

Integration of Product Recovery in Microbial Advanced Biofuel Production

PhD-student: Arjan Heeres

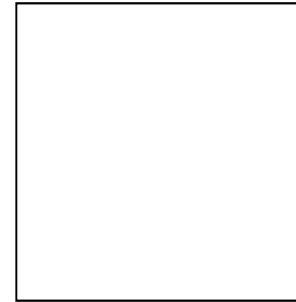
Promotor: Prof. Luuk van der Wielen

Supervisor: Dr. Maria Cuellar

Institute: Delft University of Technology, Department of Biotechnology, Section Bioprocess Engineering

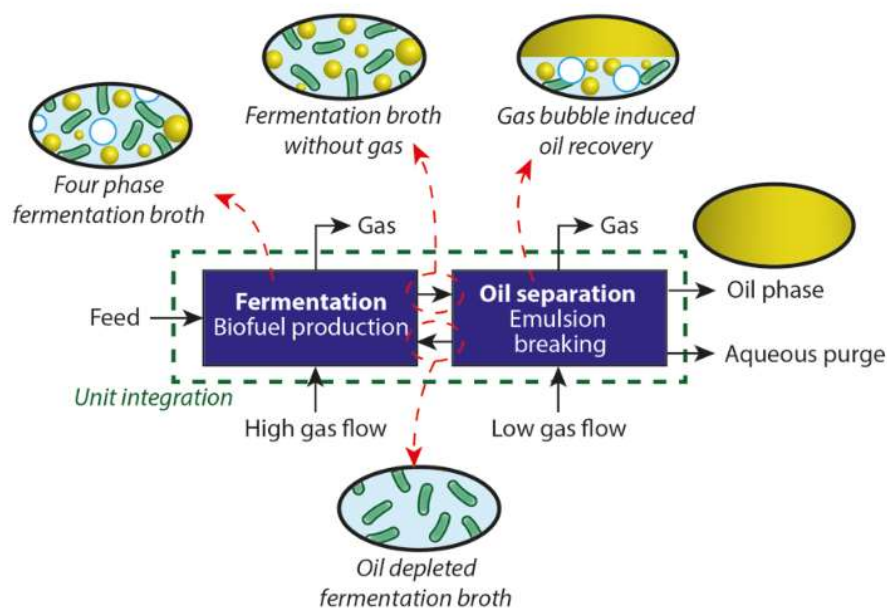
Project term: 2011 – 2015

Financed by: BE-Basic



Description

In the microbial production of advanced biofuels, the product is secreted and oil droplets are formed in the fermentation broth. Components in the fermentation broth, originating from the feed or the microorganism, can cause droplet stabilisation. This results in formation of a stable emulsion and hinders the recovery of the product. The present recovery process (centrifugation and de-emulsifiers) is expensive and does not allow complete cell recycling. These problems also apply to other multiphase fermentations. Therefore, the DIRC project was conceived, aiming at developing cheaper process technology that can be applied at an industrial scale to make the production of advanced biofuels more economically feasible. The first goal was to study the likeliness of emulsions in these processes and to come with a model emulsion that can be used to characterise the stability and behaviour of these emulsions. The second goal was to develop an oil recovery process that avoids the use of usually toxic de-emulsifiers, has low energy requirements and investment costs (no centrifugation), and can be integrated with the fermentation.



Dissertation

Heeres, A.S., Integration of Product Recovery in Microbial Advanced Biofuel Production: Overcoming Emulsification Challenges. [PhD Thesis, Delft University of Technology, 2016.](#)

Publications from the dissertation

Heeres AS, Picone CS, van der Wielen LA, Cunha RL, Cuellar MC, Microbial advanced biofuels production: overcoming emulsification challenges for large-scale operation, [Trends in biotechnology 2014 Apr; 32\(4\): 221-9](#)

AS Heeres, CGPH Schroën, JJ Heijnen, van der, LAM Wielen, MC Cuellar Fermentation broth components influence droplet coalescence and hinder advanced biofuel recovery during fermentation, [Biotechnology Journal 10 \(2015\) 1206-1215](#)

Arjan S Heeres, Joseph J Heijnen, Luuk AM van der Wielen, Maria C Cuellar, Gas bubble induced oil recovery from emulsions stabilised by yeast components, [Chemical Engineering Science 145, \(2016\): 31-44](#)
