Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Atmospheric convective transport contribution to evaporative sessile droplets FLORIAN CARLE, SERGEY SEMENOV, MARC MEDALE, DAVID BRUTIN, Aix-Marseille University - IUSTI UMR 7343 — The scientific community struggles with the creation of an accurate quantitative description of sessile droplet evaporation flux rate. The classically used description considers evaporation as a quasi-steady process controlled by the diffusion of vapor into the air, and the whole system is assumed to be isothermal at the ambient temperature. However, when two types of fluids (alcohols and alkanes) are let to evaporate on heated substrates while a side view camera measures their evaporation flux rate, droplets tend to see their evaporation flux rate underestimated by this model mostly due to convection. This experimental study aims to understand how atmospheric convective transport in the vapor phase influences evaporation in order to developed an empirical model that describes with accuracy the evaporation flux rate. The Rayleigh number is used to analyze the contribution of natural convection and an empirical model is developed combining diffusive and convective transport for each type of fluid. The influence of the molecular chain length (and the increasing number of carbon atoms) is also being discussed.

David Brutin
Aix-Marseille University - IUSTI UMR 7343

Date submitted: 23 Jul 2014 Electronic form version 1.4