

## ENUMERATION METHOD AND MEDIUM DESIGN FOR A MIXED CULTURE OF SACCHAROMYCES CEREVISIAE AND CHLORELLA VULGARIS

Angéla La, LGPM, CentraleSupélec, Université Paris-Saclay, France  
angela.la@centralesupelec.fr

Patrick Perré, LGPM, CentraleSupélec, Université Paris-Saclay ; Paris-Saclay, Centre Européen de Biotechnologie et de Bioéconomie(CEBB), France

Behnam Taidi, LGPM, CentraleSupélec, Université Paris-Saclay ; Paris-Saclay, Centre Européen de Biotechnologie et de Bioéconomie(CEBB), France

Key Words: flow cytometry, autofluorescence, autotroph, heterotroph, symbiosis, photo-bioreactor

The scientific literature shows a rising interest in studies on symbiotic mixed cultures as an innovative bioprocess to increase biomass and lipid productivity. The main issue with mixed cultures appears to be the dominance of one organism over the other during cultivation. In the current work, a methodology is proposed to develop a co-dominant mixed culture of *Saccharomyces cerevisiae GFP* and *Chlorella vulgaris*, in which their growth would be based on mutual symbiosis through recycling O<sub>2</sub> and CO<sub>2</sub>. The first challenge was to develop a rapid and accurate method to distinguish and enumerate each population. We confirmed a method based on flow cytometry to enumerate simultaneously *S. cerevisiae GFP* and *C. vulgaris* through their autofluorescence (GFP protein and chlorophyll respectively). The second challenge was the design of a medium adapted to both organisms and likely to avoid the dominance in mixed culture. The newly designed medium was formulated by combining components from the microalgae growth medium (Bristol medium) and the yeast growth medium (YPD). Monocultures of *S. cerevisiae GFP* and *C. vulgaris* in the newly-designed medium were grown in a 5-liter photo-bioreactor. The designed medium limited yeast overgrowth and enhance the maximum microalgae population and its specific growth rate. The enumeration method and strategy for medium design proposed here can be adapted to bio-processes involving mixed cultures between an autotrophic and a heterotrophic microorganisms.