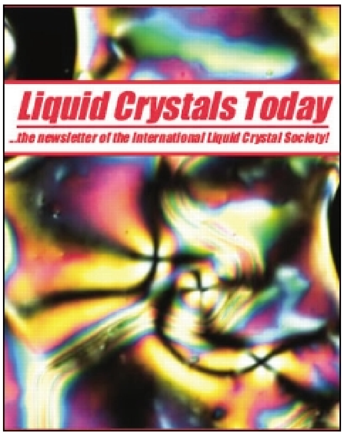

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A review of: "The Optics of Thermotropic Liquid Crystals"

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BOOK REVIEW

The Optics of Thermotropic Liquid Crystals

***Edited by* Steve Elston (*University of* Oxford, UK) *and Roy Sambles* (*University of* Exeter, UK). *Published by Taylor and* Francis, London, UK, ISBN 0-7484-0629-8**

Review by
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The optical anisotropy of nematic, cholesteric, and smectic phases is certainly one of the most important properties of liquid crystals. It is not only the basis of numerous applications in displays and other devices, quite often it serves also as a valuable tool in fundamental research of liquid crystals. Examples are the determination of elastic constants via light scattering, the study of soft mode dynamics above the chiral smectic A to smectic C transition using the electroclinic effect, or the classification of phase types by observing textures in a polarizing microscope. *The Optics of Thermotropic Liquid Crystals*, edited by Elston and Sambles, intends to give an overview of all aspects, applied as well as fundamental, of liquid crystal optics, focusing slightly on the optical properties of displays. It is organized in 12 review chapters, between 12 and 65 pages long, by selected authors with recognized expertise in the corresponding areas.

After a short introduction (Chapter 1), Chapter 2 by Dunmur starts with the basics of the optics of anisotropic materials and then reviews how the optical properties of liquid crystals rely on the molecular structures and structures of the liquid-crystal phases. Chapter 3 by Galatola and Oldano deals with the theory of linear optics of liquid crystals with special emphasis on various matrix methods. The next two chapters are concerned with experimental optical methods: Chapter 4 by Coles describes the determination of elastic constants and viscosity coefficients of nematic liquid crystals by electric field light scattering, and in Chapter 5 (Yang, Sambles and Bradberry) various guided mode and related techniques are reviewed, which yield information on the director profile in aligned liquid-crystal displays (nematic as well as ferroelectric smectic). Nonlinear optics of liquid crystals is discussed in Chapters 6 and 7. Chapter 6 by Marrucci and Shen gives an introduction to nonlinear optics of liquid crystals and focuses then on director reorientation induced by the optical electric field. Chapter 7 (Macdonald and Eichler) extends this subject further to the effects of short intense laser pulses inducing transient distortions in the liquid-crystal material. Chiral smectic phases are dealt with in the next two chapters. Whereas in the nematic phase electro-optical effects are based on a coupling to the square of the applied electric field E, smectic phases of chiral molecules exhibit a field coupling which is not independent of the sign of E. The origin and applications of the electroclinic effect in non-tilted smectic phases are described in Chapter 8 by Lagerwall, Matuszczyk, Rohde and Ödman, and in Chapter 9, by Ulrich and Elston, the optical properties and display applications of ferroelectric and (briefly) antiferroelectric liquid crystals are reviewed. The possible uses of liquid-crystal polymers as optical filters and storage devices are briefly discussed in Chapter 10 (Bowry), which is followed by an extensive chapter (Crawford, Whitehead and Zumer) on the optical properties of polymer dispersed liquid crystals. Finally, the now exceedingly widespread twisted nematic and supertwisted nematic displays are reviewed in Chapter 11 by Raynes, and the volume ends with a comprehensive chapter by Slaney, Takatoh and Goodby on defect textures in liquid crystals.

The review character of the various chapters makes this book especially attractive to everybody interested in an overview of any subfield of liquid-crystal optics. Because of the comprehensive lists of references it is also a valuable and helpful source book for the specialist. I can wholeheartedly recommend this volume to students and researchers at all levels of expertise in the field of liquid-crystal optics.

PEOPLE IN THE NEWS

Peter Raynes moves to Oxford University

Liquid crystal research activities at Oxford University will be boosted by the recently announced move of Peter Raynes from Sharp Laboratories of Europe to the Chair of Optoelectronic Engineering at Oxford from 1 October 1998. Peter has spent almost all of his scientific career working with liquid crystals and spent many years working at RSRE, Malvern (now part of DERA). He was part of the very successful consortium which involved amongst others, RSRE, BDH (Poole) Ltd and the Chemistry Department at Hull University, which made a substantial contribution to the development of liquid crystal materials displays in the 1970s and 80s. More recently Peter has been Director of Research and Head of the Liquid Crystal Group at Sharp, and has built up a strong liquid crystal research effort there. The move to Oxford University's Department of Engineering Science, where he has been a visiting Professor for a number of years, will enable Peter to develop further his research interests and contribute to the teaching programme in the University, and he also expects to continue collaborations with Sharp Laboratories.