

Microfluidic devices with living surfaces based on photo-Reversible-Deactivation Radical Polymerization

CDD 18months at CEA Saclay

Context

Objects with customizable surfaces, both in terms of patterning and chemical diversities, are highly sought after yet rarely attained. Application of photo-Reversible-Deactivation Radical Polymerization (RDRP) combined with microfluidics is very scarce and the originality of the proposal is grounded on that combination to obtain 4D objects with tailored surfaces (patterning, surface chemistry). Especially, the coupling of RDRP for living photolithography is an unexplored field with numerous applications. In this context and based on the skills of our partners in the ANR 3DCustomSurf project we propose to develop microfluidic systems with living surfaces.

Mission

Initially the candidate will be trained in microfabrication using the RDRP method. For this, he/she will work in close collaboration with a doctoral student from the partner laboratory in Mulhouse who will pass on her know-how. This will require repeated visits to this laboratory.

In a second phase, the microfluidic systems will be characterized and tested in the laboratory. For example, the wetting and swelling properties will be studied in relation to the degree of re-polymerisation of the surfaces.

Finally, we will produce a prototype for double emulsion generation with well-localized wettability (hydrophobic/hydrophilic). The prototype will be made from selected resins (polymers). We will have a special interest to fluorinated oils, which are a gold standard for biological applications in droplet microfluidics.

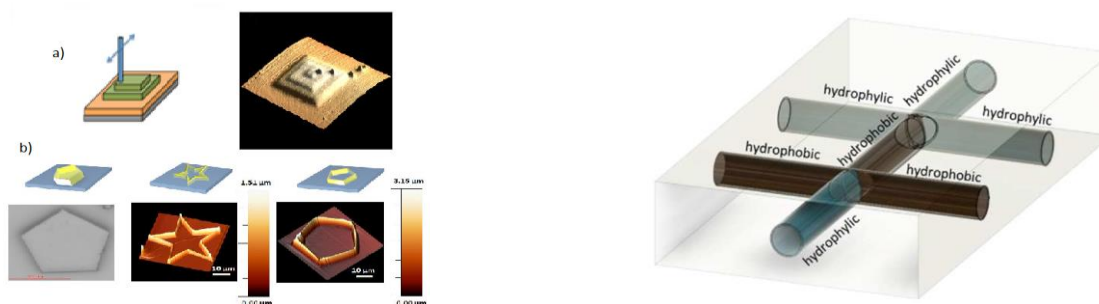


Figure 1: Left. Structures made using light-sensitive alkoxyamines. Right. Scheme of principle for patterned microfluidic device.

The candidate will mainly work in the LIONS CEA Saclay (<https://iramis.cea.fr/en/Pisp/lions/index.html>) for the microsystem development, characterization and proof of concept but he/she will be in close collaboration with our partners from Marseille for chemistry of the molecules and he/she will travel to our partner in Mulhouse for transfer technology.

Profile

With an engineering background (or equivalent) and/or a PhD in Microfluidics/Engineering/Physico-Chemistry, the candidate must be able to make proposals, be independent and be motivated by challenges in a multidisciplinary team.

Applicants will have an experimentalist profile.

Applicants shall speak English or French, and have good communication skills.

Duration: 18 months

Starting date: To be filled: April-May 2023

Localization: LIONS at CEA/Saclay, Gif sur Yvette France. Several one-week missions in Mulhouse (partner laboratory) are to be expected.

Contacts CV, motivation letter and recommendation letter should be sent to:

Dr. Florent Malloggi : florent.malloggi@cea.fr