

Université de technologie de Compiègne – Thesis Proposal

Part 1 : Scientific Fact Sheet	
Subject	Development of electrosynthesis processes for the transformation of molecules from biomass
Type of funding	CSC Program
Host Laboratory	<p>Research Unit :</p> <p>Transformations Intégrées de la Matière Renouvelable (TIMR) - EA 4297</p> <p>Research team :</p> <p>Organic chemistry and alternative technologies (OCAT) Compiègne</p> <p>site web : http://www.utc.fr/timr/</p>
Thesis supervisors	<p>Co-PhD Supervisor : Assistant Professor G�erald ENDERLIN</p> <p>Co-PhD Supervisor: Director of Research G�erard BACQUET</p>
Areas of expertise	<p>Green chemistry</p> <p>Engineering science</p> <p>Organic chemistry</p>
Description of the subject	<p>This research work is dedicated to the development of electrosynthesis processes applied to biomass conversion.</p> <p>By immersing electrodes, connected to a direct current generator, in the reaction medium, oxidation and reduction reactions will occur on their surface. By controlling the electrolysis current, it is possible to influence the reactive kinetics. In this case, electrical activation replaces thermal, catalytic, photochemical etc... In addition, the use of a non-polluting reagent as inexpensive as the electron, compared to conventional oxidizing or reducing reagents, exerts a powerful attraction for organic chemists.</p> <p>The electrocatalysis process allows us, unlike conventional processes, to dispense with many steps of synthesis, the use of corrosive chemical reagents and facilitates purification.</p> <p>Electrosynthesis applied to biomass is a powerful and elegant response to current economic and environmental challenges.</p> <p>Biomass products are still undervalued through electrocatalytic transformations.</p> <p>We will be interested as starting substrates :</p> <ul style="list-style-type: none"> - derivatives of oils and their constituents. In particular, fatty acids, which are the raw materials of biorefineries and can be easily exploited by this technology. - As well as sugars and their derivatives such as furfural, which are high potential candidates for these transformations. <p>This thesis will focus on:</p> <ul style="list-style-type: none"> - electrocatalytic transformations of biomass compounds. - understanding of the reaction mechanisms during electrosynthesis and control of the counter reaction. - development of a multipurpose laboratory reactor, through the control of, contact surface, heat exchange, flow

	-Production of bio-sourced sustainable chemical products and materials; - Characterization of the compounds obtained through their physico-chemical properties.
Key words	Organic electrosynthesis, electrochemistry, industrial processes, electron transfer, CC coupling, green chemistry
Candidate Profile and Competencies	She/he must have received priority training in organic chemistry and/or physico-chemistry. Knowledge or experience through courses on electrochemical systems or catalysis will be particularly appreciated. CAD skills will be a plus. The candidate will have to be very comfortable with the modern analytical techniques (HPLC, GC, RMN, etc...) on which he/she will be trained to become quickly autonomous. He/she will have to be dynamic, curious and persevering to carry out the multiple syntheses, characterizations, tests and interpretations of the results, and demonstrate the ability to work in a team and in several different scientific environments. A good command of French or English (comprehension, speaking, writing) will be essential
Start date of the thesis	September-October 2022
Place of work of thesis	TIMR EA 4297

Part 2 : Job description	
Durée	36 to 42 months
Possibility of complementary missions	Teaching
Host laboratory	TIMR
Materials resources	collective office, computer, PPE Laboratory of synthesis, equipment of electrotechnologies, platform of analyses and characterizations.
Human resources	University environment, interns, technicians, engineers
Financial resources	Available and consistent with the successful completion of the thesis
Work arrangements	Regular follow-up of laboratory work with a thesis supervisor and submission of a semi-annual report of results to the thesis supervisors.
Research project related to this thesis	
National Collaboration(s)	Professor Jean-Paul CHOPART, LISM, University of REIMS
International Collaboration(s)	no
Thesis in international cotutelle	no
Contact Information	<p>Gérald Enderlin Tel : 03 44 23 88 08 g.enderlin@escom.fr 1, allée du réseau JM Buckmaster 60200 COMPIEGNE</p> <p>Gérard Bacquet Tel : 03 44 23 88 00 g.bacquet@utc.fr 1, allée du réseau JM Buckmaster 60200 COMPIEGNE</p>