

Subject Proposal for Exchange Students in Chemistry (Master Level)
(6 months, at any time of the year)

Study of Emulsions and Microemulsions Using the Microfluidics Technology.
Application to Catalytic Oxidation with Catalytic Surfactants.

Borned in 1990's inspired in electro mechanical systems; Microfluidics is a fluid mechanics branch that studies flow behavior in microchannels. This science, mainly used in biochemistry (DNA analysis, technology "lab on a chip"), is now growing because it has many applications in wide range of fields, such as the formulation or the industrial synthesis (optimization of the reactions).

Microfluidics is a useful tool when making emulsions with homogeneous and monodispersed size matters. This method, in contrast to stirring emulsification, forms droplets separately from coalescence phenomena, permitting to create droplets of almost the same size (figure 1). This kind of emulsion is search for encapsulation of fragrances, particles synthesis and controlled drug delivered. Moreover, monodispersity of the emulsions have and important influence in the final product properties (viscosity and stability)

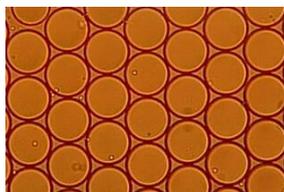


Figure 1. Monodispersed emulsion obtained by microchannel emulsification

Droplets in microchannels are also used for making reactions. The possibility of forming constant volume droplets, good diffusion of reactants (laminar flow) and great temperature control are valuable assets for the performance of chemical reactions.

The purpose of this internship is the development of a formulation based on catalytic surfactants to obtain biphasic and triphasic systems that serve as reaction medium for oxidation and cleavage of alkenes.

Techniques like nuclear magnetic resonance (NMR), gaz chromatography (GC), tensiometry, viscosimetry and densimetry, will be used for characterization of the products obtained.

This internship (4 to 6 months with a salary of ≈ 430 €/month) is available to students of last semesters with knowledge in formulation chemistry, engineering chemistry and organic synthesis. English basis is required and French is optional.

Key Words: microfluidics, microchannel emulsification, emulsions, microemulsions, physicochemistry, surfactants, oxidation, catalytic surfactants.

Profile of candidates:

The candidate should preferably have some knowledge of physicochemistry of surfactants, emulsions and microemulsions.

Gratification: 435€/month

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