

## **Post Doctoral Position**

### **Subject Title: Spectroscopic investigation of PAHs formed in sooting flames using jet cooled laser induced fluorescence**

**Location:** PC2A, UMR CNRS 8522, Université de Lille, Sciences et Technologies  
Bât. C11 - 59655 Villeneuve d'Ascq

**Duration:** 12 months (started early 2016)

**Salary:** 24504 € to 28284 €

**Supervisor:** Xavier Mercier (C11 – RDC)

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#### **SUBJECT:**

Particulate emission during combustion processes are the subject of special attention because of their potential involvement in different types of disease ranging from cardiovascular diseases to lung cancer and respiratory allergies. These harmful particles mainly consist of soot. Furthermore, the reduction of the emissions of soot particles is governed by increasing stringent standards.

The chemical mechanisms of formation of these compounds raise many questions and require quantitative experimental data (i.e. measurement of species concentration) to achieve a detailed understanding of these processes.

Soot particles are known to be strongly interconnected to the formation of PAHs in flames which are considered to be the main precursors of these particles. In the PC2A laboratory, we have developed a laser based method to selectively measure PAHs. This method, named jet cooled laser induced fluorescence relies on the sampling of the species from the flame through a microprobe and their cooling inside a free jet expansion. In these conditions of low temperature and pressure, PAH spectra become structured which allows the use of the laser induced fluorescence method for their selective and quantitative measurement with a detection limit of a few tens of ppb, according the species.

In the frame of this post doctoral position, we offer active participation to the implementation and use of this laser based technique to provide quantitative and spectroscopic data of the PAHs responsible for the formation of soot particles in the combustion process. The investigations will be mainly conducted in premixed flames (flat and laminar) but some possibilities of measurement in diffusion flames and the jet stirred reactor are also envisaged. The data obtained from these experiments will be used to validate a detailed kinetic model previously developed in our laboratory.

The role holder should have or be about to complete a PhD in chemistry, physics, engineering or related fields, with a focus on laser based diagnostics and spectroscopy. Other desirable skills are experience in signal and image detection, and general laboratory experience in the combustion field. This project will be performed in the framework of the Labex CAPPA.

**Keywords: Soot, Combustion, Laser Diagnostics, PAHs, Spectroscopy**