ECOLE POLYTECHNIQUE DE BRUXELLES

3BIO-BioControl

SuNuP

Optimization of the microorganism fermentation and drying conditions for the production of dry and active sourdoughs, starters and probiotics

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Research context

The goal of the SuNuP project is to understand the mechanisms involved in microorganism resistance to drying through an analytical integrated approach: from the lab-scale cultures in mini-bioreactors to pilot scale drying. Funded by Wagralim, the agri-food innovation cluster in Wallonia region, the project consortium is made of

- 3 academic partners
    - 3BIO-BioControl – Biosystems modeling and control lab at Université libre de Bruxelles (modeling, identification, state estimation and optimization of biological cultures)
    - TIPs – Transfers, Interfaces and Processes lab at Université libre de Bruxelles (characterization and modeling of phenomena involved in drying processes)
    - MiPI – Microbial Processes and Interactions lab at Gembloux Agro-Bio Tech (single-cell analysis of microbial populations and bioreactor cultures)
- 2 industrial partners
    - Vésale Pharma (microorganism encapsulation and probiotic production)
    - Puratos (yeast and sourdough fermentation) – project coordinator

Objectives

The main objectives at 3BIO-BioControl will be to

- build dynamical models of mono- and co-cultures of lactic acid bacteria and/or yeast for predicting, as a function of the operating conditions (especially the bioreactor feeding), microorganism growth, substrate consumption, metabolite production and stress protectant accumulation (for yeast);
- provide mathematical modeling and analysis of the interaction/competition mechanisms in the case of co-cultures of lactic acid bacteria and yeast;
- determine, based on the dynamical models, the optimal operating conditions for maximizing the microorganism growth rate and, in the case of yeast cultures, for maximizing the accumulation of stress protectants;
- build software sensors (state estimators) for the online monitoring of the stress protectant accumulation in yeast.