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Publisher *Taylor & Francis*

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## Liquid Crystals

Publication details, including instructions for authors and subscription information:

<http://www.informaworld.com/smpp/title~content=t713926090>

## Book reviews

To cite this Article (1996) 'Book reviews', *Liquid Crystals*, 21: 6, 933 – 934

To link to this Article: DOI: 10.1080/02678299608032913

URL: <http://dx.doi.org/10.1080/02678299608032913>

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## Book reviews

### *Liquid Crystals in Complex Geometries Formed by Polymer and Porous Networks*

Edited by G. P. CRAWFORD and S. ZUMER

1996, pp. xvii and 505. Taylor and Francis Ltd, ISBN 0 7484 0464 3.

As the subject of liquid crystals evolves with developing knowledge, from time to time particular areas acquire such importance in terms of fundamental science and technology that they become sub-disciplines of the subject. Since the discovery of Polymer Dispersed Liquid Crystal (PDLC) systems in the mid-1980s and their subsequent commercialisation, the broader subject of liquid crystals in confined geometries (whether these geometries relate to spherical droplets, cylindrical pores or irregular cavities in polymer networks, gels and aerogels) has achieved the importance of such a sub-discipline. It now attracts intense interest at all levels from the fundamental physics relating to the obviously critical role of the surfaces in relation to molecular ordering and properties, through materials chemistry to applications for such systems.

It is therefore most timely that this book has been produced, drawing together different facets of the fast expanding knowledge base concerning liquid crystals confined to simple or random geometries. The book also allows a deserved dedication to be made by the editors to Professor Bill Doane in his 60th year in recognition of his very considerable contribution to the subject while Director of the Liquid Crystal Institute at Kent State University.

The book consists of twenty two papers contributed internationally by leading researchers from academic and industrial groups. Rather than attempt to discuss the topics covered by each of these, it seems preferable to take a step back and consider what the book covers through different sets of these contributions.

An important historical review of the area is given first, introducing the newcomer to a range of different confinements and describing their significance. This is followed by a full and expert treatment of the role of surface anchoring which assumes great importance in confined geometry situations where much larger surface to volume ratios are involved than in for example flat panel systems.

A series of papers then considers different methods of producing and characterising network/liquid crystal

systems ranging from anisotropic gels obtained by photopolymerisation to low molar mass LC phases—including cholesteric and ferroelectric—stabilised by polymer networks. Five papers are devoted to existing (PDLC) or potential applications involving confined LC systems, for example, bistable reflective cholesteric displays and consideration of ways in which polymer networks and polymer stabilised phases might bring improvements to currently commercialised flat panel TN and STN displays. Finally a group of seven papers relates to ways in which confinement influences the properties of liquid crystals, e.g. phase transitions, and to different physical techniques (X-ray, light scattering, NMR) whereby the influence of confinement upon ordering may be studied.

There is some overlap amongst the different contributions, but this is not a problem for a book whose function is to provide information from a number of different standpoints rather than to simply be a straightforward textbook. Well produced as one would expect, fully referenced, and edited in a clear style, with good diagrams and figures, the book is a pleasure to browse through, aided in this important respect by a really good index.

The book must surely be an essential source of information and reference for all active liquid crystal researchers—from pure scientists, both physicists and materials chemists, through to device oriented engineers—who today must be aware of developments in this significant area of their subject, but beginners in the field will also learn and be stimulated by reading selected contributions.

GEORGE GRAY  
(Merck Ltd, UK)

### *Metallomesogens*

Edited by J. L. SERRANO

1996, DM298-00 (hbk), pp. xix and 498. VCH, ISBN 3 527 29296 9.

Liquid crystal materials incorporating bonded metals—metallomesogens—have an inherent appeal, implying colour, unusual stereochemistry, novel properties and possible new applications. They have been a topic of curiosity for many years, but have been researched intensively only since the mid-1980s, thanks mainly to a fairly select body of inorganic and organometallic chem-

ists who have made a widening range of metallomesogens available for physical study. One centre of research excellence in metallomesogens is the Materials Science Institute of Aragon uniting research groups in Zaragoza at the University and the Consejo Superior de Investigaciones Cientificas, and it is fitting that this first general overview of metallomesogens should emanate from here, edited by Jose Serrano, and that its twelve chapters should be written entirely by seven of the researchers in the Institute, including the editor.

Chapter 1 by Serrano provides a useful introduction to liquid crystals in general and to metallomesogens in particular and is followed by four chapters in which, successively, low molar mass (LMM) lyotropic, calamitic, discotic and polymeric metallomesogens are discussed from the standpoint of structure/property relationships. In Chapters 6 and 7, synthetic methods and design strategies for LMM and polymeric metallomesogens, respectively, are reviewed. Chapter 8 is concerned with X-ray methods of characterisation and Chapter 9 with EPR studies of paramagnetic metallomesogens. Chapter 10 is devoted entirely to magnetic properties, Chapter 11 covers a range of other physical characteristics of metallomesogens and possible applications to which these properties may lead, and the book is concluded by some summarising comments in Chapter 12.

As would be expected, the book is very well produced and has been carefully edited to a uniform and very readable style. It has excellent clear structures and figures, each chapter is concluded by a comprehensive list of references, and the whole book has a very good and functional index. Bearing in mind the time and effort which goes into the production of such a text, the editor, authors and publishers have done well to bring the book in to the marketplace early in 1996 with the assurance that the literature is covered up to the end of the first half of 1994.

In creating this book, a very considerable service has been done to the international liquid crystal community not only by providing an excellent source-book of information and references for specialist workers—chemists, physicists, and technologists—in the field of metallomesogens, but also an introduction and overview for other liquid crystal researchers—both new and experienced—who are seeking entry to the field, but may have been dissuaded in the past by lack of coherent accounts of best techniques for obtaining and studying such materials. The book will therefore serve the experienced, specialist researcher well and do much to attract new workers into this fascinating and potentially technologically fertile field of metallomesogens.

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