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Novel intensified bioreactor by continuous product phase separating**Arjan Oudshoorn**

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Innovations in molecular biology grow the number of products that can be generated by biosynthesis exponentially. Cost effective production is key in order to successfully introduce those biosynthesized products in novel market applications and/or replace, often fossil based, chemicals. Cost effective production requires not only strain improvement but requires all aspects of production to be in-line with one-another. DAB has developed an *in-situ* product removal (ISPR) methodology and integrated this in a bioreactor for intensified microbial fermentations. This intensified bioreactor allows continuous production and ongoing product removal. The benefit of the ISPR bioreactor, called the FAST (Fermentation Acceleration by Separation Technology), is to increase the productivity (by reducing product inhibition) and to lower the intensity of the downstream processing steps. In this way operational expenditure, especially direct downstream processing cost, can be significantly reduced. This presentation gives an overview of the most interesting results of a one-year successful piloting campaign on multiphase fermentations at the Bioprocess Pilot Facility in Delft. As an example, a

sesquiterpene producing *E. coli* extractive fermentation is addressed. Organic phase separation capacity of the intensified 'FAST' reactor can be tailored towards microbial activity. Recovery efficiency can go >95% overall, while fermentation is still ongoing. Based on the technical performance of the reactor in the yearlong pilot campaign, the readiness of the reactor concept is discussed; this, in relation to its applicability in large scale microbial production processes for advanced fuels and chemicals as well as in relation to future cost-effective production biosynthesis of chemicals.

Speaker Biography

Arjan Oudshoorn has a PhD from Delft University of Technology, The Netherlands in separation technology; applied to *in-situ* product removal of butanol fermentations. He is CTO of Delft Advanced Biorenewables (DAB). He has over 12 years of experience on fermentation product separation and bioprocess development. He worked in three start-up companies and led process development to three successful pilots.

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