**Proposed thesis topic for the Doctoral degree studies (2022-2026) in   
Ecology and Environmental Science at Marine Research Institute (Klaipėda University)**

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| **Title** | **Synthesis, characterisation and application of cellulose aerogels for**  **aquatic oil spills clean-up** |
| **Brief description of the topic** | Even though we are moving toward a fossil-free economy, the world is still very dependent on oil, and there are numerous oil spills every year which have negative impact on local ecosystems, human health, and the economy. In recent years, in light of climate change mitigation, there has been increased attention to environmentally friendly aquatic oil spill response measures. One of those is a multifunctional substance with unique physicochemical properties – an aerogel.  Cellulose aerogels are fabricated from renewable and biodegradable materials and allow for the rapid, efficient, and environmentally friendly removal of oil pollutants from the marine environment. They have a large surface area, low density, high porosity, and relatively high compressive strength. In addition, cellulose aerogels can be reused, thus extending their life cycle.  The diversity of the properties of cellulose aerogels and their application as sorbents for aquatic oil spills clean-up has not been systematically evaluated so far. The novelty of the idea is also related to the use of oil-degrading microorganisms extracted from marine environment in order to speed-up the biodegradation process.  The proposed dissertation will focus on increasing the aquatic oil removal capacity by optimizing physical, chemical, biological, and mechanical properties of fabricated cellulose aerogels in terms of usability and efficient production. |
| **Requirements for a candidate** | We are seeking a highly motivated candidate with a master's degree or equivalent qualification in ecology and environmental science, chemistry, environmental engineering, chemical engineering or a related field.  Scientific experience and the ability to operate laboratory equipment (gas chromatograph, water quality measuring instruments, etc.) would be an advantage. |
| **Existing research experience** | The applicant will join a team of scientists who have developed innovative solutions for the clean-up of oil spills in water environment. Currently the team is implementing a project “[InoBioTech Baltija](https://www.eu-conexus.eu/en/2021/04/12/a-sustainable-solution-has-been-found-to-cope-with-the-effects-of-oil-spills-at-sea/)” (No. 01.2.2-MITA-K-702, 2021-2022) – Development of a biotechnological *in-situ* treatment method for oil spills in the Baltic Sea. This [technology](https://search.vpb.lt/pdb/patent/dossier/2020%20527) is patent pending in European Patent Office (2022). |
| **Existing research infrastructure and support** | The main research work will be executed in the laboratories of the Faculty of Marine Technology and Natural Sciences (chromatographic analysis, sorption analysis, determination of physical parameters of aerogels, etc.) and in the laboratories of the Marine Research Institute (aerogel synthesis, microbiological analysis, mechanical properties etc.).  Additional analysis (aerogel morphology, microbiology) if needed will be performed by other institutions, including EU-Conexus partners. |
| **Potential supervisor** | Dr. Tatjana Paulauskiene, [tatjana.paulauskiene@ku.lt](mailto:tatjana.paulauskiene@ku.lt) ; +37068148697 |
| **Potential scientific advisors** | Dr. Marija Kataržytė, [marija.katarzyte@jmtc.ku.lt](mailto:marija.katarzyte@jmtc.ku.lt)  Dr. Jochen Uebe, [jochen.uebe@ku.lt](mailto:jochen.uebe@ku.lt) |