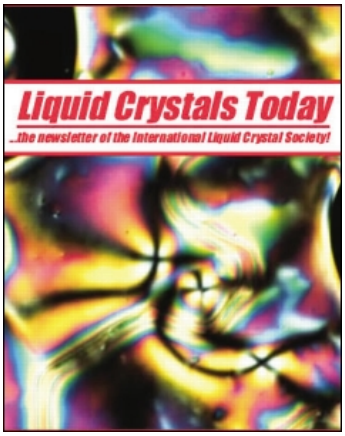

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ASIA Display '95

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ASIA DISPLAY '95

15th International Display Research Conference, Hamamatsu, Japan

16-19 October 1995

The ultra-modern ACT City Complex of Hamamatsu was this year's venue for Asia Display '95. Formerly known as Japan Display, the renaming of the series of International Display Research Conferences recognizes the growth of the display industry in Asia, and the increasing importance of the region to the world economy. More than 40 per cent of a total of over 200 talks and poster presentations were specifically concerned with liquid crystal displays (LCDs), and following the Conference were whole day workshops on Advanced LCDs and LCD colour filters. Without being biased it is fair to say that LCDs dominated the Conference, although advances in multicoloured Electroluminescent Displays, large area Plasma Displays and Field Emission Displays showed that the LC Display Industry cannot afford to be complacent about rival technologies.

It is impossible in a short report to give any serious scientific overview of the Conference, which had four parallel sessions and an abstract book weighing more than 2 kg. In the area of LCDs there were invited lectures covering the following topics: active matrix LCDs (E. Lueder, University of Stuttgart, Germany), reflective cholesteric PDLCs (J. W. Doane and W. D. St John, Liquid Crystal Institute, Kent State University, USA), antiferroelectric–ferroelectric switching (A. Fukuda, Tokyo Institute of Technology, Japan), liquid crystal projection displays (P. C. Candry, Barco NV Co, Belgium), multiple-line addressed LCDs (Y. Hirai, T. Kuwata, Y. Nakagawa and H. Araki, Asahi Glass and Optrex Corps, Japan), soft X-ray and optical studies of rubbed polyimide surfaces (Y. Ouchi, K. Seki and K. Kondo, Nagoya University and Hitachi, Japan), a novel reflective LCD (T. Uchida, T. Nakayama, T. Miyashita, M. Suzuki and T. Ishinabe, Tohoku University, Sendai, Japan), and progress in TFT–LCD technology (H. Katoh, NEC Corp, Japan). Other sessions dealt with developments in MIM (metal–insulator–metal)–LCDs, TFT–LCDs, LC technologies, LCD components, passive matrix LCDs, LC materials and wide viewing-angle LCDs. The author interview sessions on each day provided opportunites for detailed discussion with the day's speakers, and the accompanying demonstrations attracted much interest.

A highlight of the Conference was the paper entitled 'A bistable nematic LCD driven by a passive-matrix addressing', presented by T. Tanaka *et al.* of Seiko Epson, Japan. They described switching a nematic liquid crystal between two metastable states, similar to the switching of ferroelectric liquid crystals. This bistable nematic mode can be operated with passive-matrix addressing, and so avoids the complications of active-matrix addressing. Displays based on this mode feature a high contrast and wide viewing angle. Another new development announced at the Conference by research groups from Hitachi was a Super TFT–LCD based on an in-plane switching mode with greatly improved viewing angle characteristics, while new reflective LCDs from a number of groups attracted a lot of interest.

As well as being a forum for the presentation of latest developments in different display technologies, the programme of Asia Display '95 had a number of contributions on multi-media systems. In fact the theme of the keynote address for the Conference given by

Editorial Board members David Dunmur and Hiro Kawamoto promoting Liquid Crystals Today *at Asia Display '95*

Report by **David Dunmur**, University of Sheffield, UK and **Hirohisa Kawamoto**, Sharp Corporation, Nara, Japan

H. Mizuno (Matsushita Co Ltd) was 'Information Displays for the Era of Multi-media'. This gave a broad overview of social, technological and market aspects of the display and multi-media industries, and Mr Mizuno concluded that semiconductors were the 'rice of industry', while flat panel displays are the 'face of industry'.

A special invited lecture was given by T. Williams of Industrial Light and Magic, San Rafael, USA. In this he described the contribution of computer graphics to the motion picture industry, with illustrations from well-known films such as Jurassic Park, Who Framed Roger Rabbit and ET. The Asian character of the Conference was emphasized by a special session entitled Display Research and Development Industries in Asia, during which invited speakers gave overviews of display activities in China, Hong Kong, India, Japan, Korea, Malaysia/Singapore and Taiwan.

Hamamatsu City, host to Asia Display '95, is more widely known as the home of Yamaha Corporation, and a special evening session presented by Y. Nayai (Yamaha) was devoted to electronic music: one of the components, along with displays, of multi-media systems.

A Conference on the scale of Asia Display '95 requires a massive involvement of many people to ensure the ultra-smooth arrangements, which with the science ensured the success of the Conference. In this respect a special tribute should go to the Conference Chair (Heiju Uchiike), the Executive Chair (Hiroo Hori) and the Programme Chair (Shigeo Mikoshiba). The Conference was sponsored by The Institute of Television Engineers of Japan and the Society for Information Display; the next Asia Display will be held in Seoul, Korea in 1998.

BOOK REVIEW

Nuclear Magnetic Resonance of Liquid Crystals

By Ronald Y. Dong, Springer-Verlag (1994), ISBN 0 387 94121 5

Reviewed by G. P. Crawford, Xerox PARC, Palo Alto, CA 94304

One of the first problems facing graduate students in physics, chemistry, and/or materials science who are engaging in the field of research that involves the application of nuclear magnetic resonance (NMR) spectroscopy and the study of liquid crystals is the choice of text or reference book to read to become familiar with the field. Ronald Dong has done a superb job combining the underlying principles of NMR with the basic properties of liquid crystals. The book provides an excellent overview of this field which began in the early 1960s.

The book is organized into nine chapters. The first chapter is a rather brief introduction into the basic physics and chemistry of liquid crystals. The author introduces the classical mesophases, such as the nematic, chiral nematic, smectic phases, and orthogonal phases, as well as those materials that fall under the category of 'exotic' liquid crystals where discotic, polymer, and lyotropic liquid crystals are discussed in some detail. The introduction finishes up with field effects and polymorphism. Chapter 2 provides a very nice formalism for the density matrix, nuclear spin Hamiltonian, and spin dynamics under the influence of radio frequency pulses. Chapter 3 treats the orientational order and orientational distribution function of rod-like molecules in the Maier and Saupe framework. The end of Chapter 3 relates orientational order to the NMR technique and describes the use of the NMR technique to probe uniaxial and biaxial mesophases. Chapter 4 outlines molecular field theories of flexible mesogens with particular emphasis on the additive potential method.

In Chapter 5, semiclassical relaxation theory is treated with applications to the one spin $I=1$ system and Chapter 6 describes spin relaxation processes in liquid crystalline systems. Chapter 6 also presents a very elegant description of director fluctuations. The intricate mechanisms behind rotational and translational dynamics are presented in Chapter 7. Chapter 8 deals with the internal dynamics of flexible mesogens and describes the details behind modelling spin-lattice relaxation rates in these molecules. The final chapter addresses the new and emerging NMR techniques such as multiple quantum and two dimensional NMR and describes some of the advantages of these techniques when probing liquid crystalline systems.

The book is well organized and contains all the mathematical rigor to understand the application of NMR to liquid crystalline systems. The 258 page book is not a complete treatment of this field, nor does it aim to compile the most recent publications in this subject area, but it does provide the basic underlying physics and mathematical rigor of the NMR technique applied to liquid crystalline systems. The NMR technique has certainly helped us to understand the details of liquid crystal phases and their dynamics, and this book provides a lot of fundamental information so that the reader can follow the NMR literature. I can recommend Dong's NMR of Liquid Crystals as an excellent addition to any liquid crystaller's library, and it will certainly make the theory of the NMR technique more accessible to students in physics, chemistry, and materials science who are just entering the exciting field of liquid crystals.