EBIO – Biofuels through Electrochemical transformation of intermediate BIO-liquids

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Project Information

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1.0	*10/11/2024*	*Edoardo Nencetti*	*Initial version*
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Description of the deliverable content and purpose

This document provides an overview of the scientific publications produced as part of the EBIO project. It includes a summary of publication types, a detailed list of published and pending articles, key highlights and impacts of the research, challenges encountered during the publication process, and the future publications scheduled.

Content

1. Introduction

Since the beginning of the EBIO project, its partners have been actively engaged in contributing to the advancement of knowledge in the field of electrochemical biomass conversion. A significant focus has been placed on ensuring that the results of the project are shared with both the academic community and industrial stakeholders, emphasizing open-access principles wherever possible to maximize the reach and impact of the research.
Over the course of the project, a total of 20 publications have been produced, of which 19 have an open-access disclosure level. These include **8 peer-reviewed journal articles** published in leading scientific journals, **10 conference papers** presented at international conferences, and **2 dissertations** that delve deeper into specific aspects of the project's innovations. In addition to these, other forms of dissemination, such as posters and oral presentations, were widely used.

2. Detailed List of Publications

As of today, 12 publications have been either published or submitted/under review. Those include journal articles and dissertations. **Annex 1** contains the full list of publications produced during the EBIO project.
Several other publications are currently drafted and will be submitted, including two PhD theses.

3. Highlights and Impact

The EBIO project has achieved remarkable advancements in the field of biofuel research, as documented through its scientific publications. It introduced innovative methods to upgrade bio-liquids like pyrolysis oil through electrochemical decarboxylation, utilizing advanced materials such as boron-doped diamond electrodes and platinum-modified surfaces. For example, the project demonstrated the ability to selectively decarboxylate short-chain carboxylic acids, reducing acidity and improving the stability of bio-oils for refinery use (*Faraday Discussions, 2023*).

EBIO was also featured in collaborative articles, including the *Open Research Europe* publication titled 'Developing the next generation of renewable energy technologies: an overview of low-TRL EU-funded research projects.' The article highlighted a cluster of eleven research and innovation projects, including EBIO, funded under the EU's H2020 programme. These projects, focused on developing breakthrough renewable energy technologies to shape the energy systems of 2030 and 2050, also collaborated during a workshop at the 10th Sustainable Places Conference (SP2022).

The project's findings were showcased at several conferences, including *EUBCE 2022*, where the study "Pyrolysis oil treatment using Kolbe electrolysis of organic acids" focused the potential of integrated electrolysers to convert low-value pyrolysis crude into energy-dense hydrocarbons.

Notably, EBIO's participation in events like GREN 2023 further exemplified the effective dissemination of project results at international conferences. On this occasion, PhD candidate Talal Ashraf presented his research on the electrooxidation of acetic acid/sodium acetate using BDD electrodes, achieving faradaic efficiencies of up to 80% for methanol production.

4. Future Plans

Several publications are currently in draft stages and are planned for submission in the near future. **Annex 2** provides a detailed table outlining the planned scientific articles, including their titles, authors, target journals or conferences, and expected submission dates.

1. Annex 1 – Detailed List of Publications

Journal publications and dissertations

The following publications have been accepted/submitted:

	Authors	Journal	Submission Date	DOI/ Reference
Electrochemical Dehydrogenative sp2-Coupling Reaction of Naphthols Accessing a Polycyclic Naphthalenone Motif	Julian Buchholz; Elisabeth K. Oehl; Maximilian M. Hielscher; Simone L. Kuhn; Dieter Schollmeyer; Siegfried R. Waldvogel	Organic Letters	20/09/2024	DOI: 10.1021/acs.orglett.4c03518
Studies on Electrochemical Cross-Coupling Reactions	Elisabeth K. Oehl	Dissertation	Concealed until 29/11/26	tbd
Talal Ashraf	Biofuels through Electrochemical Transformation of Pyrolysis Oil	Dissertation	Published on 17/03/2025	tbd
The Influence of Alkali Cations on the Performance of Pt Electrodes in Kolbe Electrolysis of Acetic Acid (2024)	Talal Ashraf, Bastian Timo Mei, Guido Mul	ChemElectroChem	30/03/2024	DOI: 10.1002/celc.202400274
Investigating the platinum electrode surface during Kolbe electrolysis of acetic acid	Margot Olde Nordkamp, Talal Ashraf, Marco Altomare, Andrea Casanova Borca, Paolo Ghigna, Tatiana Priamushko, Serhiy Cherevko, Viktoriia A. Saveleva, Cesare Atzori, Alessandro Minguzzi, Xiufang He, Guido Mul, Bastian Mei	Surfaces and Interfaces	04/07/2023	DOI: 10.1016/j.surfin.2023.103684.
Substrate specificity in decarboxylation of mixtures of acetate and propionate using oxidized Pt electrodes and galvanic square-	Margot Olde Nordkamp, Talal Ashraf, Guido Mul, Bastian Mei	Sustainable Energy & Fuels	13/09/2024	DOI: 10.1039/D4SE01274G

wave pulsed electrolysis				
Talal Ashraf, Ainoa Paradelo Rodriguez, Bastian Timo Mei, Guido Mul	Electrochemical decarboxylation of acetic acid on boron-doped diamond and platinum functionalised electrodes for pyrolysis-oil treatment	Faraday Discussions	05/04/2023	https://doi.org/10.1039/D3FD00066D
Developing the next generation of renewable energy technologies: an overview of low-TRL EU-funded research projects	Laura María Pérez Caballero, Fernanda Neira D'Angelo, Roman Tschentscher, Axel Gottschalk, Ahmed M. Salem, Daniel Carbonell, Mihaela Dudita-Kauffeld, Arnaud Bruch, Eleonora Alamaro, Luca Pasquini, Paola Ceroni, Anastasia Grozdanova, Stefania Privitera, Bart Vermang, Philip Schulz, Davide Mencarelli, Luca Pierantoni, Michele Midrio, William Leithead, Ignacio Gurruchaga, Robert Haberl, Jasper Vermaut, Michael Kauffeld	Open Research Europe	11/01/2023	https://doi.org/10.12688/openreseurope.15276.2
Talal Ashraf, Bastian Timo Mei, Guido Mul	Electrochemical Decarboxylative Oxidation of Carboxylic Acid Mixtures on Boron Doped Diamond Electrodes,	Electrochimica acta	Conditionally accepted, under revision	tbd
Roman Tschentscher, Marta Barros, Tobias Graßl, Rieke Neuber, Morten Frøseth	Electrochemically produced peroxydicarbonate for efficient gold catalysed oxidation of glucose to gluconic acid	Open Research Europe	Conditionally accepted, under revision	tbd
Anton Rajakumaran Abilash, Roman Tschentscher	Electrodeposition of highly porous catalyst layers onto metal foams	Open Research Europe	Conditionally accepted, under revision	tbd

Chloe Roux, Cassandre Ecrabey, Linda Mezule, Sabarathinam Shanmugam, Timo Kikas, Roman Tschentscher	Electrochemical lignin depolymerization - Effects of electrolyte composition and electrode materials	Open Research Europe	Conditionally accepted, under revision	tbd

2. Annex 2 – Future Publications Plan

The following publications are in preparation:

Can Güvenç, Ayşegül Bayat, Seda Karahan, Özge Atik, Gizem İş, Tugay Sayan, Aydın Can, Şelale Acar, Robbie Venderbosch, Ludo Boot, Serdar Çelebi	Hydrodeoxygenation of Light SDPO over NiMo/Alumina Catalyst	Fuel	In preparation	tbd
Yannick Matthieu et al.	Co-FCC of	tbd	In preparation	tbd
Joao Mendes, Aranza Vidal, Roman Tschentscher	Scale-up of lignin depolymerisation	Open Research Europe	In preparation	tbd
Ferran Torres	Co-FCC of crude and upgraded bioliquids	Dissertation	In preparation	tbd
Niclas Schupp	Electrochemical depolymerisation of lignin dissolved in bioliquids	Dissertation	In preparation	tbd