

CASE STUDY—CAPILLARY ELECTROPHORESIS

Dr Diana Oliviera from University College Cork was one of the first researchers to complete a BRISK2 transnational access visit. Her successful proposal took her to LNEG in January 2018 to apply Capillary Electrophoresis (CE) to dairy waste protein profiles.

The production of traditional dairy products, such as cheese, generates large quantities of low-value side-streams (e.g. whey). Due to its high levels of organic matter, they present processing and environmental challenges. To address this, a range of whey-based ingredients are produced for food and non-food applications, and within a biorefinery concept. Finding new solutions for low-value side-streams is part of a strategic path towards more sustainable production.

Of the BRISK2 partners, the BBRI facility from LNEG in Portugal provided the expertise and advanced analytical instrumentation required, specifically Capillary Electrophoresis (CE), which is currently missing within UCC's research group. A collaboration between DPTC-UCC and BBRI-LNEG, under the supervision of Dr. Luisa Roseiro, was proposed and successfully granted.

The proposal focused on the development, optimisation and application of an advanced analytical methodology by CE for dairy-waste protein profiles. Dairy by-products have a complex matrix which makes characterisation



Fig 1: Agilent HP3D CE with diode array (DAD) detection

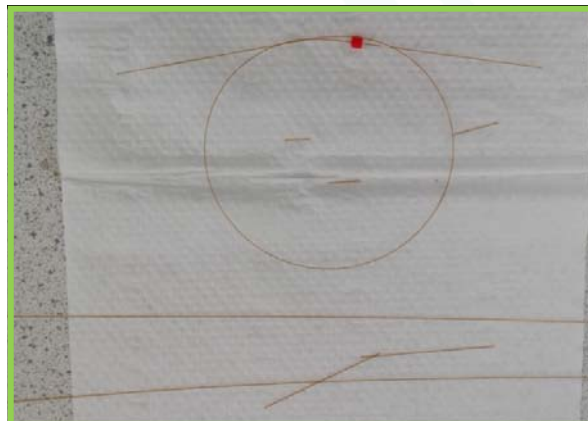


Fig2: Troubleshooting—CE capillary breakage

difficult. Protein analysis can be complicated, however CE has applications, including biochemical analysis. Therefore, the development of a successful analytical methodology for the rapid identification and quantification of whey-proteins in dairy side-streams gives the dairy industry the opportunity to engage in more sustainable strategies for low-value side-streams.

The work developed at BBRI-LNEG included sample preparation and method setting, troubleshooting and optimisation, in addition to sample analysis. The necessary equipment, materials and facilities were provided as well as training and guidance.

Overall, a method for whey protein identification and quantification was successfully developed and optimised, and the objectives of the work package proposed were fully achieved. The results have shown the potential of CE, not only for protein analysis but also for lactose and potentially specific bioactive lipids, such as phospholipids. This requires further investigation and suggests new collaboration opportunities in the future.

Dr Diana Oliviera is a post-doctoral researcher at The Dairy Processing Technology Centre (DPTC) at University College Cork (UCC), Ireland — a center of excellence for dairy processing research and innovation.



diana.oliviera@ucc.ie