

Klaipėda University strategic research directions
“Towards sustainable technologies, blue and green growth and a healthy sea”
Postdoctoral Fellowship Topic Application (2023-2025)

Title of the internship topic	Processing of pyrolysis oil by electrochemistry
Field(s) of study, department, start date, duration	Technological sciences, Chemical engineering. The traineeship would take place in the Department of Engineering. Start 2024.01. Duration two years.
Brief description of the research project and the results to be achieved (objective, keywords)	<p>Non-recyclable plastic waste pollutes the environment because it is either incinerated or deposited in landfills. Pyrolysis is currently probably the best method for recycling such plastic waste. However, the products from pyrolysis are very complex and unstable and have few applications. Electrochemical technology is an environmentally friendly method of processing organic materials since it requires little electrical energy and does not involve the use of mostly worthless parallel products. It is usually carried out at about 35°C and without overpressure, which has a favorable effect on the selectivity and purity of the products.</p> <p>The aim of the project is to develop electrochemical processes for products from pyrolysis oil in order to promote the recycling of plastic waste.</p> <p>Objectives:</p> <ol style="list-style-type: none"> 1. installation and development of equipment 2. electrochemical investigations on pyrolysis oil from different plastic wastes 3. characterization and evaluation of the produced recyclables <p>Keywords: pyrolysis, plastic waste, electrochemistry, in-situ treatment, valuable materials</p>
Relevance of the topic to the goals and priorities of the strategic research direction	The proposed research is in line with the sub-theme "Towards sustainable technologies, blue and green growth and a healthy sea" in the strategic direction of science. The research will test new methods for processing pyrolysis oil. This could reduce the use of fossil hydrocarbons and close the carbon cycle for plastics and organic waste to the benefit of the economy and the environment.
Planned intermediate and final results (scientific outputs: publications, reports, etc.)	3 scientific publications will be produced and a conference will be attended.
Requirements for the trainee	A PhD, preferably in the natural sciences or technology. Preferably, the candidate should be able or willing to work in a laboratory and have experience in chemical or other research. It would be an advantage if the candidate has mastered modern analytical methods and has experience in evaluating and interpreting data using statistical analysis methods. The candidate should be able to summarise results in reports and present them both internally and at conferences. Experience in preparing manuscripts is required. Strong communication skills, a systematic working style, reliability, commitment and team spirit are desirable. Good oral and written English language skills are required.
Equipment of the topic (infrastructure, connection to ongoing projects)	The candidate will be part of a team of chemists and chemical engineers with extensive experience in the field of pyrolysis of biomass and plastics, electrochemistry, and product analysis. The available equipment (pyrolysis reactor, equipment for product analysis, potentiostat with control software, etc.) will ensure the use of the intern. Support from the on-site team will contribute to the success of the project.
Proposed supervisor of the internship	Dr. Jochen Uebe (jochen.uebe@ku.lt); tel.: +370 684 08676
Experience of the supervisor with the proposed topic	Dr. Jochen Uebe has extensive experience in research projects and the development of new technologies. He has worked on the InoBioTech Baltics project (01.2.2-MITA-K-702-11). His idea was the basis for the development of a cavitator model for INOVTECHNA. The project was funded by MITA. Jochen Uebe and his colleagues have developed and patented six technologies in the field of nanoscale layered silicates for lithium-ion batteries and electrochemical capacitors, smart shock absorber fluids for cars, and car headlight housings in their previous work (at the M.

	<p>Planck Institute for Polymer Research and the Fraunhofer Institute for Silicate Research, Germany). He also has extensive experience in both renewable energy and commercialization of scientific ideas. Pyrolysis technologies and their development for recycling plastic waste and algae are currently of great scientific interest. In recent years, 15 articles have been authored and published in journals referenced by Clarivate Analytics DB. The supervisor has extensive experience and expertise in the proposed field.</p> <ol style="list-style-type: none"> 1. Uebe, Jochen; Kryževičius, Žilvinas; Kuhan, Aravindaraj; Torkelis, Arturas; Kosychova, Lidija; Žukauskaitė, Audronė. Improving of pyrolysis oil from macroalgae <i>Cladophora glomerata</i> with HDPE pyrolysis oil // <i>Journal of marine science and engineering</i>. Basel : MDPI. eISSN 2077-1312. 2022, vol. 10, iss. 2, art. no. 131, p. 1-14. DOI: 10.3390/jmse10020131. 2. Uebe, Jochen; Zukauskaitė, Audrone; Kryzevicius, Zilvinas; Vanagiene, Gintare. Use of 2-ethylhexyl nitrate for the slow pyrolysis of plastic waste // <i>Processes</i>. Basel : MDPI. eISSN 2227-9717. 2022, vol. 10, iss. 7, art. no. 1418, p. 1-13. DOI: 10.3390/pr10071418. 3. Uebe, Jochen; Kryzevicius, Zilvinas; Majauskiene, Rasa; Dulevicius, Marijus; Kosychova, Lidija; Zukauskaitė, Audrone. Use of polypropylene pyrolysis oil in alternative fuel production // <i>Waste management & research</i>. London : SAGE Publications. ISSN 0734-242X. eISSN 1096-3669. 2022, vol. 40, no. 8, p. 1220-1230. DOI: 10.1177/0734242X211068243. 4. Uebe, Jochen; Kryževičius, Žilvinas; Janutėnienė, Jolanta; Žukauskaitė, Audronė; Bertašius, Eugenijus; Rapolavičius, Rokas; Jankūnas, Valdas; Senulis, Audrius. Desulfurizing of pyrolysis oil of used tires using a 3d-printed vortex diode and modeling of process // <i>Journal of marine science and engineering</i>. Basel : MDPI. eISSN 2077-1312. 2021, vol. 9, iss. 8, art. no. 876, p. 1-15. DOI: 10.3390/jmse9080876.
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