

A Multi-Omic Approach to Characterizing the Biomolecular Nanoparticle Corona Using CESI-MS

Andy Chetwynd, PhD

School of Biosciences, University of Birmingham, Birmingham, UK

Upon exposure to biological matrices a layer of biomolecules adsorb to the surface of nanomaterials (NMs) forming what is known as a corona. Interactions between this corona and cell membrane receptors enable it to influence cellular uptake and toxicological responses to NMs. The proteins in the corona have received interest but researchers have focused on just the top 10 - 20 proteins using a nanoLC-MS approach. Here we demonstrate a new CE-MS workflow that enables an in-depth analysis of the corona while increasing sample throughput at no loss to reproducibility. This work also investigated a quantitative CE-MS metabolomics approach to investigate the role of metabolites in the corona, an area previously over-looked. It revealed that NMs recruit a unique suite of metabolites to the corona with a degree of specificity to isobaric isomers and it was found that the presence of proteins significantly influences the composition of the metabolites in the corona suggesting that direct adsorption only partially accounts for the formation of the corona.