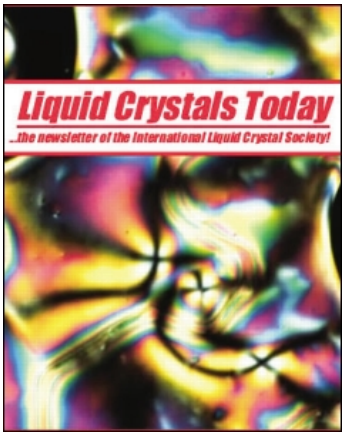

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Conference Reports

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Conference Reports

1995 Society for Information Display International Symposium

Orlando, Florida, 23–25 May, 1995

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The 1995 *Society for Information Display (SID) International Symposium* is the premier international gathering of scientists, engineers, technologists, manufacturers, and users of flat panel displays, where virtually all aspects of information displays are presented. The organizers, Richard H. Bruce (Symposium Chair) and Hugo Steemers (Programme Chair) of Xerox Palo Alto Research Center, did a magnificent job in arranging a programme that covered a wide range of technology and applications from high definition flat panel displays of both emissive and liquid crystal display (LCD) technology to the latest in CRT development and large area display projection systems. The symposium featured over 180 papers from around the world in 45 technical sessions; the conference papers are published in the *SID International Symposium Digest of Technical Papers* Vol. XXVI. It is very apparent just by paging through the *Digest of Technical Paper* that LCDs have entrenched themselves in the flat panel display community, and as the need for high information content continues to grow, LCDs are expected to play an even bigger role. From the liquid crystal materials perspective, the conference was heavily weighted towards reflective displays, polymer dispersed liquid crystal displays for projection, alignment and viewing angle issues, and active matrix technologies.

The flat panel display community was 'dazzled' by the recent advances in reflective liquid crystal display technology developed at Kent State University. The most significant breakthrough being the new dynamic drive scheme presented by X.-K. Huang that takes advantage of the rapid transition from the homeotropic state to the transient planar state in polymer stabilized cholesteric texture (PSCT) displays opening up this reflective technology to a wider scope of applications. The detailed physics behind the dynamic switching process was presented by D. K. Yang. Other advances in reflective cholesteric LCD technology included multicolour (L. C. Chien), surface modified cholesteric displays (Z.-J. Lu), and a passively addressed high resolution (100 dpi) PSCT display for electronic books and newspapers (M. Pfeiffer).

A reflective display technology that holds great promise for the future is the holograpically formed polymer dispersed liquid crystal (H-PDLC) that was described by K. Tanaka; this multilayer composite has very high reflection efficiencies at the Bragg wavelength. H. Koimal reported on a polarizer-free reflective amorphous chiral nematic guest host LCD. A novel approach to reflective nematic guest host LCDs was reported by Takatsu who implemented a spiral polymer agent to enforce twist in a nematic liquid crystal doped with dichroic black dye. A new holographic reflector which improves brightness and contrast by a factor of 2–3 and eliminates image degradation due to glare was presented by A. Chen. An interesting evening panel discussion was moderated by Z. Yaniv on the present and future of reflective displays. Much work is now being dedicated towards developing reflective LCDs because of their many attributes over backlite LCDs: such as low power consumption, compactability, and sunlight readability.

Many applications using PDLC materials are beginning to be realized; the most conspicuous being in projection displays. An entire session was devoted to PDLC projection displays which included presentations by Y. Nagae on compact projectors with high optical efficiency, Y. Ooi on reflective type liquid crystal–polymer composite light shutters, S. Shikama on PDLC light values utilizing amorphous-silicon thin-film transistors (TFTs), and J. Glueck on high efficiency TFT PDLC light values for projection. For direct-view PDLC displays, the 'trick' remains to enhance the backscattering of the PDLC material; J. LeGrange presented one approach which used a passive brightness enhancement filter behind the PDLC display. Other projection devices using liquid crystals were presented by J. Funfschilling who used cholesteric filters and a novel optically active diffractive device using patterned alignment techniques was presented by P. Bos.

There have been several advances in non-rubbed alignment technology to achieve uniform homogeneous anchoring conditions. T. Hashimoto demonstrated quartered subpixel alignment with pretilt using directional polymerization. Achieving pretilt using directional polymerization methods has been a formidable obstacle in the past; however, Hashimoto achieved pretilt by adopting a double exposure and slanted irradiation method. Another powerful approach to non-rubbed alignment was presented by J. West who aligned liquid crystal materials using UV exposed polyimides; this approach is particularly attractive since conventional polyimides are already optimized for liquid crystal display applications and have phenomenal thermal stability as compared to other directional polymerized alignment films. Another approach to non-rubbed alignment technology was presented by N. Koma who established multi-domain alignment using the surrounding electrode method.

Wide viewing angle capability was a particularly hot topic this year. The four domain reverse rubbing procedure for twisted nematic liquid crystals was presented by J. Chen and a novel tilted homeotropic vertically aligned four domain technique was presented by H. Vithana. The wide viewing angle properties of the optically compensated bend mode were reported by T. Miyashita and M. Flynn presented an optimization algorithm for viewing angle and colour

uniformity performance of the Pi cell. A full colour antiferroelectric LCD with wide viewing angle was presented by Y. Yamada. S. Zimmerman discussed a means to 'funnel' light into various parts of the LCD to improve viewing angle. D. Broer reported on thin plastic films formed by *in situ* photopolymerization of reactive liquid crystals that are useful for compensators and polarization control.

There is significant effort in the continual evolution of active matrix liquid crystal displays; many presentations focused on refining this technology and lowering its manufacturing cost. Other sessions concentrated on the infrastructure of LCDs (colour filters, backlights, addressing schemes, display measurement, etc.) and manufacturing issues. Conduction effects in liquid crystal materials were presented by A. Kmetz who attributed the delayed appearance of cosmetic defects in super twisted nematic (STN) displays to conduction effects and by B. Maximus who reviewed the various conduction regimes in LCDs. The poster session devoted to liquid crystal technology at the conference was extremely fertile, ranging from simulation and computational aspects of LCDs to passive optical elements for improved viewing angle performance. Unfortunately, presentations on ferroelectric liquid crystals were sparse.

It was obvious from the number of presentations at the conference on LCD technology that LCDs have emerged as a mature flat panel display technology that will become more dominant as we progress even further into the information age.

The Third Russian Symposium on Liquid Crystal Polymers

20–23 February, 1995, Moscow, Russia

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The third Russian Symposium on Liquid Crystal Polymers (LCP) took place in Moscow (Chernogolovka town) from 20 to 23 February, 1995. More than 130 scientists from Russia, France, Germany, The Netherlands, USA, Uzbekistan, etc. participated in the scientific programme of the Symposium. There were many leading experts in the area of LCPs, among them representatives of well-known research institutes and universities and companies (Shell, Hoechst Celanese Corporation, DSM). The programme included 18 invited lectures and about 100 posters. A wide spectrum of topics in the chemistry and physics of main chain and side chain LCP were covered, e.g. mesophase formation by

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Polymer Dispersed Liquid Crystals: A Look Back, a Look Ahead by Paul Drzaic, Raychem Corporation, *Liquid Crystals Today*, Vol. 5, 1 (1995).

The editor regrets that figure 4 of Paul Drzaic's article was incorrectly reproduced, and is pleased to reprint it here, as an example of the application of dichroic PDLC films.

Figure 4 A reflective NCAP (PDLC) display used as a control panel on Xerox model 4850 and 4890 copiers. The display consists of a dichroic PDLC panel coupled to colour reflectors. The display exhibits high relative brightness under both high and low illumination conditions, and possesses excellent viewing angle without backlighting.