Toulouse Biotechnology Institute
Bio & Chemical Engineering

Researcher permanent position[1] at Toulouse Biotechnology Institute on wide-scope eco-design for biotechnology and bioeconomy

Application process: January-February 2020
Estimated job start date: September 2020
Contact: Professor Ligia BARNA, INSA Toulouse – TBI, ligia.barna@insa-toulouse.fr
Deadline for contact: end of December 2019

Context

Today, the development of innovative technologies or the promotion of new rationalized scenarios for the transformation of bio-resources must take into account technological and economic criteria as well as environmental performance. In this context, the eco-design of physical-chemical and biological processes is presented as a real necessity for an early assessment and design of new routes of bio-resources transformation, and aims at harmonizing industrial biotechnology with the assets of sustainable development.

Research field

The research programs of TBI are at the interface of biology and chemical engineering with varied applications in the fields of biotechnology, agro- and food industries, and eco-industries. Recognizing this complementary context, the researcher is expected to work on the development of generic eco-design tools, targeting various application fields. Examples of activities and initial expected implications are: (1) development of tools (homemade, and using commercial software) for modelling and scale-up unit operations, (2) integrated flowsheeting and Life Cycle Assessment (LCA) for biotechnology (physical-chemical and bio-chemical processes).
To enable concrete involvement at the heart of research program, the researcher would also be involved in several existing projects, such as Cambioscope (Carbon management towards low fossil carbon use) and Ecotransform (Environmental assessment of processes for transformation of bio-resources) and would benefit from the close R&D collaboration with ProSim company for software development and improvement.

Related publications:

[1] A Ahmadi A., E Severac E., N Monties N., M Claverie M., M Remaud-Simeon M., C Moulis C.,Tiruta-Barna L., Eco-design approach for an innovative production process of low molar mass dextran, Green Chem., 21, 2019, 4512.
[2] Shimako, A.H., Tiruta-Barna, L., Pigné, Y., Benetto, E., & co., Environmental assessment of bioenergy production from microalgae based systems, Journal of Cleaner Production, 139, 2016, 51-60
[3] Hamelin L, Naroznova I, Wenzel H., Environmental consequences of different carbon alternatives for increased manure-based biogas. Applied Energy, 114, 2014, 774-782.

Work environment

The researcher integrates a new eco-design and bioeconomy cell within SOPHYE research team, in which he/she is not only in contact with other specialists in process modelling, optimisation, LCA and Bioeconomy, but can also benefit from the global laboratory synergy with other researchers in various disciplines, ranging from microbial and enzyme molecular engineering to chemical and bio-chemical engineering.
More specifically, the researcher will work under the supervision of Prof. L. Barna, in close collaboration with Ass. Prof A. Ahmadi and Dr. L. Hamelin. The team already benefits from software and home-made computing tools for use in other applications and developments.

Requirements

- PhD degree; Excellent background in chemical engineering; Motivation
- Good skills and experience in process modelling and simulation and in programming (e.g. VBA, Python, CAPE-OPEN, …)
- Reasonable knowledge of numerical methods (e.g. optimisation).
- LCA skills are a plus.

[1] Poste de Chargé de Recherches