



DIRECT AND INDIRECT BIOREFINERY TECHNOLOGIES FOR CONVERSION OF ORGANIC SIDE-STREAMS INTO MULTIPLE MARKETABLE PRODUCT

Introduction

In 2011 the European Commission published a roadmap to a resource efficient Europe (COM (2011/571). 'Management of waste as a resource' was described in the roadmap as a milestone to be reached by 2020. The InDIRECT project aims to contribute reaching the EC, BIC and United Nations goals by exploring the potential of biorefinery approaches for waste recycling and re-use goals. New value chains are proposed for transforming agricultural and other side-streams into marketable products (and energy) via a cascading biorefinery approach in a sustainable way resulting in significant reduced emissions of greenhouse gases.

To cope with the heterogeneity of the side-streams, a 3-step (indirect) biorefinery concept is envisioned within InDIRECT that converts in a first step the heterogenic feedstock into a homogenous biomass. The game-changing approach that will be applied is the use of insects in this step. Insects are able to convert a variety of feedstocks into a more homogenous biomass, being their own biomass. In a second step, the insect biomass will be further fractionated into a lipid, protein and chitin fraction, that all three have potential to be converted into marketable end-products. The ability to use various feedstocks results in a more robust and scalable biorefinery. The cascading biorefinery approaches of the insect biomass and plant sides-streams that will be optimized in InDIRECT, will aim at (1) preserving the functional properties of the compounds to create added value (higher valuable compounds) and (2) generation of reproducible products.

Objectives

The InDIRECT project aims to explore new value chains based on underspent organic side-streams. Therefore, two pathways will be developed:

- Indirect biorefinery of side-streams via insect biomass, which will be fractionated in useful compounds.

- Direct biorefinery from those side-streams for comparison with the indirect pathway.

These biorefineries will be optimized to increase the conversion efficiency and increase the value of the feedstock. The compounds obtained through the biorefinery will be essayed for use in various sectors like food and feed an chemistry. Also, the legal boundaries of such (in)direct biorefinery concept will be tackled.

ChemStream

ChemStream has expertise in the development of (nano) emulsions and dispersions with (tailor made) dispersing agents, emulsifiers and encapsulating agents. With this project we will expand our portfolio of sustainable (and biodegradable) dispersing agents, emulsifiers and encapsulators. We would like to vary the application of the chitosan moiety over a wide area of the "Hansen solubility space". This could be achieved either by chemical or enzymatic modification, which in turn can further compile to the development of green and multifunctional compounds based on chitosan.



Figure 1: Synthesis of new green and multifunctional compounds based on chitosan
Within the InDIRECT project, ChemStream is responsible for the development and the upscaling of new compounds for use in dispersions or encapsulation. By strategic validation together with potential customers we aim to create new business opportunities.



Figure 2: ChemStream's upscaling facilities for chemical synthesis

Project website: www.bbi-indirect.eu

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