Comprehensive Characterization of TiO_2-Nanoparticles using state-of-the-art Asymmetrical Flow Field-Flow Fractionation coupled with MALS and DLS detection

Lisa Schilder, Florian Meier, Evelin Moldenhauer, Thorsten Klein

Postnova Analytics GmbH, Landsberg, Germany

e-mail: info@postnova.com

Having found applications in a large range of consumer products such as e.g., white wall paint, cleansers or sunscreen formulations, TiO_2-nanoparticles have nowadays become an essential part of our everyday life [1]. However, in order to ensure a consistently good product quality as well as reliable safety and risk assessments, a comprehensive characterization of these engineered nanomaterials is indispensable.

In this presentation, we describe the application of Asymmetrical Flow Field-Flow Fractionation coupled with MALS [2] and DLS [3] for the comprehensive characterization of commercially available TiO_2-nanoparticles (AeroDisp® w740x from Evonik Industries, Germany). In addition, CO_2-dried sunscreen formulations containing aforementioned TiO_2-nanoparticles representing spiked real samples are also evaluated.

The determination of the radii of gyration as well as hydrodynamic radii facilitated the direct characterization of the applied TiO_2-nanoparticles with particular respect toward agglomeration. Hence, the obtained results not only clearly indicate the excellent applicability of FFF as a reliable technique suitable for the routine analysis of TiO_2-nanoparticles during and after the manufacturing process, but also for the sensitive determination of TiO_2-nanoparticles in CO_2-dried sunscreen formulations. The capability of determining TiO_2-nanoparticles with hydrodynamic radii below 100 nm in real samples renders the FFF technology ideally suitably for the monitoring of existing [4] and upcoming EU regulations, where nanoparticle containing consumer products have to be specifically labeled.

References

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