CHARACTERIZATION OF COMMERCIAL EVA AND LLDPE COPOLYMERS BY HIGH-TEMPERATURE TWO-DIMENSIONAL LIQUID CHROMATOGRAPHY

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Polyolefins are the biggest polymer commodity. The market of polyolefins is rapidly growing by 5-6% per year because of their variety with respect to physical and mechanical properties, their low cost and easily available raw materials. Therefore, the synthesis and characterization of polyolefins has become one of the most important areas in polymer research.
Comprehensive characterization of the polyolefins being distributed in more than one compositional feature (i.e., chemical composition distribution, molar mass distribution, functionality type distribution , degree of branching distribution , block-length distribution , tacticity distribution etc.) is essential for understanding the catalyst performance, as well as for process optimization and structure-property relationships.
The different distributions are mutually dependent. For the comprehensive characterization of the distribution a separation is necessary. Without a separation only information on average values can be obtained. Obviously, n-parameters require n-dimensional analytical methods for comprehensive characterization of the different structural parameters. Using high–temperature two-dimensional liquid chromatography (2D-LC), information on different aspects of molecular heterogeneity of polyolefins could be obtained. Our group has recently developed first interactive HPLC systems for separation of polyolefins and functionalized polyolefins. By coupling of interactive HPLC systems, which provides the information on CCD, with SEC, which gives the knowledge about MMD, 2D-LC characterization of industrially produced **ethylene-vinyl acetate copolymers (EVA)** as well as **ethylene-butene copolymers (LLDPE)** was performed for the first time. The presentation will demonstrate advantages of using comprehensive high-temperature two-dimensional chromatography in comparison of the underlying one-dimensional experiments.

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