EBA 2.0 – Improving Expanded Bed Adsorption Technology for Bioproduct Recovery

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Description

The downstream processing of biological materials usually involves a cascade of different unit operations to clarify the fermentation broth, capture and purify the desired product, followed by a formulation step. The large number of unit operations combined with the purity demands for the final product make downstream processes of bioproducts, such as proteins used for pharmaceutical or food purposes, very costly.

With Expanded Bed Adsorption (EBA) technology, biomass/solids removal and target capture can be combined in one unit leading to less processing time, reduced process steps, and lower operation cost. EBA came to life in the early 90's to combine and replace the clarification, capture and initial product concentration/purification process [1]. However, until now, it has only been successfully implemented on a laboratory/pilot scale or by using model suspensions and/or very narrow, controlled conditions.

In this project academic and industrial researchers from the Netherlands and China will collaborate tightly to improve EBA technology, from the design of new systems and the better understanding of EBA performance to the application verifications. The overall goal is to understand, optimize, design and scale up/down the EBA Technology and implement this technology for biopharmaceuticals purification as business application.

The Delft University of Technology will perform multiphase computational fluid dynamic studies to investigate how hydrodynamics and separation performance are affected by the column design and solid phase properties. Using available experimental data from academic and industrial partners the models can be validated [2, 3] and subsequently used to design new, improved EBA systems.

References

1. Draeger, N. and H. Chase, *Modelling of Protein Adsorption in Liquid Fluidized Beds*, in *Separations for Biotechnology 2*, D.L. Pyle, Editor. 1990, Springer Netherlands. p. 325-334.
2. Lin, D.Q., et al., *Evaluation and characterization of axial distribution in expanded bed. I. Bead size, bead density and local bed voidage.* Journal of Chromatography A, 2013. **1304**: p. 78-84.
3. Lin, D.-Q., et al., *Evaluation and characterization of axial distribution in expanded bed: II. Liquid mixing and local effective axial dispersion.* Journal of Chromatography A, 2015. **1393**(0): p. 65-72.

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