Characterization of Colloidal Drug Carriers by Electrical Flow Field-Flow Fractionation

Christoph Johann¹, Stephan Elsenberg²

¹Wyatt Technology Europe GmbH, Germany, christoph.johann@wyatt.eu
²Superon GmbH, Germany

Electrical Field-Flow Fractionation (EAF4) is a new FFF separation method in which an electrical field is employed in addition and parallel to the flow field [1]. Under the influence of an electrical field the retention time of eluting species can be shifted according to their electrophoretic mobility to either shorter or longer retention times depending on the polarity of charge on the species and the accumulation wall. EAF4 can be used as well to determine the absolute value of electrophoretic mobility and its distribution for a sample measured at different values of the applied electrical field. The application of EAF4 is interesting for colloidal drug carriers which are designed to transport a payload to the cell or the cell nucleus. One application is transport of RNA or DNA into cells which is of growing interest in medical and pharmaceutical research. It has been shown, that the charge of the drug carrier complex is critical for successful incorporation to the cell [2]. It is often not helpful to measure the charge using a batch method based on Phase-Analysis-Light Scattering (PALS), because the samples are mixtures of different species and an average value is not specific for the complex of interest. If they can be separated by Flow-FFF, it is possible to determine the charge on the different components, e.g. the colloidal carrier itself, the payload species (DNA or RNA) and the complex. EAF4 can help as well to understand how the charge of the colloidal drug carrier depends on synthesis conditions and the composition of the building blocks. Results will be presented which illustrate the application of EAF4 to elucidate charge composition of different colloidal drug carrier systems.

References