



October 20, 2019 **BLOG**

In Situ Product Removal Using EBA

In fermentation-based processes, products are produced in diluted environments to prevent microbial growth inhibition by the products or by-products. Consequently, downstream processing (DSP) is usually composed of several unit operations, which translate into higher costs for the overall process (e.g. for biopharmaceuticals DSP costs can represent 80 % of the total costs) and reduced overall yields. Therefore, there is a need to use process technologies that can improve process economics.

IN SITU PRODUCT REMOVAL

As bioprocessing is moving towards continuous modes of operation, in situ product removal (ISPR) is an interesting strategy to improve the DSP efficiency. ISPR enables product separation during fermentation. However, ISPR requires unit operations that can perform primary product recovery.

PRIMARY RECOVERY STRATEGIES

Traditionally, centrifugation and membrane technologies are preferred for the primary recovery. Nevertheless, fermentation streams are sensitive to mechanical forces and complex to process smoothly using membrane operations. Consequently, with this strategy, there will be considerable amounts of product that degrades and cells that die before the broth is recirculated back into the fermenter. Therefore, membrane filtration is not a viable option. Could chromatography be used instead then? The answer is yes.

Fermentation streams cannot be processed using packed bed chromatography, but they can be effectively processed using expanded bed adsorption (EBA) chromatography!

EXPANDED BED ADSORPTION (EBA)

EBA is a chromatography technology that combines cell removal, product capture, and initial purification step in a single-unit operation. As a typical adsorption process, the adsorbent is kept inside the column where the product stream flows through. In EBA, the liquid stream flows upwards, enabling the adsorbent resin beads in the column to become fluidized (expanded). Thus, the particulate biomass can flow through the bed void [1].

IN SITU PRODUCT REMOVAL WITH EBA

The fermentation broth is directly fed into the EBA column, and, due to the selective interaction between the target compounds in the broth and the resin beads, a selective separation is achieved by capturing product and allowing the cells to flow through. The adsorbed product is collected later on, in an elution step.

This process does not result in any cell disruption. New media can be added to the flow-through stream and recirculated back into the fermenter to improve productivity using cell recycling.

FINAL REMARKS

Could this strategy be applied in your process? Then take a look at how the XPure-E system could simplify the performance of EBA and contact us for more information. Let us discuss the feasibility for your product.

[1] Pathapati et al. 2018. Expanded Bed Adsorption of γ -aminobutyric acid from E.coli broth by CS16GC and IRC747 resins. Chemical Engineering Technology. DOI: 10.1002/ceat.201800295

For more information, please [contact us](#).