

## 8 months of Post-doctoral fellowship (+18 months)

### Ultrasonic Instrumentation to determine the cristalinity rate in polymers for hydrogen gaz storage

The increasing scarcity of oil resources the last past years leads to new researches to develop energy alternatives. Among the solutions envisaged, the hydrogen is one of the most promising. In the automotive domain, the hydrogen gas on-board storage must be safe, economical and efficient in order to cover as many kilometers as a gasoline vehicle. One of the most economical solution is to develop the storage of hydrogen gas with a constant pressure of 700 bars.

In the last 15 years, the CEA Le Ripault leads R&D projects on hydrogen gas storage tanks (type IV, 700bar with polymer liner and composite shell) in order to supply PEMFC fuel cells and meet the industrial need in the field. This work is carried out with a focus on materials and process innovation in collaboration with academic and industrial partners.

This post-doctoral fellowship is part of the ARD Lavoisier program in collaboration with the CEA Le Ripault. It will take place in the GREMAN Laboratory (<https://greman.univ-tours.fr/>) at INSA Centre Val de Loire in the city of Blois.

This project is carried out with the CEA teams. It is based on a multidisciplinary, essentially experimental scientific approach. The objective of this post-doctorate is to study the barrier properties to H<sub>2</sub> gas through the study of the crystallinity rate in thermoplastic polymers.

The rates determined by conventional methods (as DSC) will be compared with the results obtained by ultrasonic measurements. This post-doctoral fellowship requires the **development linear and non-linear ultrasonic methods** for the **medium characterizations**. The final objective of this work is to establish a qualitative or quantitative **relationship between the microstructure of the polymer material, the gas permeation properties and the ultrasonic quantities**. The experimental results obtained from characterization tests developed specifically for the project will then be exploited by the CEA.



**FIG1:** (a) Hydrogen tank for automotiv sector. (b) The polymeric material using for the tank must have barrier properties to the H<sub>2</sub> gaz.

The contract could be extended with a second postdoctoral fellowship of 18 months on a related project.

Profile: Candidates with a PhD in acoustics.

Requirements:

- Experimental characterization of material by ultrasonic method
- Data analysis and processing
- Linear and non-linear method for acoustic characterization
- Basics of the polymer science
- Open towards the material science challenges
- Writing articles and scientific communications
- Curiosity, teamworking

Duration: 8 months + 18 months

Start date: Available today

Location: Blois, France

Salary: 2300 euros/month

Contacts: Please, send your CV, your cover letter and your publication list to:

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