

# Chemical Composition and Microstructure Analysis of Complex Polymers by Multidimensional Liquid Chromatography

Harald Pasch, Pritish Sinha, Wolf Hiller<sup>1</sup>

*University of Stellenbosch, Department of Chemistry and Polymer Science, Stellenbosch  
South Africa, E-mail: hpasch@sun.ac.za*

<sup>1</sup>*Technical University Dortmund, Faculty of Chemistry, Dortmund, Germany*

Complex polymers are distributed in more than one direction of molecular heterogeneity. In addition to the molar mass distribution, they are frequently distributed with respect to chemical composition, functionality, and molecular architecture. For the characterization of such complex materials frequently multidimensional analytical methods are used.

Different liquid chromatographic techniques have been developed, including size exclusion chromatography (SEC) separating with respect to hydrodynamic volume, and liquid adsorption chromatography (LAC) which is selective towards chemical composition. Liquid chromatography at the critical point of adsorption (LC-CC) is a versatile method for the determination of the chemical heterogeneity of segmented copolymers.

The present talk presents the principle ideas of multidimensional analysis schemes for (block) copolymers. Most promising are the combination of two different chromatographic methods and the combination of chromatography and spectroscopy. The basic principles of two-dimensional chromatography and the hyphenation of liquid chromatography with selective detectors such as <sup>1</sup>H-NMR will be discussed.

Various applications will be discussed showing the advantages of multidimensional chromatography and the on-line coupling of LC with <sup>1</sup>H-NMR.