

ESR 10 | Dynamic analysis of subpopulation distributions of engineered *Cupriavidus necator* for biomolecules production from CO₂: determination of the strain robustness under the constraints of gas fermentation

ORGANISATION

With 14,000 alumni present in all economic sectors, the "Institut National des Sciences Appliquées" of Toulouse, an international, pluridisciplinary, state engineering school, is recognised for the excellence of its five-year education which attracts students of a high academic level. The international dimension has been a priority for INSA since it opened and international sections have gradually been set up. On campus, one in five students is an international student.

The position we offer will be embedded at the Toulouse Biotechnology Institute (TBI) within the research group Fermentation Advances and Microbial Engineering (FAME). With its highly developed competences in Life Sciences and Engineering Sciences, TBI implements a scientific strategy that is multi-scale, multidisciplinary and interdisciplinary in order to take up the challenges of bioeconomics with a worldwide collaborative network of public and private contributors (http://www.toulouse-biotechnology-institute.fr/en/presentation_of_lisbp.html). Research activities of the FAME group focus on kinetic and stoichiometric studies of microbial transformations in order to identify the phenomena which limit the performances of biotechnological processes (<http://www.toulouse-biotechnology-institute.fr/en/research/microbial-engineering/fermentation-advances-and-microbial-engineering--ead8.html>).

ROLES AND RESPONSIBILITIES

The main part of your PhD research (3 years) will be carried out at **INSA Toulouse** under the supervision of **Dr. Nathalie Gorret** in the FAME group at the Toulouse Biotechnology Institute. Within these three years an academic research stay (6-7 months) will take place at the **Graz University of Technology** (TUG, Austria) under the supervision of **Prof. Robert Kourist**. Additionally, an industrial secondment at the company **TOTAL Raffinage Chimie (France)** is foreseen. The H2020 Marie Skłodowska-Curie Actions (MSCA) – Innovative Training Network (ITN) project ConCO2rde starts in January 2021. The date of recruitment and start of the PhD project is planned for May 2021 and latest on December 2021. Your **PhD degree** will be awarded based on successful completion of the research work **from two universities** (INSA, France and TUG, Austria). You will also be required to participate in the **training events and workshops** organized by the ITN-European Joint Doctorates (EJD) program. As a Marie Skłodowska-Curie Actions (MSCA) fellow, you are also expected to **contribute your time in the dissemination of your PhD project's result** through public engagement and other scientific platforms.

The PhD research will be part of the Work Package 3 "Process intensification of gas-driven processes" of the ConCO₂rde project aiming at deciphering the bottlenecks at the technological levels in order to run gas fermentations at high cell densities within pressurized bioreactors in order to speed up the development of the future bioprocess from CO₂ as unique Carbon source.

The ESR10 PhD research will focus on the investigation of heterogeneities within engineered *C. necator* according to the imposed environmental conditions in gas bioreactor for better process control :

- (i) Interdisciplinary project on bacterial physiology, metabolic engineering, fermentation
- (ii) Strain engineering for the synthesis of isopropanol and biosensor
- (iii) Strain engineering for heterogeneity monitoring (academic secondment),
- (iv) Characterization of engineered strains and sub-populations in pressurized bioreactor in autotrophy,
- (v) Process intensification and rentability studies with the industrial partner.

Primary supervisor: Dr. Nathalie Gorret (ngorret@insa-toulouse.fr)

Recruiting institution: INSA Toulouse (France)

Double degree awarding institution: Technische Univeristät Graz (TUG, Austria)

REQUIREMENTS

- An outstanding M.Sc. degree in Biochemical engineering, Biotechnology, Microbiology, Biochemistry or related field
- Eligible as a graduate student at INSA Toulouse, France
- Research experience in fermentation (bioreactor, microbial kinetics), analytical methods (HPLC, GC, MS, NMR etc.), single cell analysis (flow cytometry, ...), genetic engineering
- Ability to work in an international team,
- Inter- and multidisciplinary thinking,
- High motivation,
- An integrative and cooperative personality with excellent communication and social skills,
- Fluency in English – written and oral.

CONDITION OF EMPLOYMENT

We offer you a work contract in accordance with the Collective Labour Agreement for French Universities. The salary will range within € 3 783 to € 4 383 pre-tax per month depending on the personal situation. The full time appointment is temporary for a specified period of three years. The preferred starting date is between May 1st and October 1st 2021.

APPLICATION PROCEDURE

To apply for the position, kindly provide:

- (i) A letter of motivation including a statement of your research interests, relevant skills and experience;
- (ii) A CV including publication list; and
- (iii) Names and contact details of three referees willing to write confidential letters of recommendation.

Please upload applications only according to instructions at www.conco2rde.eu.

We are an equal opportunity employer and value diversity at our University. We are committed to building a diverse faculty so you are encouraged to apply. Our selection procedure follows the guidelines of the Recruitment code and European Commission's: European Code of Conduct for recruitment of researchers.

APPLICATION DEADLINE

31st of January 2021 11:59pm Central European Time



Innovative Training Network – European Joint Doctorates

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