Michal Blatkiewicz et al., J Biotechnol Biomater 2017, 7:1(Suppl)
http://dx.doi.org/10.4172/2155-952X.C1.070

Continuous methods of fungal laccase concentration

Michal Blatkiewicz[1], **Anna Antecka**[1], **Stanislaw Ledakowicz**[1] and **Andrzej Gorak**[1, 2]
[1]Lodz University of Technology, Poland
[2]Dortmund University of Technology, Germany

Statement of the Problem: Downstream processing of biological molecules is a very time- and energy-consuming task. One of the major trends in contemporary biotechnology revolves around cost-effective and environment-friendly methods of concentration and purification of bioproducts. Various novel downstream processing tactics are currently being investigated as alternatives to established methods such as ultrafiltration and chromatography. The purpose of this research was to examine the feasibility of polyethylene glycol-phosphate aqueous two phase systems (ATPS) and cetrimonium bromide-induced foam fractionation (FF) as methods for *Cerrena unicolor* and *Pleurotus sapidus* laccase separation from culture supernatants. Both processes were investigated in batch and continuous forms.

Methodology: The biosynthesis was performed in a 14-L bioreactor equipped with a set of sensors for process control. The filtered supernatants were concentrated with the use of aqueous two-phase systems or foam fractionation. Batch ATPS experiments were conducted in specially designed extraction flasks, and for continuous ATPS experiments, a mixer-settler unit (MSU) was used. FF experiments were conducted in a special glass column equipped with air disperser and peristaltic pumps for liquid intake and outtake. Laccase activity was determined by 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid) assay.

Findings: *C. unicolor* laccase showed greater affinity towards salt-rich phase with over 90% yields and partitioning coefficients up to 2200. *P. sapidus* laccase showed strong affinity towards polymer rich-phase also with over 90% yields and full partitioning. MSU experiments showed consistency with batch experiments within non-extreme phase ratio range. Foam fractionation effectiveness depended strongly on pH and surfactant concentration, leading over 100 partitioning coefficient towards the foamate. Low gas and liquid flow rates led to more effective concentration.

Conclusions: Aqueous two-phase extraction and foam fractionation are both effective alternatives to established downstream processing methods for laccase concentration.

Biography

Michal Blatkiewicz has done his Master of Engineering Technology in the field of Chemical and Process Engineering from Cracow University. Currently, he is a PhD student at Lodz University of Technology, Faculty of Process and Environmental Engineering, where he is also employed as a Scientific Project Contractor. During his PhD studies, he has done four internships at Dortmund University of Technology. His scientific scope includes primarily fungal cultures and enzymes, and also downstream processing of biological molecules. Currently, he is a part of a research team working on a project concerning continuous processes of biosynthesis, concentration, and purification of fungal laccases, in which he focuses mostly on novel downstream processing methods, such as aqueous two-phase extraction and foam fractionation.

michal.blatkiewicz@p.lodz.pl

Notes: