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innovative continuous chromatography

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XPure in Conversation with ESBES Winner Victor Koppejan

XPure in conversation with Victor Koppejan, winner, ESBES award 2018, thoughts on EBA Technology

At XPure, we believe that the application of efficient downstream technologies like EBA leads to sustainable and profitable process industries. Here, we would like to share the thoughts of a young scientist from TU Delft, about his work on EBA Technology and award-winning talk at ESBES 2018.

How do you feel about winning ESBES (European Society of Biochemical Engineering Sciences) award for 2018

I'm really happy as a Ph.D. candidate in Bioprocess Engineering at Delft University of Technology, that I was able to participate and selected as one of the winners. At the previous ESBES in Dublin two years ago I saw two of my colleagues present during the award ceremony. Since then I've been looking forward to a change to participate and be able to share my story with a bigger audience.

What do you think made you stand out among the high-quality research presentations from different streams of biochemical engineering?

In the group of Dr. Marcel Ottens, I strongly feel that our approach in which we applied traditional chemical engineering techniques together with mathematical modelling to a high potential technology like expanded bed adsorption (EBA) helped me to stand out.

How do you see the future of EBA?

Here I must say that I'm really excited about the approach to EBA Xendo has within the European PRODIAS (PROcessing Diluted Aqueous Systems) project. So far the application of EBA in biopharma has been challenging, as investments on technologies which can have a small level of discrepancy can lead big risk factor. Also, cleanability (and with it the validation and compliance challenges) is

a very critical aspect for pharma and one of the fundamental challenges. The fields of non-pharma proteins and small molecules have different drivers for process development and CAPEX/OPEX optimizations are more dominant. I think here EBA can be a competing separation technology. In turn, successful business cases based on EBA will help convince industries that might have become reluctant to implement it.

What do you see as challenges to be addressed that can prepare the technology for the future?

In our research (which is part multi-disciplinary consortium) we focus on the fundamentals of fluidization in EBA columns. We try to approach it as a liquid-solid fluidized bed rather than a packed bed column "in disguise". Since experimental research on hydrodynamics for such a system is highly challenging, we use advanced computer simulations. These allow us to investigate local resin particle environment as well as extract statistics for the overall expanded resin bed. Developing these models has proven to be a tough challenge but are now at a point where we can generate reliable data. Our aim is to use insights we get from the simulation data for the better design of column hardware and to provide a benchmark for ideal fluidization behavior. These benchmarks can then be used to detect early deviations in the process. We hope that this increases the rationale in process control, leading to a more robust equipment operation.

Brief motivation for researchers out there.

Development of EBA systems is a field dealing with multi-phase, multi-scale and multi-physics challenges. Typically, processes at various length and time scales will interact with each other in ways that may not seem obvious at first. These are challenges which, on a more abstract level, are not unique to EBA and I think lessons learned here can be applicable to a broader range of technologies. Continuing that line of thought I'd like to end with a quote from Sir Stanley Eddington I recently came across.

"we often think that we have completed our study of one we know all about two, because 'two' is 'one and one'. We forget that we still have to make a study of 'and' "