100 YEARS OF CHROMATOGRAPHY EXPERIENCE DRIVES INNOVATION AND NEW INNOVATION PRODUCT CHROMOLITH AND THEIR APPLICATIONS

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Although there is a common belief that Chromatography, which was first used already more than 100 years ago, and also High-Performance Liquid Chromatography (HPLC) has reached saturation point with respect to application possibilities, chromatography research continues to make progress in its development. High-performance liquid chromatography has, since its discovery some 35 years ago, developed into one of the most widely used chromatographic analytical methods. At the beginning of the 70s, companies such as Merck started producing and marketing the first generation of conventionally manufactured porous silica gels of irregular form in particle sizes extending to 5 µm. The production of a series of surface-modified spherical materials hence became the greatest challenge for chromatography material companies in the years 1980-1990.

The third generation of HPLC separating materials was initiated by the ever-increasing demands of chromatographers faced with the task of separating extremely complex mixtures of substances, especially basic pharmaceutical substances.

In recent years the demands on laboratories to do ever more with the same resources has continued to rise. In addition, new fields of scientific research - such as proteomics - need tailor made materials to allow the separation of complex mixtures of macro molecules. One of the bottlenecks is the separation column used, which up till now has been made of particulate materials, usually of silica. The very nature of this powdered silica gel, when packed tightly into an HPLC steel column or fused silica capillary, creates a significant obstacle to the flow of the solvent/sample mixture. The limitations of existing particulate columns have driven us to develop an innovative new form of separation columns, which provide chromatographers with practical solutions to the difficulties of particulate materials. The new sorbent material consists of monolithic cylindrically shaped rods of highly porous metal free silica. The defined homogeneous bimodal pore structure, produced during the manufacturing process, means that the columns possess a unique
combination of a large internal surface area, over which quick chemical adsorption can take place, together with a significantly higher total porosity. I will show, after an introduction in the development and properties of chromatographic materials, the basic preparation of monolithic materials, either designed as an HPLC column or inside a capillary. In further I will present applications using these kind of monolithic materials, thus to show how to speed up separations with the new Chromolith® columns.