Macroalgae as Source of Formic Acid and Proteins: Application of the OxFA-Process for a Complete Biorefinery Approach

Master thesis in cooperation between the Institute for Technical and Macromolecular Chemistry (UHH) and the Institute of Technical Biocatalysis (TUHH)

Introduction

Macroalgae are a natural source of high-added value compounds. Specifically, macroalgae proteins are renewable, environmentally friendly and non-toxic. Furthermore, they have a very broad revalorization potential and are characterized by a high biocompatibility, film-forming properties, non-antigenicity and biodegradability. These properties make them potential candidates for the development of protein films as sustainable substitutes of conventional plastics. However, to gain access to macroalgae proteins, effective extraction and purification methods need to be developed.

The OxFA-process allows the oxidative conversion of biomass to formic acid (FA), a chemical widely used in several industries that is only produced from fossil raw materials so far.

The aim of this thesis is to investigate the application of the OxFA-process on macroalgae biomass to selectively oxidize the carbohydrates into FA (liquid phase) and to investigate the composition of the obtained solid phase as potential source of macroalgae proteins.

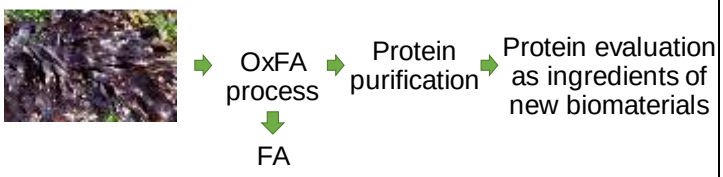

Figure 1: Main Master Thesis steps

Beginning: immediate

Content of the Thesis

- Characterization of macroalgae biomass: elemental analysis, biochemical composition, water content, etc.
- Oxidative conversion of the biomass to FA by the OxFA-process
- Liquid-Solid separation and characterization of the solid fraction
- Study of proteins solubility and development of a protein purification process
- Protein characterization as potential ingredients of new biomaterials: structure and functional groups, molecular weight, amino acids composition…
- Screening of potential enzymes for protein crosslinking

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