



The Combustion Institute

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Postdoctoral opening: Tracking surfactants in porous media using Laser Induced Fluorescence Imaging

Among the many scientific challenges addressed at IFPEN, one aims to provide multiscale descriptions of porous media, geological structures and complex flows. The objective of this postdoctoral position is to contribute to these challenges by performing experimental studies to understand the behavior of surfactants in porous media which may or may not contain hydrocarbons. In particular, the aim will be to characterize the temporal and spatial distribution of surfactants, their propagation kinetics and their mechanical and chemical interactions with the porous media.

An advanced measurement technique based on Laser induced Fluorescence (LIF) will enable visualizations of surfactant flow and measurements of surfactant concentration inside a two-dimensional transparent porous medium. The length scales considered are typically submillimeter. As illustrated in Fig. 1 (on page 2 of this document), some initial experiments have been performed at IFPEN and revealed promising results. In this context the first step will be to explore ways to improve the temporal and spatial measurement resolution, and to characterize the precision uncertainty of the methodology and propose a strategy for improvement reach good quantification accuracy. The second step will be to extend the methodology to fully representative surfactants. A search for a good combination between the surfactant fluorescent properties, the laser light source characteristics and the micromodel chip will be required. Finally the objective will be to demonstrate the feasibility of the experimental methodology for measuring concentration distribution and evolution in a representative micromodel chip.

The research findings are expected to be published in scientific journals since such measurements are considered innovative in both the optical diagnostics and geosciences fields. This postdoctoral fellowship will also provide the opportunity for the candidate to work in a multidisciplinary and team environment, thus developing skills in managing complex experimental campaigns.

Keywords: Optical Diagnostics, micro fluidic, fluorescence

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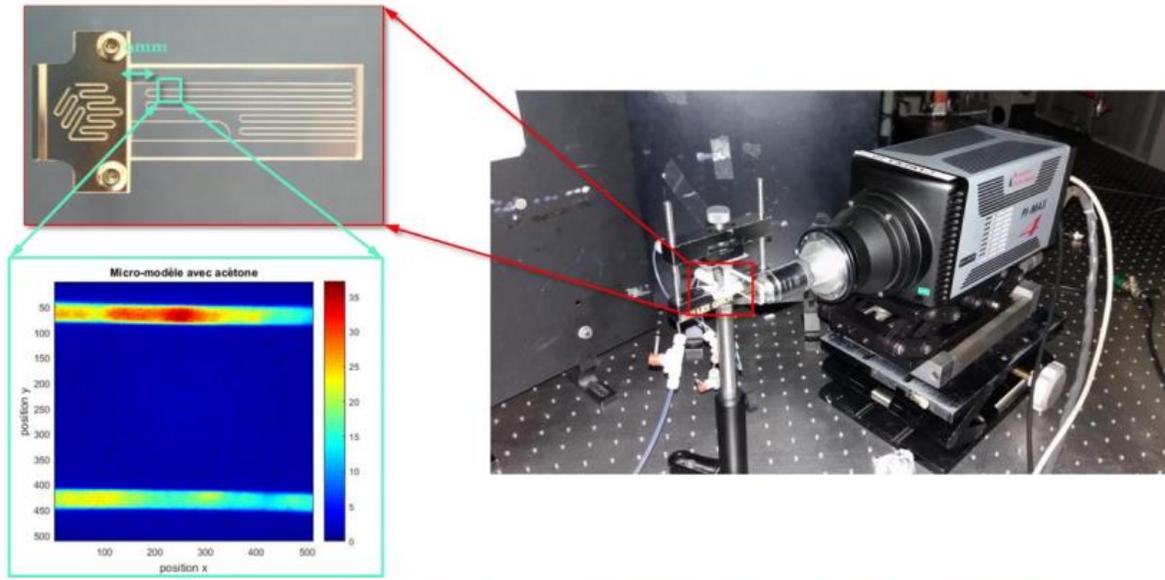


Figure 1. Setup and first results of measuring LIF signal in a submillimeter 2D-chip.

Essential Requirements and How to Apply

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IFPEN supervisor	Dr Guillaume PILLA (Optical Diagnostics) and Dr Jalila Boujlel (Geosciences)
PhD location	IFP Energies nouvelles, Rueil-Malmaison, France
Duration and start date	1 year
Employer	IFP Energies nouvelles, Rueil-Malmaison, France
Academic requirements	PhD degree in relevant disciplines (fluid mechanics, physics, optics, ...).
Language requirements	Fluency in French or English
Other requirements	I.T. skills (Matlab, Office...), Strong background in experimental physics

For more information or to submit an application, see theses.ifpen.fr or contact the IFPEN supervisor.

IFP Energies nouvelles is a French public-sector research, innovation and training center. Its mission is to develop efficient, economical, clean and sustainable technologies in the fields of energy, transport and the environment. For more information, see <http://www.ifpen.fr/>.

IFPEN offers a stimulating research environment, with access to first in class laboratory infrastructures and computing facilities. IFPEN offers competitive salary and benefits packages. All PhD students have access to dedicated seminars and training sessions.

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