Mette Hedegaard Thomsen, Professor, Aalborg Univeristy, Denmark

Title of talk: Harvesting value from halophyte and seaweed biomasses in the cascade extraction based biorefinery.

About Mette Thomsen
Mette Hedegaard Thomsen (MHT) is a recognized scientist within the field of biorefining and biochemistry. From 2010-2016, she was part of the founding faculty in chemical engineering at Masdar Institute (MI), Abu Dhabi, UAE. Her research at MI was centered around projects sponsored by Boeing and Etihad airways to develop biofuel processes from halophytes and seaweed. As PI, she has submitted four inventions disclosures and filed 3 patents. In 2016 MHT relocated back to Denmark at AAU where she has successfully built a portfolio of funded projects and significantly expanded the biorefinery infrastructure at AAU.

Brief Introduction: The ReSEAlience project pioneers a transformative approach in the sustainable valorization of marine bioresources, focusing on seaweed and halophytes. By integrating advanced biorefinery technologies, ReSEAlience goes beyond traditional practices, enhancing efficiency and sustainability, significantly advancing the Blue Economy.

Objective: In this context, the development of biorefinery processes applied to macroalgae and halophytes are crucial. The work in WP1 and 2 focuses on the implementation of advanced extraction techniques, which enable the recovery of bioactive compounds (like polyphenols and pigments) with antioxidant, anti-inflammatory, and antimicrobial properties, using sustainable approaches free from conventional solvents. Various species of macroalgae are being studied, including: *Alaria esculenta, Saccharina latissima, Ulva fenestrata, Fucus vesiculosus and Laminaria digitata*.

Methods: Cascade extraction processes are being developed and optimized to enable the sequential fractionation of macroalgae and halophyte biomass, thereby maximizing the selective recovery of bioactive compounds. This approach integrates successive stages under controlled conditions (as temperature, time and solid-liquid ratios) to obtain fractions enriched in polyphenols, pigments, and other metabolites of interest, whilst preserving their stability and biological activity. In this way, an efficient and sustainable strategy is established that lays the foundations for the subsequent valorization of the biomass within the biorefinery concept.

Results: Optimized cascade extraction for the halophyte *Salicornia ramosissima* has yielded highly bioactive extracts with proven effects in cosmeceutical products and fish feed. For the seaweed examined, various extractions methods have been compared, which is the first step in developing the extraction cascades. Preliminary results and bioactivities of extracts will be presented.