

Scientific exchange visit boosts separation technologies collaboration

Scientific exchange funding from BioProNET has enabled Ben Dolman, a PhD student from the University of Manchester to visit the lab of Maria Cuellar Soares at the Technical University (TU) of Delft in the Netherlands. The visit was co-funded by the High Value Chemicals from Plants NIBB.

During his PhD, Ben has developed a gravity-based separation system that recovers insoluble sphorolipid biosurfactants from a fermentation broth. This technology aligned with the work of the bioseparation technology group from TU Delft, who are working towards the industrially relevant production of insoluble compounds, in particular terpenoids, and ways to separate them from the production media.

So Ben's exchange visit applied the gravity separation device to the production systems used at TU Delft.

Scientific results: The gravity-based separation system could separate insoluble molecules that formed an emulsion with the fermentation broth components, as well as showing that *E.coli* cells continued to grow (in accordance with a previously described model) after they were returned to the bioreactor after the use of the separator.

"This opens up the application of our system to a whole new range of biomolecules, with the potential to be used as an integrated pre-concentrating step to recover a product-rich emulsion from a bioreactor, and returning the cells and media back to the bioreactor for continued production," says Ben.

Ben was also able to enhance the understanding of how fermentation time, cell density, cell growth rate and emulsion formation time can have an effect on emulsion stability and the ease of

separation, which complemented the ongoing work on this theme being undertaken at TU Delft.

New skills: Ben learned a number of techniques for rigorous analysis of cell behaviour during fermentation.

He also attended the AkzoNobel Imagine Chemistry competition finals during his visit, and benefited greatly from hearing first-hand what AkzoNobel's industrial experts considered the most important steps to be for the separation technology to reach commercialisation.

New collaborations: At the Imagine Chemistry Competition, Ben set up interesting collaborations with two of the other finalist teams.

Exchange of knowledge: He notes that the placement was also incredibly productive from a research commercialisation perspective, as he had the opportunity to meet employees from Delft Advanced Biorenewables to discuss the industrial application of the separation technology.

"We were able to share some of the challenges and opportunities that TU Delft and the University of Manchester are both facing bringing our technology to market," he says.



Early career researcher Ben Dolman and (inset) the gravity-based separation system that he used at TU Delft