

## Dynamics of the Triple Contact Line during Phase Change at both Macro and Microscale

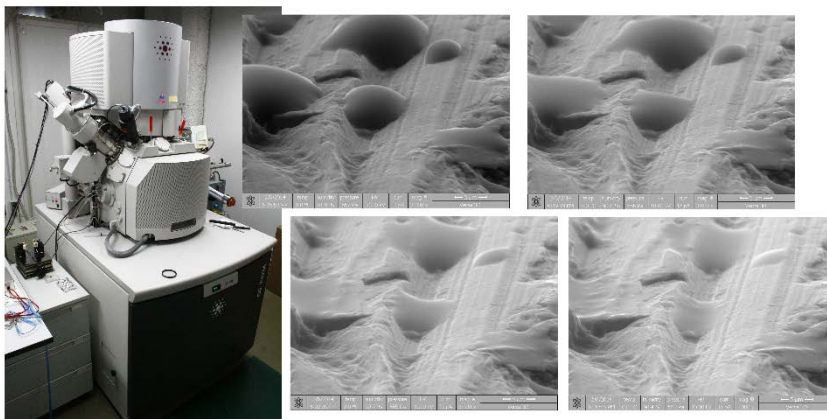
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The ubiquitous nature of wetting phenomenon where a liquid contacts a solid surface is commonly observed all around us and it is relevant for many industrial and everyday applications. For example sessile droplets have been used for the characterization of solid surfaces for years. Typically, after the deposition of a droplet on a solid, droplet profile evolves until thermodynamic equilibrium, or state of minimum energy, at the triple contact line (TCL) between the different phases (solid-liquid-gas) present is reached. Mentioned profile depends on the binary interactions solid-liquid, liquid-gas and solid-gas governed by the physical and chemical properties of the substrate, liquid and surroundings [1]. On other hand equilibrium situations where a fluid stands on a surface are rarely found in nature due to the tendency of the liquid to evaporate. Both, evaporation and wetting phenomena are far from trivial and depend on many factors, such as wettability, roughness, temperature, pressure, chemical interactions, adsorption and external forces applied.

Most of the work carried out on this topic has devoted efforts to the study of these interfacial interactions for macroscopic droplets [2], whereas with this experimental research we provide unprecedented information of the interactions and mechanisms present during two-phase change on a smaller scale. Figure 1 includes some preliminary images obtained during phase change at the microscale of 5 microns droplet ( $\sim 10^{-17}$  litres). This will deepen our understanding of the Thermophysical Properties of solid surfaces and of the simultaneous heat and mass transfer taking place during evaporation or boiling. The present study aims for the development of high Heat Flux Thermal Energy Systems and the minimization of Heat Loses during Heat Transfer with the consequent reductions in CO<sub>2</sub> emissions.



**Figure 1:** FIB-ESEM (Focus Ion Beam-Environmental Scanning Electron Microscope) apparatus and experimental images of a 5  $\mu\text{m}$  droplet evaporating on a copper substrate.

[1] de Gennes, P. G., Wetting Statics and Dynamics, *Review of Modern Physics* 57, Vol. 3, 827 (1985).

[2] Deegan et al., Capillary flow as the cause of ring stains from dried liquid drops, *Nature* 389, 6653 (1993).