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## An integrated approach for whole bioprocess design

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A biotherapeutic product requires many bioprocess steps to produce, recover and purify. We have identified interactions among these steps. The optimization of the operation parameters are often determined sequentially from upstream to downstream and individually after the selection of appropriate unit operation steps. Such a linear approach often needs many reworking when difficulties appear in any of the downstream steps due to the interactions among the steps. An integrated approach for whole bioprocess design would recognize such interactions and enable new experimental design methods to take these interactions into consideration. Such an integrated approach has the potential to increase the efficiency of the whole process and reduce the time and the cost of the process development phase. In this presentation, several process interactions in a typical whole bioprocess will be identified and an integrated whole bioprocess design approach and its new challenges will be introduced. As the complexity in the design of a whole bioprocess increases, the need for taking a holistic approach is manifested. These new challenges will be presented through a series of case studies which demonstrate that, by taking the advantage of high throughput experimentation and ultra-scale down technology, new experimental design methods and data visualization methods, the process design can be optimized. Our results showed that the experimentation effort needed for bioprocess development can be significantly reduced. In addition, the integrated approach helps us to understand the bioprocess characteristics better and enable the creation of novel solutions. Future perspectives on an integrated approach for the faster creation of bio-manufacturing processes at lower cost will also be highlighted.

### Biography

Yuhong Zhou obtained a PhD in Control Engineering from Imperial College and has established expertise in Biochemical Engineering and Bioprocess Design research over more than 20 years. Her research goals include developing methods for faster creation of bio- manufacturing processes at lower cost. Her research interests are bioprocess modeling, development of bioprocess knowledge bases, metabolic network modeling, bioprocess monitoring and control, and rapid whole bioprocess design achieved by combining ultra-scale down experimentation and bioprocess modeling.

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