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BOOK OF ABSTRACTS

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Potential solution for marine litter? Assessment of the degradability and ecotoxicity of biobased composites

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Biobased composites can be a sustainable alternative to oil-based polymers, a major component of marine litter. In the marine environment oil-based polymers are used in most applications including fish, shellfish and seaweed farming, energy harvesting, shipping, and buoying elements. Due to hydromechanical forces and UV radiation, oil-based polymers surfaces can undergo physical stress, degrade to microplastic (MP), and leach chemicals to the environment. Concern on the sustainability of oil-based polymers and the potential negative impacts of MP to marine organisms has increased the demand to create sustainable biobased composites with a lower environmental impact. The Interreg 2 Seas Mers Zeeën project SeaBioComp aims to develop and produce novel biobased composite materials as alternatives to conventional oil-based polymers used in the maritime industry. The project will produce analytical protocols to evaluate the long-term durability and assess the impact of biobased composites on marine organisms. On a first stage, biobased composites will be exposed to realistic temperature and UV-intensity for different durations to quantify and identify the formation of MPs and the release of leachates. To identify MPs, we will employ a combination of light microscopy, scanning electron microscopy coupled to an element detection system, and infrared technology (μFTIR). The chemical analysis of the leachates will be performed applying standard methods using high performance gas and/or liquid chromatography/mass spectrometry. On a second stage, standardized ecotoxicological assays will be utilized to test the toxicity of the leachates to low trophic level marine organisms. To do so, we will expose a diatom, *Phaeodactylum tricornutum*, in a seventy-two hours growth inhibition test (ISO 10253: 2016) to a dilution series of leachate solutions resulting from the UV exposure of biobased composites and of reference oil-based polymers. Together with the algae assay, we will also conduct a mussel larval development assay (ASTM E724 – 98: 2012), following the same experimental design. By doing so, we will obtain insight in the ecotoxicological effect of biobased composites and oil-based polymers. We anticipate that our results will contribute to assess the environmental impact of new biobased composites, which can present a more sustainable alternative to oil-based polymers and a potential solution to marine litter.

References

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