Model-based High Throughput Biopharmaceutical Downstream Process Development

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Description

Process development for the purification of biopharmaceuticals is often limited by the lack of knowledge regarding key process parameters owing to the complexity of biomolecules. A novel approach that allows faster, highly automated and more cost efficient process development is needed since decreased time-to-market in case of biopharmaceuticals is key and the product quality requirements applying to them high (Nfor et al. 2008). In the approach that we are developing, miniaturised high throughput experimentation (HTE), which is used to determine important process parameters, is combined with robust mechanistic modelling to allow subsequent *in-silico* process design (Hanke and Ottens 2014).

This project focuses on mechanistic modelling for process development and subsequent validation of this model through application on industrial cases. Additionally, this project is to develop a user friendly process synthesis tool for biopharmaceutical process synthesis which gives the user information regarding the needed unit operations, their order and the required process conditions in order to purify a desired biopharmaceutical fulfilling specific requirements such as purity and product cost from a given feed.

In order to achieve this, mechanistic models for different unit operations will be linked into a cascaded process model. Subsequently, these will be used to optimise process flow sheets. The challenge in finding the best process scheme out of a large number of alternatives will be addressed.

References

Hanke AT, Ottens M. 2014. Purifying biopharmaceuticals: knowledge-based chromatographic process development. Trends Biotechnol 32(4):210-20.

Nfor BK, Ahamed T, van Dedem GWK, van der Wielen LAM, van de Sandt EJAX, Eppink MHM, Ottens M. 2008. Design strategies for integrated protein purification processes: Challenges, progress and outlook. Journal of Chemical Technology and Biotechnology 83(2):124-132.