights into the mechanism of drop self-propulsion and interactions in unbounded environments.

[1]We thank the program CNRS Momentum 2017 for its support.

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Date submitted: 28 Jul 2020 Electronic form version 1.4