



PhD position in Atmospheric Chemistry



Investigating BVOC oxidation in the troposphere

The Department of "Atmospheric Sciences and Environmental Engineering" (SAGE) of IMT Lille Douai, France (<http://sage.imt-lille-douai.fr/>), has ongoing research activities focused on atmospheric chemistry, air quality and the impacts of human activities on atmospheric composition. SAGE is currently composed of a staff of about 50 persons including 15 full-time faculty members. Research projects aim at a better understanding of the physical and chemical processes involved in the formation, transport and aging/transformation of gaseous and particulate pollutants in the indoor and outdoor atmospheres.

CNRS-ICARE develops research activities in the areas of combustion chemistry and physics, plasmas for propulsion and atmospheric chemistry and environment. The total staff members is about 100 people including 17 permanent scientists and 16 academics. The research activities of the Atmospheric Reactivity group (ARg) involved in this thesis subject mainly deals with laboratory and field studies of gas phase and heterogeneous chemical processes relevant for the troposphere. Furthermore, ARg is associated with the Observatoire des Sciences de l'Univers en région Centre (OSUC; <http://www.univ-orleans.fr/osuc/>), one of the Institutes of Orléans University and belongs to the French national network of observatories in Earth and Space Sciences (INSU-CNRS). ARg has access to the different OSUC laboratories and facilities.

Project description:

Local and regional air pollution by ozone and other photooxidants is a major issue for human health and environment. Urban areas are essentially concerned by anthropogenic Volatile Organic Compounds (VOCs) whose degradation in the presence of NO and NO₂ generates this type of atmospheric pollution. In rural areas, biogenic VOCs are the main organic drivers and their chemical structure often bearing one or more unsaturated bonds makes them highly reactive towards ozone. Because of the present climate change and the increasing stress phenomena on plants, biogenic VOCs emissions are expected to increase in the next years. BVOC ozonolysis leads to the formation of new stable compounds, radicals and secondary organic aerosols (SOA). The detailed characterization of these products will allow evaluating the importance of these physico-chemical processes and their impacts on air quality and climate.

The proposed study thus involves rate constant measurements of a series of BVOCs and chemical mechanism development. The atmospheric oxidation chemistry will be investigated in environmental simulation chambers (ESC). Such facilities enable reproducing atmospheric conditions in which VOCs can be oxidized under low to high simulated polluted conditions. Product and SOA precursor kinetics will be determined using state-of-the-art analytical instrumentation connected to the chambers. It is planned to use two complementary ESC, one at ICARE (Orléans), the other at IMT (Douai).

Keywords: Atmospheric sciences, simulation chambers, VOC oxidation

Candidate profile: The candidate must have a Master degree or equivalent, clearly showing an initiation to research (through a master's degree or a long-term internship in private or academic research).

The profile of the candidate must be consistent with the description of the thesis subject. The position requires a high level of communication skills, both oral and written (French or English required) to be able to present at conferences and write articles in scientific publications.

We are looking for a PhD fellow who will be able to become fully involved with the project, with a thirst for knowledge, a certain independence of thought and strong motivation to develop skills in the field of



IMT Lille Douai
École Mines-Télécom
IMT-Université de Lille

PhD position in Atmospheric Chemistry



Investigating BVOC oxidation in the troposphere

atmospheric chemistry. In addition, the candidate must be able to work in a team on multi-disciplinary projects.

Laboratories: SAGE, IMT Lille Douai, ICARE, CNRS-Orléans

Academic supervision: Dr. V. Daële and Dr. A. Mellouki (ICARE)
Pr. Alexandre Tomas and Dr. M. Romanias (SAGE)

Doctoral School: EMSTU (Ecole Doctorale Energie - Matériaux - Sciences de la Terre et de l'Univers, Université d'Orléans, France)

PhD duration and starting date: PhD training of 3 years, with a starting date preferably on 2 January 2019. The graduate student will be awarded a PhD degree from University of Orléans if the work is successfully conducted to completion.

Constraints and risks: Permission from the Defense Official to work in an area with restricted access

Job application: The candidate must have a Master degree or equivalent, clearly showing an initiation to research (through a master's degree or a long-term internship in private or academic research).

He (or she) must not have already started a thesis and cannot apply for another offer of ED EMSTU.

The profile of the candidate must be consistent with the description of the thesis subject. The position requires a high level of communication skills, both oral and written (French or English required) to be able to present at conferences and write articles in scientific publications. Applications must include a detailed CV and grades for the Masters 1 or 2 or the engineering degree. The closing date for sending applications is 01/12/2018.

Dr. Véronique Daële: veronique.daele@cnrs-orleans.fr

Pr. Alexandre Tomas: alexandre.tomas@imt-lille-douai.fr