

The ANATRAC research group at the PhLAM laboratory, University of Lille, France
invites applications for a **Postdoctoral position** in

**Mass spectrometry analysis of aeronautic combustion emissions:
seizing the impact of next generation biofuels**

*The appointment period is initially for one year (starting October 1st, 2019), but can be renewed
annually based on satisfactory progress*

Research Context: Aviation is currently one of the strongest growing transport sectors, and this trend is predicted to continue. Therefore, the impact of aviation emissions on climate and air quality is of great concern nowadays. The aviation industry has identified the development of biofuels as one of the major tools to mitigate its emissions. These emissions are not limited to greenhouse gases like CO₂ or water but include as well other gases like nitrogen oxides (NO_x) or sulfur oxides (SO_x) and volatile and non-volatile particulate matter (vPM and nvPM, respectively). nvPM is defined as particles present in the engine exhaust at temperatures higher than 350°C and consists essentially in soot particles produced by the incomplete combustion of the fuel. vPM is formed by nucleation from gaseous precursors in the cooling exhaust gas downstream the combustor, when the concentration of preexisting particles has decreased, favoring homogeneous nucleation versus heterogeneous one. The molecular mechanism behind this phenomenon is still unknown. The main objective of this study is to determine the mechanism behind vPM formation in the engine exhaust and if there is a link with fuel composition. A Combustion Aerosol Standard (CAST) generator especially designed to work with aeronautic fuels (available at ONERA, Palaiseau) will be mainly used to mimic aeronautic engine emissions. Collected samples will be characterized at PhLAM laboratory by means of laser desorption/ionization and secondary ions mass spectrometry. The ANATRAC research group has gained extensive expertise in characterising the physico-chemical properties of carbonaceous aerosols by developing state-of-the-art surface science techniques and comprehensive data analysis protocols for over 15 years. See our [selected publication list](http://www.phlam.univ-lille1.fr/spip.php?article138) and group page for further information (<http://www.phlam.univ-lille1.fr/spip.php?article138>).

Primary Job Duties: The prime directive of the present project is to investigate the surface physico-chemical properties of relevant aerosols produced in a controlled manner in the laboratory or collected from engine exhausts. The chemical characterization of the aerosol surfaces will be performed using a **custom Time of Flight (ToF) mass spectrometer instrument coupled to a laser desorption/ionization technique**. Various ionization schemes developed in our laboratory will be tested, including VUV sources. Further chemical mapping may be performed using a **Secondary Ion Mass Spectrometry (SIMS)** instrument available on campus.

Requirements and Application Procedure: This post-doctoral position is part of the ANR UNREAL (**Unveiling Nucleation mechanism in aiRcraft Engine exhAust and its Link with fuel composition**) project (2019-2022). Candidates should have a Ph.D. in Physical Chemistry, Physics, or related fields and demonstrate a strong interest in **experimental work, especially related to mass spectrometry**. Solid communication skills in English (written, oral), a publication record in international peer-reviewed journals, and willingness to work in a team are mandatory. Applicants will be expected to demonstrate their capability to prepare manuscripts for publication in an independent manner. Salary is commensurate with experience and net salary starts at 2100€/month. Please send electronically a letter of interest, CV, and publication list to Cristian Focsa at cristian.focsa@univ-lille.fr. Review of applications will continue until July 1st, 2019, for the position to be filled October 1st, 2019.

Living in Lille: Lille is a pleasant city in northern France, within an hour by train from Paris, about 30 minutes from Brussels and an hour and half from London. This privileged geographic position makes Lille a veritable gateway to Europe.