

## Research Grants for PhD students from the China Scholarship Council

Information Form (please read the guidelines carefully on the website [www-csc.utt.fr](http://www-csc.utt.fr))

Supervisor's name : BALS Given names : OLIVIER

Status (prof., assistant prof., ...) : Assistant prof

Laboratory : Transformations Intégrées de la Matière Renouvelable Website address : <http://www.tai-team.fr> et <https://www.utc.fr/timr/>

Institution : Université de Technologie de Compiègne Website address : [www.utc.fr](http://www.utc.fr)

Scientific competence of the supervisor:

Process engineering  
Freezing  
Drying  
Extraction of valuable compounds

Two major publications in the field proposed for the PhD :

1. Yu, X. Gouyo, T., Grimi, N., Bals, O., Vorobiev, E. Ultrasound enhanced aqueous extraction from rapeseed green biomass for polyphenol and protein valorization. *Comptes Rendus Chimie*, Volume 19, Issue 6, 1 June 2016, Pages
2. Parniakov, O. Bals, O., Lebovka, N., Vorobiev, E. Effects of pulsed electric fields assisted osmotic dehydration on freezing-thawing and texture of apple tissue. *Journal of Food Engineering*, Volume 183, 1 August 2016, Pages 32-38.

Website address of the personal page :

**Supervisor's email :** [olivier.bals@utc.fr](mailto:olivier.bals@utc.fr)

**Description of the research work proposed for a PhD** **Topic # (see list) :** II-9 , II-13 and V-12

Title : Enhancement of the extraction of valuable compounds from agro-resources: impact of innovative pre-treatments

Subject :

The main objective of this thesis is to evaluate and investigate the effects of new and emerging technologies (pulsed electric field, ultrasounds, and microwaves) on the efficiency of mass and heat transfer phenomena on vegetable materials. The impact of the operating parameters (energy input, temperature, solvent, size of particles...) on the extraction of valuable compounds (polyphenols, proteins, lipids, pigments,...) from food and food wastes materials (sugar-beet residue, microalgae,...) will be studied. The relationship between the yield of the extraction, the quality of the extracts and the energy input will be established. The project concerns also the optimization of alternatives drying techniques (such as microwaves, ohmic heating, pulsed electric field). It was previously demonstrated that the convective coefficient, diffusivity of water and intracellular compounds can be modified after the pretreatments by pulsed electric fields and microwaves. The structure (cell membrane, cell wall) of the products can be changed after the pretreatments. The kinetics of extraction and drying process can be improved and quality of the product conserved. In this project, the experimental study will be completed by modeling approaches. The results of this thesis should help on the better understanding of mechanism of each treatment and parameters that influence the processes.

Keywords :

Extraction, drying, modelisation, food, waste, biomass, emerging technologies

Expected collaborations :

School of Food Science and Engineering, Wuhan Polytechnic University, 430023 Wuhan, China

Background required from the applicant :

Process Engineering, mass transfer, modeling, Biochemistry,

Existence of a PDF file detailing the proposal ("yes" or "no") : no

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