
CHARACTERIZATION OF DENDRONIZED BIOPOLYMERS AND THEIR AGGREGATION BEHAVIOUR

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Dendritic polymers are highly branched structures with a huge number of functional groups and a great application potential. Particularly the perfectly branched dendrimers are dense, repeatedly branched molecules with advantageous physical and chemical properties. Due to well-defined dimensions, surfaces and internal space, applications of biomedical interest such as targeted drug-delivery, molecular containers, catalyst support and biomimetic materials as well as the modification of biomaterial surfaces for implantation or wound-healing applications have been proposed. However classical dendritic polymers are limited in size of a few nanometers due to sterical limits. Combining linear and dendritic polymers, linear side-chain functionalized polymers, the dendronized polymers, have been developed. This special group of dendritic polymers exhibits a linear backbone with a number of grafted, dendritic side chains. On this way it is possible to reach large dimensions and high molar masses.^[1,2]

However, the complex branching structure entails challenging molar mass characterization. The separation of these polymers is strongly limited due to their large dimensions and high number of functional groups leading to interactions with the column packing and aggregation. Due to these facts asymmetrical flow field-flow fractionation (A4F) has been used for their molar mass and size characterization together with dynamic light scattering (DLS) and atomic force microscopy (AFM). The combination of these techniques enables clear understanding of the shape of the dendronized polymers on a molecular level on the one hand and on the other hand their aggregation behaviour could be systematically studied.

The investigated dendronized glycopolymers have been prepared by modification of maleimid copolymers with L-lysine dendrons. A subsequent modification with D(+)-maltose establishes a oligosaccharide shell along the polymer chain. Subject of the presentation is the molecular investigation of these structures and their aggregation behaviour depending on concentration, generation number and pH value. Therefore aqueous eluents with different buffer systems and pH values for the determination of the radius of gyration have been used. The hydrodynamic diameter obtained by DLS supported these results. Microscopic investigations provided the visualization of the molecules and the aggregates.

[1] J.M.J. Fréchet; D. Tomalia, "Dendrimers and Other Dendritic Polymers" , Wiley (2001)

[2] H. Frauenrath, *Prog. Polym. Sci.* 30 (2005) 325–384