高分子科学系列讲座

高分子物理与化学国家重点实验室 中国科学院长春应用化学研究所

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报 告 人	Harald Pasch	职　　称	教授
从事专业	高分子分析科学		
建 议 人	刘勇刚、姬相玲	主 持 人	韩艳春
报告时间	2012.4.1（周日）上午 9:30	报告地点	主楼四楼学术厅（410 房间)
单　　位	University of Stellenbosch, South Africa		
通讯地址/邮编	University of Stellenbosch, Department of Chemistry and Polymer Science, Private Bag X1, 7602 Matieland, South Africa		
电　　话	+27-21-8083173	电子邮箱	hpasch@sun.ac.za
出生年月	1952.8		

报告人背景

1976 M.Sc. in Chemistry, University of Odessa, former USSR

1982 Ph.D. in Macromolecular Chemistry, Academy of Sciences, Berlin, Germany

1987 D.Sc. (Habilitation) in Macromolecular Chemistry, Academy of Sciences, Berlin, Germany

1976-1985 Research Scientist, Institute of Organic Chemistry, Berlin, Germany

1986-1987 Department Manager, Department of Polymer Analysis, Institute of Organic Chemistry, Berlin, Germany

1987-1989 Associate Research Scientist, Kuwait Institute for Scientific Research, Kuwait

1989-1991 Department Manager, Department of Polymer Analysis, Institute of Organic Chemistry, Berlin, Germany

1992-1995 Deputy Department Manager, Applications Department, German Institute for Polymers (DKI), Darmstadt, Germany

1996-2007 Department Manager, Polymer Analysis Department, German Institute for Polymers, Darmstadt, Germany

Since 2008 **Professor, SASOL Chair of Analytical Polymer Science**, University of Stellenbosch, Department of Chemistry and Polymer Science, UNESCO Associated Centre for Macromolecules and Materials, Stellenbosch, South Africa

Area of Interest:

- Development of analytical techniques for complex polymers
- Multidimensional analytical techniques
- Analytical techniques for combinatorial materials research
- New techniques for polyolefin analysis
- Synthesis and characterization of polymers with unusual architectures

More than 230 scientific papers

Author of the textbooks “HPLC of Polymers” and “MALDI-TOF Mass Spectrometry of Synthetic Polymers”

Editor of Springer Laboratory series

Governing board member of the International Symposium on Polymer Analysis and Characterization (ISPAC) and editorial board member of the International Journal on Polymer Analysis and Characterization (IJPAC)

报告题目	**Analytical Polymer Science Interfacing Materials Science and Analytical Chemistry**

内容摘要

We define ourselves as the Information Age. However, we could also label it the Plastic (or better Polymer) Age. Polymers are present in nearly every aspect of modern life. Polymers are important materials for producing computers, carpets, water pipes, cars, planes etc. Without polymers we would not have satellites and space shuttles and medical surgery would be less advanced. The inventory of products and goods containing polymers is endless.

Polymers are complex mixtures of large molecules varying in size, chemical composition, functionality, and molecular topology. For tailoring polymer structures in view of a certain application it is important to understand the correlation between the molecular parameters and the final properties of the material. Thus, the development of analytical methods for the molecular heterogeneity elucidation of complex polymers is an important subject in materials science.

Present day polymers exhibit distributions in more than one parameter of molecular heterogeneity. Copolymers for example are not only distributed with regard to chain length but also regarding chemical composition and quite frequently molecular topology. Accordingly, analytical techniques for complex polymers must address this multidimensionality in molecular structure. In most cases, the detailed analysis of the different distributions in polymers requires chromatographic separations. Similar to the approach in classical analytical chemistry for a specific type of separation, e.g. according to molecular size or chemical composition, suitable stationary and mobile phases must be identified and optimized for maximum resolution and throughput [1-3].

The present talk discusses the principle ideas of analyzing complex polymers by multidimensional analytical techniques. The most promising protocols refer to coupling different chromatographic methods (2D chromatography) or hyphenating liquid chromatography with information rich detectors (FTIR, NMR, MS). A number of representative examples for multidimensional polymer analysis will be presented that refer to the analysis of block copolymers, hydrophilic copolymers and polyolefins.

References

[1] H. Pasch, B. Trathnigg. *HPLC of Polymers*. Springer Publishers, Berlin-Heidelberg-New York, **1998**, ISBN 3-540-61689-6

[2] P. Kilz, H. Pasch: *Coupled Liquid Chromatographic Techniques in Molecular Characterization. In: Encyclopedia of Analytical Chemistry (Ed. R.A. Meyers)*, J. Wiley & Sons, Chichester, **2000**

[3] H. Pasch, W. Schrepp. *MALDI-TOF Mass Spectrometry of Synthetic Polymers.*Springer Publishers, Berlin-Heidelberg-New York, **2003**, ISBN 3-540-44259-6