

## **Postdoctoral Researcher: Experimental and kinetic modeling of biofuels in high pressure shock tube.**

**Keys words:** high pressure shock tube, autoignition, biofuel, chemical kinetic combustion.

### **Research Laboratory:**

DRIVE Laboratory (Département de Recherche en Ingénierie des Véhicules pour l'Environnement – Reseach department in vehicule engineering for the environment) is located in ISAT (Institut Supérieur de l'Automobile et des Transports – the French institute of automotive and transportation engineering created in 1991), Nevers, France. ISAT belongs to the University of Burgundy. The DRIVE members are part of the following competence teams:

- Transport Materials and Acoustic
- Energy Propulsion Electronics and Environment: EPEE group

The coordinator and the team of this project are part of the EPEE group which has been created following a new teaching department opening in ISAT in 2008. Since then two professors and four assistants professors have been hired. This new department and this new research team follow the new needs of the personal transportation changes. This EPEE group is composed of two teams "Energy, propulsion and sustainable mobility" and "Intelligent Vehicle" composed with 2 Professors, 8 Associate Professors, 2 Assistant Lecturers and 10 PhD students. The "Energy-Propulsion and Sustainable Mobility" team created in 2009 a mix Public-Private Research Centre called ID-Motion in collaboration with the company Danielson Engineering which is specialized in fast study and construction of technological prototypes for automotive and aircraft sectors. The goal of this structure is to carry out joint research activities in the sustainable mobility domain and oriented towards future power trains for land vehicles.

The successful candidate will integrate into the EPEE group as well as contribute to the collaborative research efforts with other combustion research groups, nationally, and internationally.

### **Mission:**

The postdoc is funded by ANR JCJC project SHOCK (Shock tube study at High-pressure of Oxygenated fuels for Chemical Kinetic). The project aim is to develop a unique high pressure shock tube for autoignition measurements. Fundamental data such as ignition delay times and species profiles at practical conditions are invaluable for the improvement and extension of chemical kinetics models to engine applications. High pressure shock tubes are ideal to perform such measurements. Autoignition is a fundamental process in internal combustion engines since it is the ignition process for Diesel engines and efficiency-restricting process for spark-ignition engines (knock onset). Auto-ignition and the subsequent kinetics-driven combustion is also the ideal combustion process for HCCI

(Homogeneous Charge Compression Ignition) and CAI (Controlled Autoignition) engines. Autoignition is important for designers to predict and control for optimizing the desired performance in the gas turbines combustion. A high pressure shock tube is being installed and validated for this project. The challenge in this project is to acquire conditions close to real engine conditions above 20 bar up to 40 bar. This work will be divided into three main parts:

- The first part consists in the literature reviews of the auto-ignition of pure fuels and fuel mixtures;
- The second part consists in the validation of the high-pressure shock tube;
- The third part is based on the use of the shock tube in order to study the oxidation process of different fuels (Identification of oxygenated species which could be used for internal combustion engine, experimental and numerical study of the chosen fuels).

1 year contract

Gross Salary: 2380euros per month

Available immediately.

**Candidate profile:** Candidates must have a Ph.D, in Combustion. They should have a high level of experience and competence in combustion chemistry and in the use of a shock tube. A demonstrated output in terms of published papers in peer-reviewed journals is also required. Knowledge of French is not required.

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