



12 MONTH POST-DOCTORAL POSITION

Removal of pesticide residues in beeswax by plasma processes

Context

Wax is the primary input to beehives and is of paramount importance in the development of bee colonies. It constitutes the cement and the bricks allowing bees to build the cells in which the pollen, honey and broods will be stored. In order to speed up this natural process, beeswax is introduced by beekeepers into the hives under the form of embossed plates produced from batches of recycled beeswax. Mainly composed of fatty alcohols and fatty acids esters, this wax constitutes a lipophilic matrix behaving like a captor for pesticide molecules used either in agricultural areas (orchards, rapeseed ...) and brought back to the hives by the bees, or in acaricide treatments against varroa, a common parasite of bees, larvae and nymphs.

In a context of very strong suspicion of the effect of pesticide residues on the observed bee mortality, the project aims to evaluate, on a laboratory scale, the effectiveness of different Advanced Oxidation Processes (AOP) upon the degradation of pesticide molecules contained in recycled beeswax.

The interest of AOP lies in their ability to generate high concentrations of oxidizing species (O , OH^\bullet , O_3 , H_2O_2 , ...) conducing to the degradation and mineralization of many organic pollutants at room temperature and atmospheric pressure. Financed by the Occitanie Region with European ERDF funds, the project gathers :

- the LGC laboratory (Laboratory of Chemical Engineering of Toulouse), mastering the techniques for generation of free radicals using chemical (ozonation, Fenton reaction) and photo-chemical processes;
- the LAPLACE laboratory, having the expertise of cold plasma processes;
- an industrial partner, one of the French leaders in beeswax production.

Work program

Within the framework of this project, beeswax pesticide decontamination performances of two pilot plasma reactors will be studied and optimized. The first reactor will operate in a microwave flowing afterglow regime at reduced pressure while the second reactor will be of multi-point corona type, operating in ambient air.

The recruited post-doc will have to adapt two already existing reactors to the specificities of beeswax treatment, envisaged under solid (at high and low pressure) and liquid form (at high pressure). It will have to conduct the entire experimental program and to scan the relevant operating plasma parameters to reach the optimum degradation of a pool of pesticide molecules already identified (Coumaphos, Tau-fluvalinate, ...). Finally, the production of oxidative species in the plasma phase, quantified via emission and absorption spectroscopy techniques, will be tentatively linked to the observed degradation rates.

Profile and expected competences

The candidate must hold a PhD in plasma physics, preferably with an experimental expertise related with plasma diagnostics. Experience in emission spectroscopy and/or in LIF/TALIF tools will be appreciated.

Duration and location

12 months duration, starting on January 1st, 2021.

The post-doc will work at the LAPLACE laboratory (Paul Sabatier University, 118 route de Narbonne, Toulouse), in the PRHE (Out of equilibrium reactive plasmas) team.

Salary

2.656,97 € gross monthly, financed by the Occitanie Region through European ERDF funds

Contact

To apply, send your CV and a list of publications to :

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Complementary information

LAPLACE website <http://www.laplace.univ-tlse.fr>

PRHE team website <http://www.laplace.univ-tlse.fr/Presentation-76>

