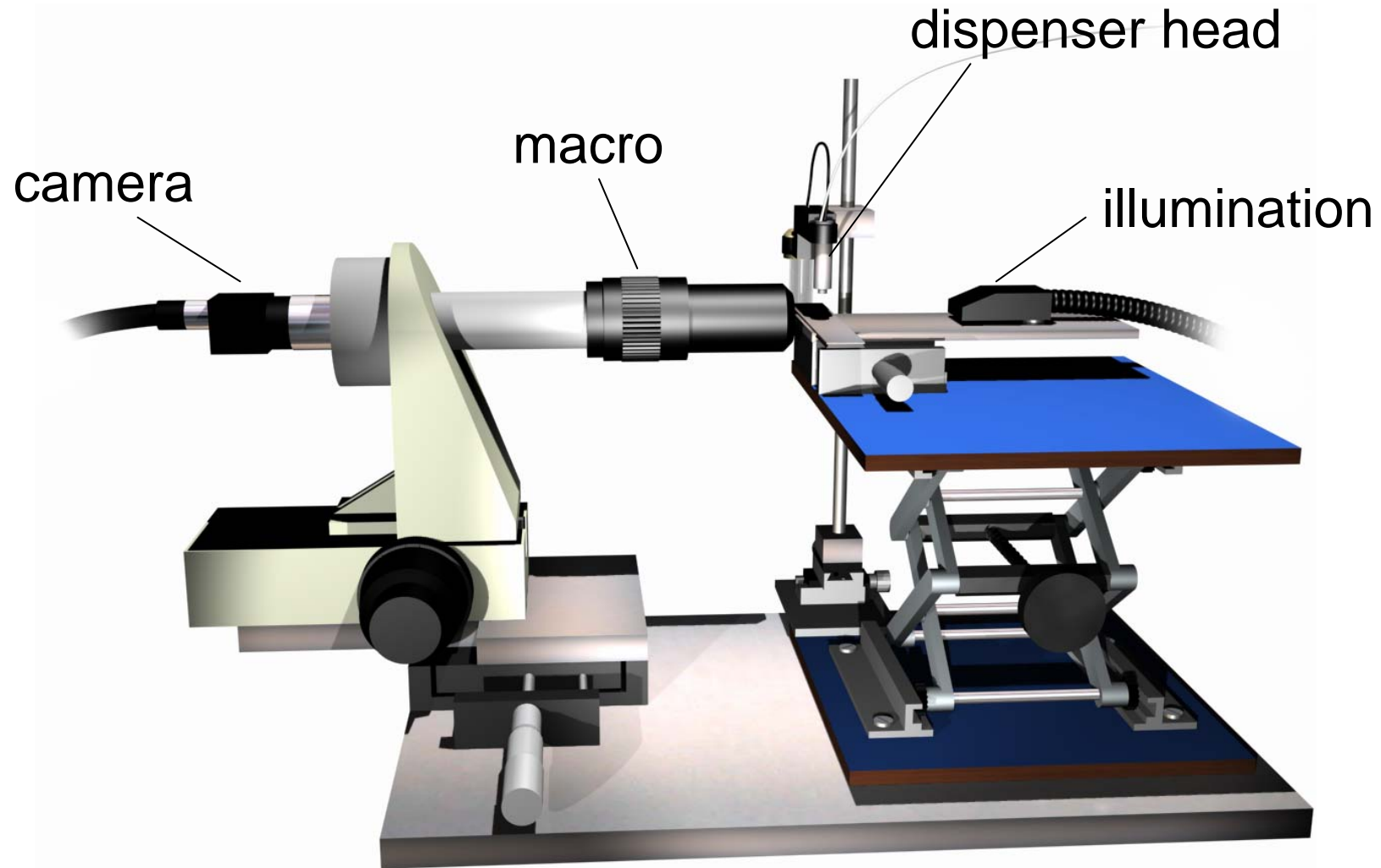




Absorption uniformity measurements using micro sized drops

Göran Ström
STFI-Packforsk

MicroDAT = Micro Drop Absorption Tester

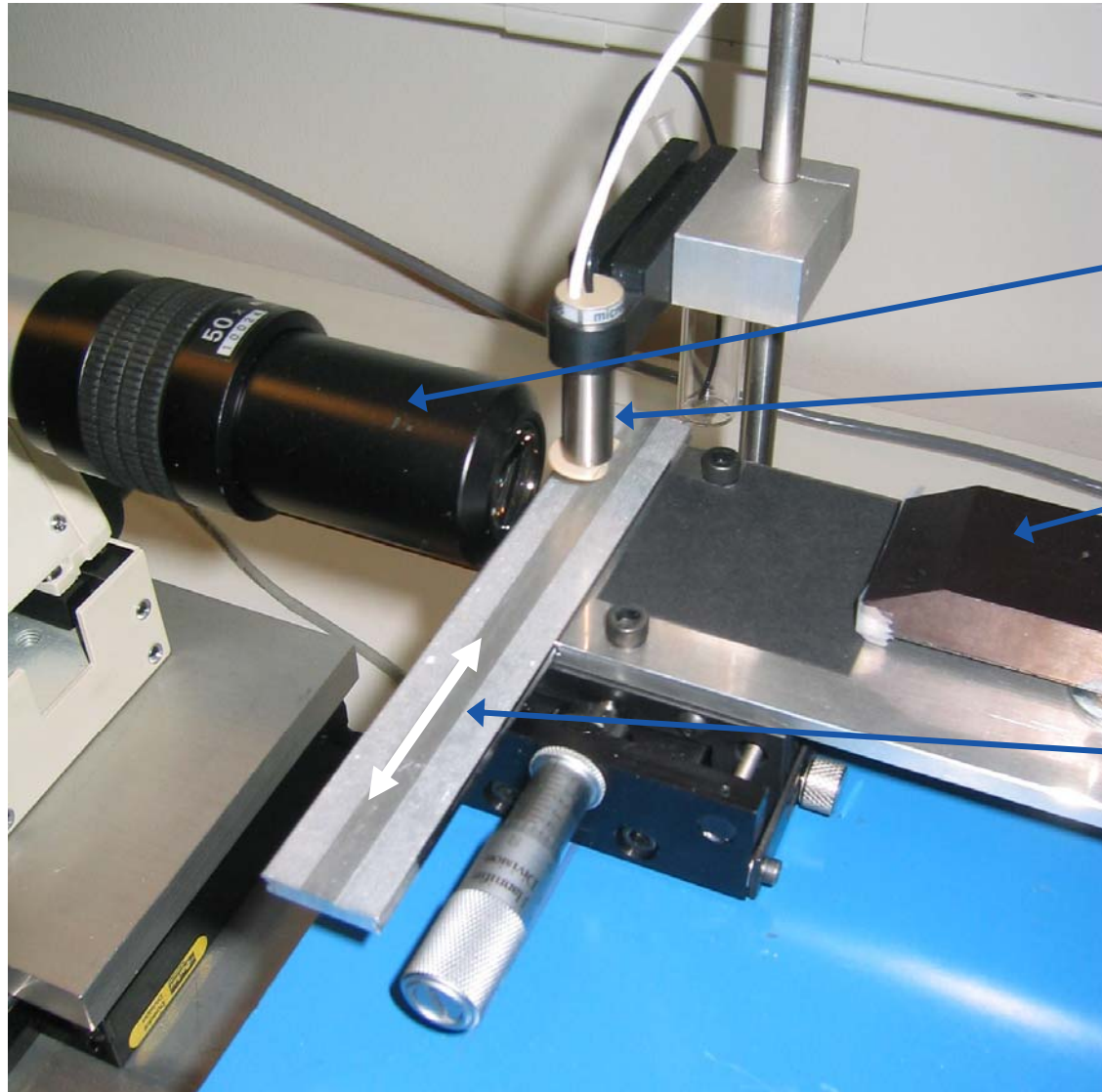


drawing: Erik Svanholm



STFI-PACKFORSK

System set-up, closer look



Objective

Dispenser head

Line light

Sample tray



Micro drop – technical details

Nozzle diameter: 50 μm

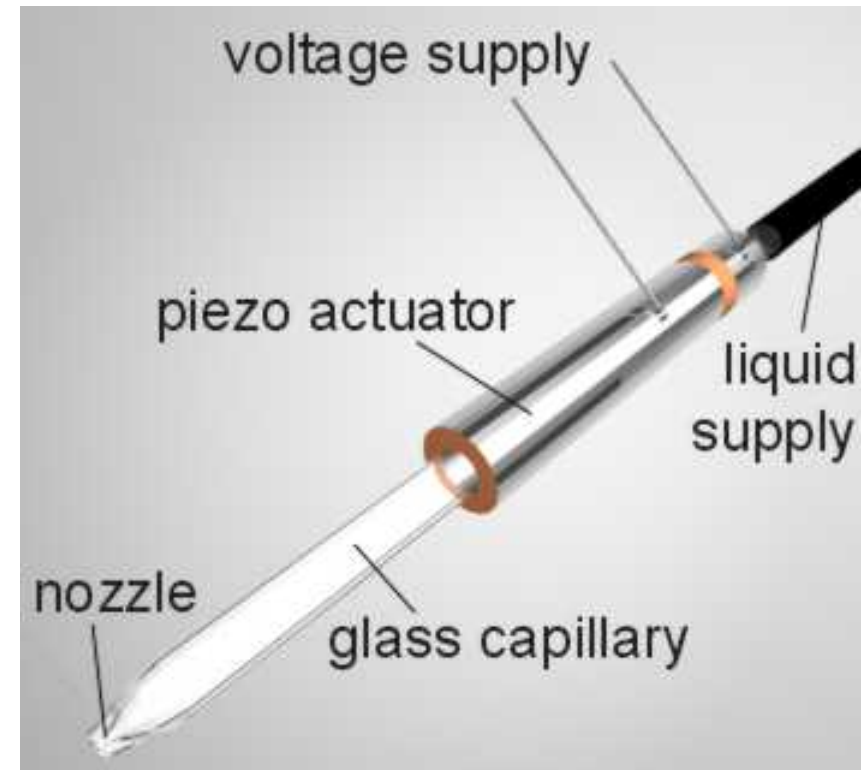
Liquid viscosity: 0.5-20 mPas

Velocity (air): 1.5 m/s

Acceleration: $\sim 100\,000\text{ g}$

Drop volume: $\sim 300\text{-}350\text{ pl}$

Drop diameter: $\sim 100\text{ }\mu\text{m}$





Differences from existing systems

- Small size droplets
(pico-litres instead of micro-litres)
- High drop application velocity
(piezoelectric instead of slow pulse
gives velocities in the range of 1.5 m/s)
- Can not be used to calculate surface
energy



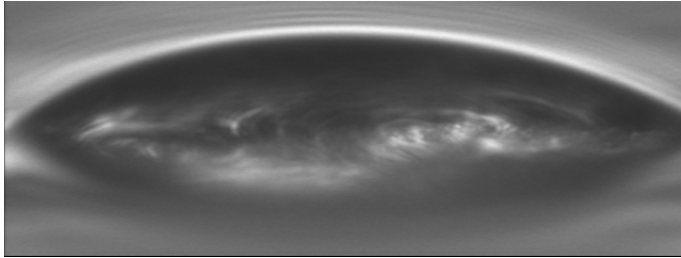
Areas of use

- Absorption of liquids into the surface
- Characterization of non-uniformity in paper absorptivity
- Interaction between inkjet-sized droplets and the coating/paper surface

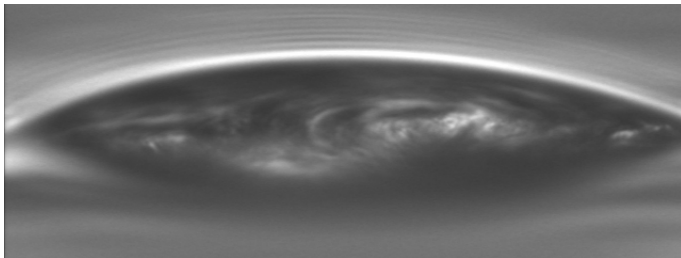


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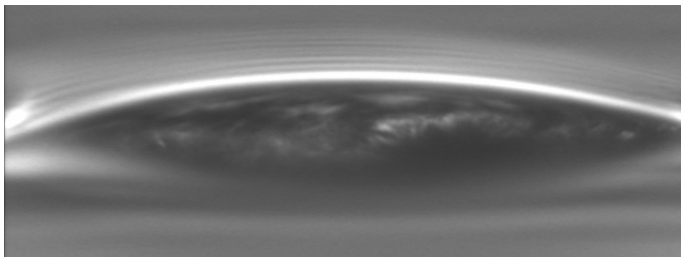
Pre-trials (deionised water)



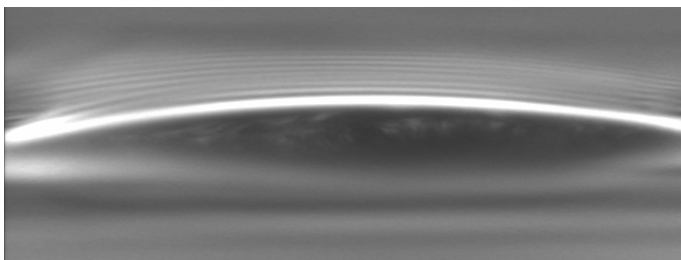
0



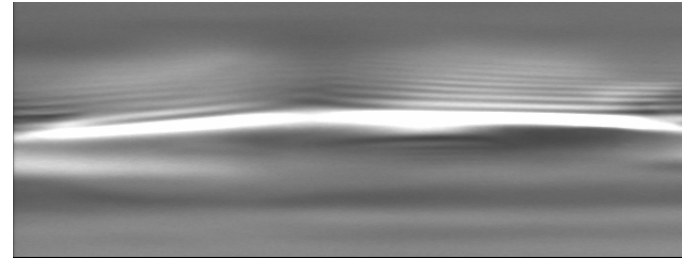
0,5 s



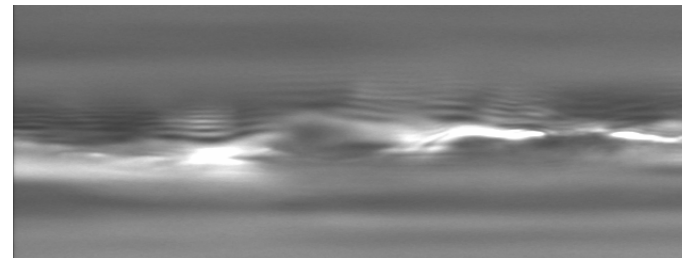
1 s



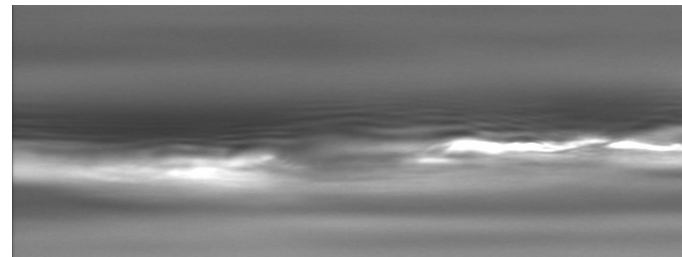
1,5 s



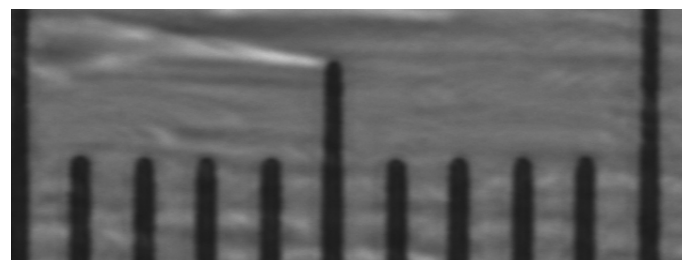
2 s



2,5 s



3,852 s



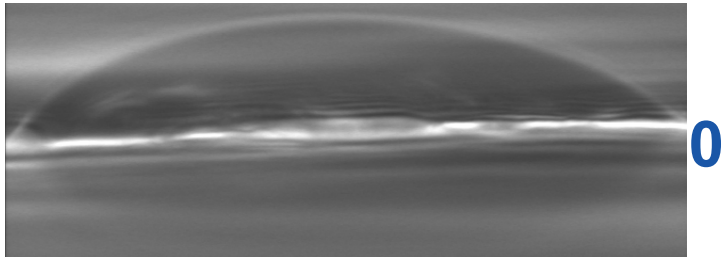
10 μ m
a step

Hewlett Packard Bright White IJ Paper

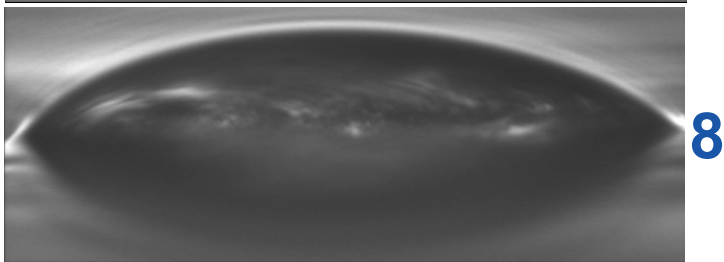


STFI-PACKFORSK

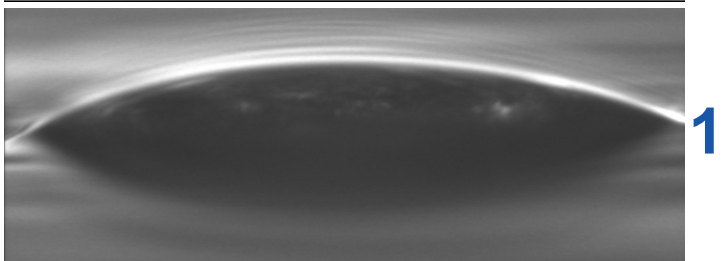
Pre-trials (deionised water)



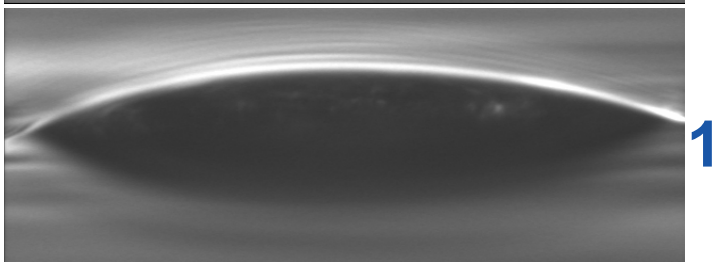
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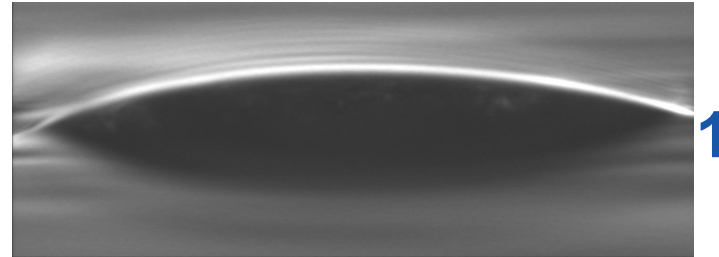
8 ms



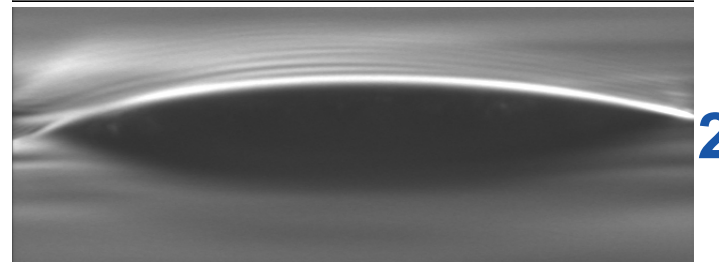
125 ms



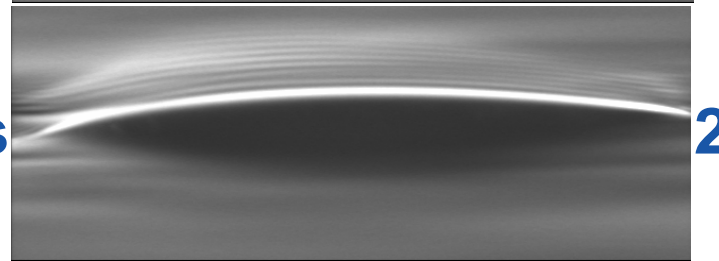
150 ms



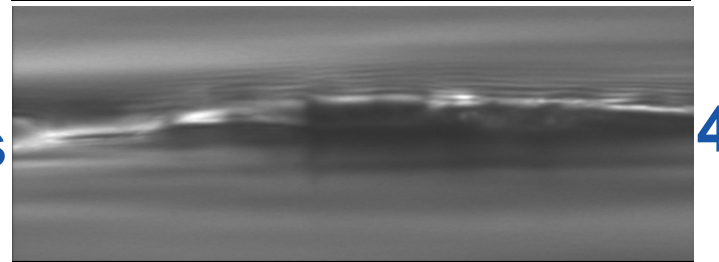
175 ms



200 ms



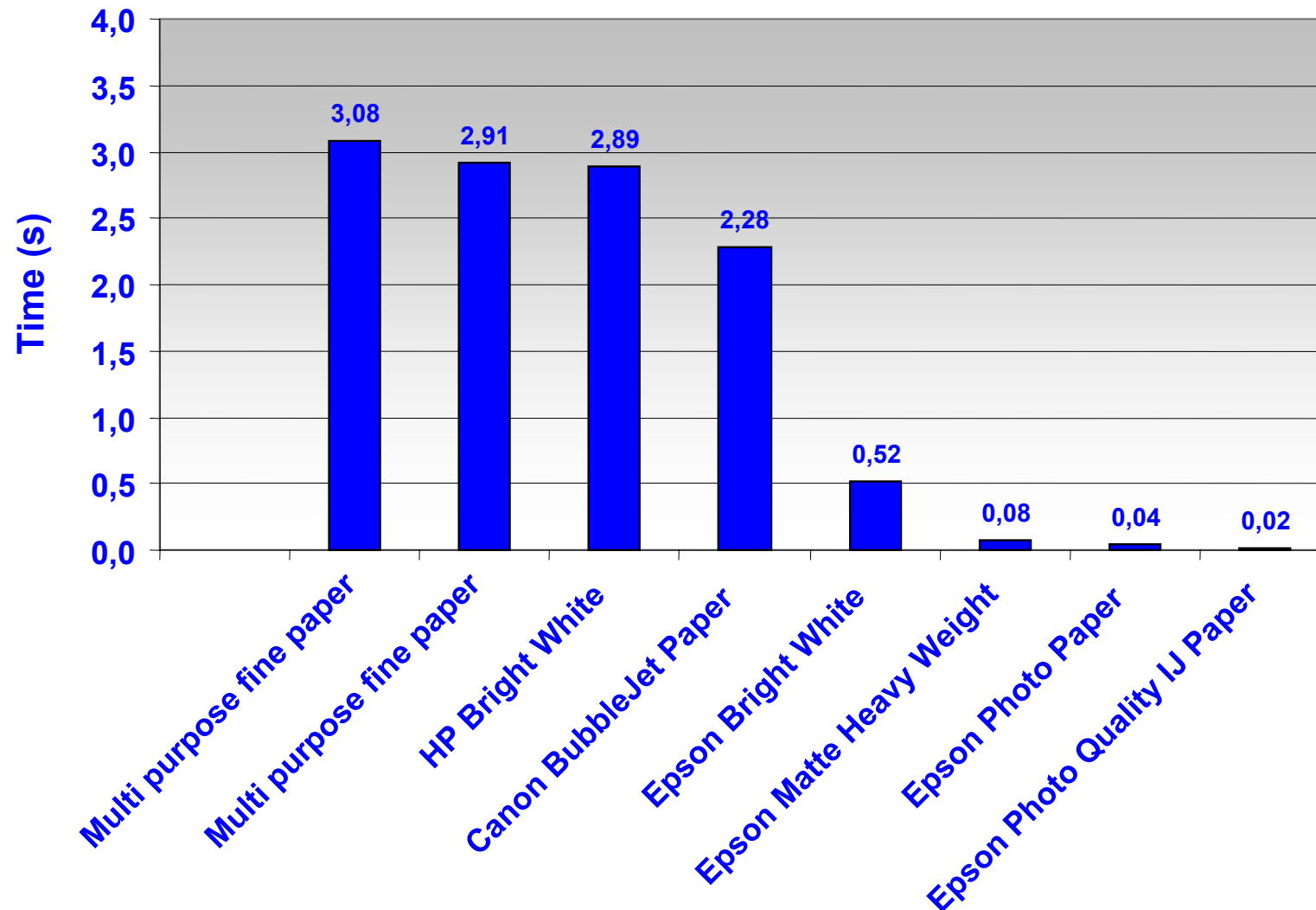
250 ms



442 ms

Epson Bright White IJ Paper

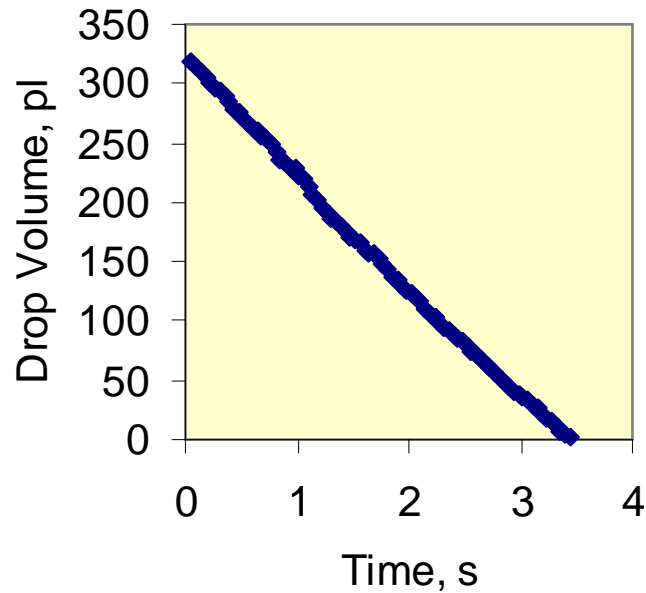
Absorption/evaporation time for a 350 pl water droplet by different papers



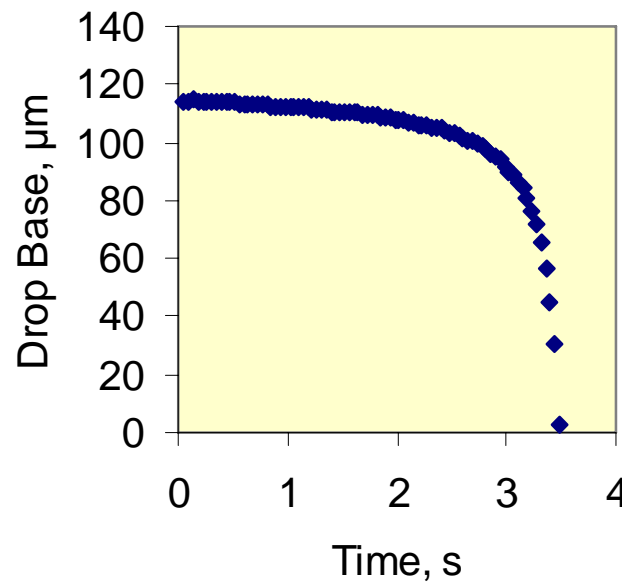


New software

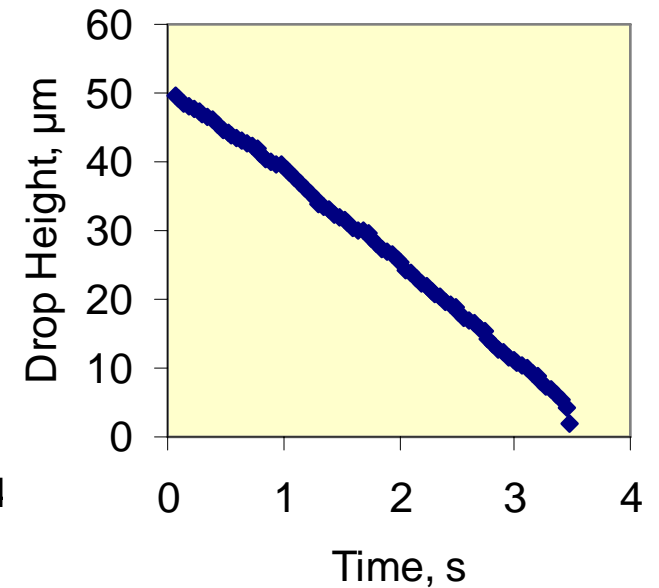
Volume vs. time



Base vs. time



Height vs. time



Slope of height vs. time gives
absorption/evaporation rate in $\text{ml}/\text{m}^2\text{s}$