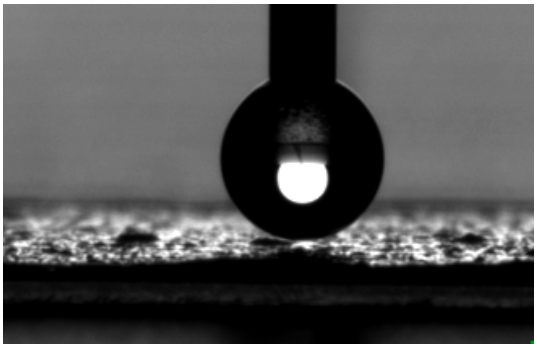
## Post-doctoral position

# Towards inkjet surface modification of paper: spreading of inks on cellulosic substrates


### Matière et Systèmes Complexes (MSC)
### Interfaces Traitements Organisation et Dynamique des Systèmes (ITODYS)

#### Université Paris Diderot


**Starting date:** November-December 2017



The use of printing techniques such as ink-jet deposition is currently extended to the manufacture of many mass-consumption products because of the low unit cost and of the control over the quantities of used products. The generalization of printing techniques also pave the way to new and innovative applications of flexible substrates such as paper that attract considerable interest as they are abundant bio-sourced materials. Made of cellulosic fibres, paper is a complex substrate with respect to printing, especially because of its porous and amorphous morphology. Current industrial processes require modification of raw paper with plasma and/or chemical treatments. The main limitation to the use of paper is its low heat resistance, making it unsuitable for classic clean-room fabrication and deposition techniques. Printing technologies provide a possible solution to this issue as they work under ambient conditions.

The aim of this post-doctoral study is to test how printing processes can be used to modify the surface of paper, from the cellulose fibers up to a paper sheet. The core of the project relies on the characterization of the static and dynamic wetting properties of liquid droplets on rigid substrates covered with cellulose layers. These layers will be prepared at ITODYS using inkjet printing with well-controlled monolayers made of materials such as polyelectrolytes. The liquid in the droplet is a model of ink relevant to the prospect of surface treatment by ink-jet printing whose formulation will be tuned at ITODYS. These inks are typically suspensions of nanoparticles. The static contact angle and the evolution of the shape of the deposited droplet over time will be monitored with photography and particle-tracking techniques to characterize modifications to the surface energy and the effective porosity of paper as well as to quantify the coffee-stain effect. The study of the dynamics of wetting will focus on the motion of the contact line on processed cellulosic layers after the rapid impact of a droplet, to conform to the conditions encountered in a printer. We aim at better understanding the relationship between the surface treatment of paper at the finer scale and the dynamics of wetting.

The announcement is for a 12-month position. The candidate will have ideally a physico-chemist profile with an interest in interface science. He will have experience in experimental science. The candidate will work between MSC and ITODYS under the supervision of M. Roché, G. Mattana, P. Brunet, L. Royon and L. Limat.

**Contact:**


Matthieu Roché : matthieu.roche at univ-paris-diderot.fr