MULTIDETECTOR THERMAL FIELD-FLOW FRACTIONATION AS A UNIQUE TOOL FOR THE CHARACTERISATION OF BLOCK COPOLYMER MICELLES

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ABSTRACT

Thermal field-flow fractionation (ThFFF) is a channel-based fractionation technique that utilises a temperature gradient to induce thermal diffusion of analytes in order to achieve fractionation according to size, chemical composition or microstructure.[1,2] ThFFF is a powerful alternative to commonly used column-based techniques, such as size exclusion chromatography (SEC), as the relatively gentle fractionation conditions and absence of a stationary phase allows for the fractionation of a variety of high molecular weight and fragile compounds without shear degradation taking place.[3] The unique features of ThFFF make it a suitable technique for the characterisation of high molecular weight self-assemblies such as micelles. Micelles are appealing for applications in fields such as colloid stabilisation, drug delivery, coating and microreactor applications due to their stability and versatility. Moreover, anisotropic micelles with mixed corona compositions, such as patchy, multicompartment and Janus micelles, have attracted significant attention in recent years due to their unique morphologies and potential applications.[4] Although micelles are traditionally characterized by various techniques such as electron microscopy (SEM and TEM), NMR, fluorescence spectroscopy and dynamic light scattering, these self-assemblies still lack suitable analytical techniques to provide comprehensive information on corona composition as well as on size and shape distributions.[4,5] It is shown for the first time that a multidetector ThFFF setup provides comprehensive information on important micelle characteristics as well as corona composition as a function of temperature from a single injection.

References:

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