

D. Demus, J. Goodby, G. W. Gray,  
H.-W. Spiess, V. Vill

# Handbook of Liquid Crystals

Vol. 3:  
**High Molecular  
Weight Liquid  
Crystals**

 **WILEY-VCH**

Weinheim • New York • Chichester  
Brisbane • Singapore • Toronto

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Vol. 1:  
**Fundamentals**

Vol. 2 A:  
**Low Molecular  
Weight Liquid  
Crystals I**

Vol. 2 B:  
**Low Molecular  
Weight Liquid  
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Vol. 3:  
**High Molecular  
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# General Introduction

Liquid crystals are now well established in basic research as well as in development for applications and commercial use. Because they represent a state intermediate between ordinary liquids and three-dimensional solids, the investigation of their physical properties is very complex and makes use of many different tools and techniques. Liquid crystals play an important role in materials science, they are model materials for the organic chemist in order to investigate the connection between chemical structure and physical properties, and they provide insight into certain phenomena of biological systems. Since their main application is in displays, some knowledge of the particulars of display technology is necessary for a complete understanding of the matter.

In 1980 VCH published the *Handbook of Liquid Crystals*, written by H. Kelker and R. Hatz, with a contribution by C. Schumann, which had a total of about 900 pages. Even in 1980 it was no easy task for this small number of authors to put together the *Handbook*, which comprised so many specialities; the *Handbook* took about 12 years to complete. In the meantime the amount of information about liquid crystals has grown nearly exponentially. This is reflected in the number of known liquid-crystalline compounds: in 1974 about 5000 (D. Demus, H. Demus, H. Zschke, *Flüssige Kristalle in Tabellen*) and in 1997 about 70000 (V. Vill, electronic data base LIQCRYST). According to a recent estimate by V. Vill, the cur-

rent number of publications is about 65000 papers and patents. This development shows that, for a single author or a small group of authors, it may be impossible to produce a representative review of all the topics that are relevant to liquid crystals – on the one hand because of the necessarily high degree of specialization, and on the other because of the factor of time.

Owing to the regrettable early decease of H. Kelker and the poor health of R. Hatz, neither of the former main authors was able to continue their work and to participate in a new edition of the *Handbook*. Therefore, it was decided to appoint five new editors to be responsible for the structure of the book and for the selection of specialized authors for the individual chapters. We are now happy to be able to present the result of the work of more than 80 experienced authors from the international scientific community.

The idea behind the structure of the *Handbook* is to provide in Volume I a basic overview of the fundamentals of the science and applications of the entire field of liquid crystals. This volume should be suitable as an introduction to liquid crystals for the non-specialist, as well as a source of current knowledge about the state-of-the-art for the specialist. It contains chapters about the historical development, theory, synthesis and chemical structure, physical properties, characterization methods, and applications of all kinds of liquid crystals. Two subse-

quent volumes provide more specialized information.

The two volumes on *Low Molecular Weight Liquid Crystals* are divided into parts dealing with calamitic liquid crystals (containing chapters about phase structures, nematics, cholesterics, and smectics), discotic liquid crystals, and non-conventional liquid crystals.

The last volume is devoted to polymeric liquid crystals (with chapters about main-chain and side-group thermotropic liquid crystal polymers), amphiphilic liquid crystals, and natural polymers with liquid-crystalline properties.

The various chapters of the *Handbook* have been written by single authors, sometimes with one or more coauthors. This provides the advantage that most of the chapters can be read alone, without necessarily having read the preceding chapters. On the other hand, despite great efforts on the part of the editors, the chapters are different in style, and some overlap of several chapters could not be avoided. This sometimes results in the discussion of the same topic from

quite different viewpoints by authors who use quite different methods in their research.

The editors express their gratitude to the authors for their efforts to produce, in a relatively short time, overviews of the topics, limited in the number of pages, but representative in the selection of the material and up to date in the cited references.

The editors are indebted to the editorial and production staff of WILEY-VCH for their constantly good and fruitful cooperation, beginning with the idea of producing a completely new edition of the *Handbook of Liquid Crystals* continuing with support for the editors in collecting the manuscripts of so many authors, and finally in transforming a large number of individual chapters into well-presented volumes.

In particular we thank Dr. P. Gregory, Dr. U. Anton, and Dr. J. Ritterbusch of the Materials Science Editorial Department of WILEY-VCH for their advice and support in overcoming all difficulties arising in the partnership between the authors, the editors, and the publishers.

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