Dr Éric Husson
Unité de Génie Enzymatique et Cellulaire, UMR CNRS 7025
&
Dr Caroline Hadad
Laboratoire de Glycochimie et des Agroressources d'Amiens, UR 7378
UFR des Sciences, Université de Picardie Jules Verne, 33 rue Saint Leu - 80000 Amiens
eric.husson@u-picardie.fr, caroline.hadad@u-picardie.fr

Thesis proposal – École Doctorale Sciences, Technologie, Santé – EDSTS 585 – Université de Picardie Jules Verne, Amiens (France)

Thesis title:

Valorization of *Cannabis sativa L.* residues: Fractioning and Nanotransformation (VALCANA)

Abstract:

This thesis explores new alternative and sustainable ways of fractioning hemp crop residues for the "wellness" market and transforming them into nanoobjects. The innovative and eco-responsible strategies developed in this thesis will combine biochemical tools (enzymes) and a rational choice of alternative non-conventional solvents (ionic liquids, deep eutectic solvents, zwitterionic ionic liquids, eco-compatible organic solvents). These approaches will aim to isolate cellulose- or lignin-enriched fractions from lignocellulosic residues. These fractions will be then transform into nanoobjects. These nanomaterials will be then chemically or enzymatically functionalized and incorporated into formulations to produce 3D films, fibers or scaffolds for high value-added applications in food packaging and tissue engineering. This doctoral project will be based on the complementary know-how and expertise of the **Génie Enzymatique et Cellulaire** (GEC) unit and the **laboratoire de Glycochimie et des Agroressources d'Amiens** (LG2A) at the University of Picardie Jules Verne in Amiens (France), in the fields of lignocellulosic biomass fractioning and carbohydrate processing respectively. Two regional industrial partners specialized in the production of "wellness" hemp, ***La Ferme Butruille - les casiers du maraîcher*** and ***Sativatech*** will make available a wide range of lignocellulosic residues (stems/leaves) from different growing conditions. This trans-disciplinary project is part of a territorial approach and will contribute to improving the circularity of this fast-growing economy.

The recruited candidate will benefit from a quality work environment (including the geographical proximity of the two laboratories) enabling daily exchanges with his/her supervisors, and will develop transdisciplinary skills at the chemistry/biochemistry/biotechnology interface.

The candidate should have a 5-year degree and strong skills and experience in biochemistry and/or organic chemistry (MASTER or engineering schools). Organized, reliable, reactive, the candidate must show initiative, innovation and have good integration skills. An interest in applied research would be greatly appreciated.

Candidates who are interested in this subject are requested to send a CV, a letter of motivation and transcripts (including detailed scores and ranking) of their Bachelor's and Master's degrees to the following addresses: eric.husson@u-picardie.fr et caroline.hadad@u-picardie.fr.

Dr Éric Husson
Unité de Génie Enzymatique et Cellulaire, UMR CNRS 7025
&
Dr Caroline Hadad
Laboratoire de Glycochimie et des Agroressources d'Amiens, UR 7378
UFR des Sciences, Université de Picardie Jules Verne, 33 rue Saint Leu - 80000 Amiens
eric.husson@u-picardie.fr, caroline.hadad@u-picardie.fr

References of two host laboratories:

1-ethyl-3-methyl imidazolium acetate, hemicellulolytic enzymes and laccase-mediator system: Toward an integrated co-valorization of polysaccharides and lignin from Miscanthus. Quesada-Salas, M.C., Vuillemin, M. E., Dillies, J., Dauwe, R ., Firdaous, L., Bigan, M., Lambertyn, V., Cailleu, D., Jamali, A., Froidevaux, R., Husson, E., Sarazin, C. *Industrial Crops and Products*, **2023**, 197, 116627.

Revisiting organosolv strategies for sustainable extraction of valuable lignin: the CoffeeCat process. Vuillemin, M. E., Quesada-Salas, M. C.; Hadad, C.; Jasniewski, J.; Husson, E.; Sarazin, C. *RSC Sustainability,* **2023**.

Theoretical and Experimental studies of chitin nanocrystals treated with ionic liquid or deep eutectic solvent to afford nanochitosan sheets. Ferreira Funes, C., Bouvier, B., Cézard, C., Fuentealba, C., Jamali, A., Courty, M., Hadad, C., Nguyen Van Nhien, A. *J. Mol. Liq.,* **2023,** *375*, 121350.

Active coatings based on oxidized chitin nanocrystals and silk fibroins for the control of anthracnose in 'Hass' avocados. Funes, C. F., Larach, A., Besoain, X., Serrano, D. D., Hadad, C., Pedreschi, R., Van Nhien, A. N., Fuentealba, C. *Int. J. Biol. Macromol*., **2023**, 253, 126673.

New biobased-zwitterionic ionic liquids: efficiency and biocompatibility for the development of sustainable biorefinery processes. Huet, G., Ayya-Farias, M., Alayoubi, R., Laclef, S., Bouvier, B., Gosselin, I., Cézard, C., Roulard, R., Courty, M., Hadad, C., Husson, E., Sarazin, C., Nguyen Van Nhien, A. *Green Chem.,* **2020**, 22, 2935.

Straightforward extraction and selective bioconversion of high purity chitin from Bombyx eri larva: Toward an integrated insect biorefinery. Huet, G., Hadad, C., Husson, E., Laclef, S., Lambertyn, V., Araya Farias, M., Jamali, A., Courty, M., Alayoubi, R., Gosselin, I., Sarazin, C., Van Nhien, A. N. *Carbohydr. Polym.,* **2020**, 228, 115382.