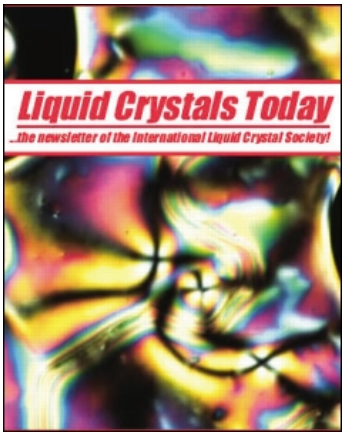

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Third International Ferroelectric Liquid Crystal Conference (FLC 91) *University of Colorado, Boulder, Colorado, USA, June 24-28 1991*

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MEETING REPORTS

Third International Ferroelectric Liquid Crystal Conference (FLC 91)

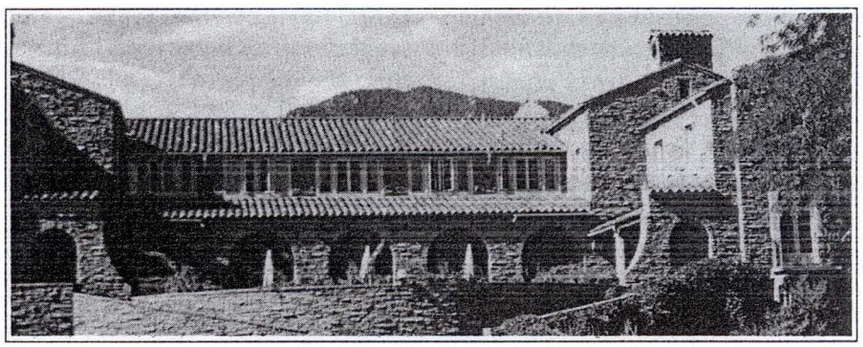
University of Colorado, Boulder, Colorado, USA, June 24-28 1991

Conference Summary from Noel A Clark, Department of Physics and Optoelectronic Computing Systems Center, University of Colorado, and David M Walba, Department of Chemistry and Biochemistry and Optoelectronic Computing Systems Center, University of Colorado, Boulder, CO, USA.

The Third International Ferroelectric Liquid Crystal Conference (FLC91) was held on the campus of the University of Colorado at the end of June. There were 225 participants and 161 papers were presented. Interest in FLCs remains high if the quantity and quality of new results and level of enthusiasm at the conference are any indication.

There were many exciting new results in the area of device development. Idemitsu-Kosan (K Yuasa et al) showed samples of a flexible FLC display consisting of a polymer FLC layer between a pair of indium-tin oxide coated sheets of polymer film. The cells, which were produced via a continuous web process, showed good contrast and their alignment, obtained by bending over a series of offset rollers, was quite robust. The devices shown, segmented alpha-numeric displays with matrix addressed devices to follow, clearly show the feasibility of very inexpensive fabrication of large area FLC devices.

The conference saw that FLC-amorphous silicon (a-H:Si) Spatial Light Modulator (SLM) technology is advancing rapidly. Seiko I&E (S Yamamoto et al) presented an impressive video of their FLC-a-H:Si SLM. This device exhibited excellent contrast (150:1), high spatial resolution (150 lp/mm), high frame rate (1250 Hz), both bistable and non bistable modes, and grey scale operation. Grey scale FLC photoaddressed SLM operation was also demonstrated by Greyhawk (M Bone et al). Displaytech (M O'Callaghan and M Handschy) presented a novel FLC electro-optic light switch concept, demonstrating the high contrast modulation of unpolarised, white light with a polarizer-free FLC device. The device employs a field controllable FLC diffractive structure which transmits light with zero amplitude in one of its states. Hoechst (K Escher at al) demonstrated a high contrast multiplexed matrix addressed test cell when it is first turned on. A materials related device highlight was the Fujitsu (A Mochizuki et al) presentation, showing a high quality passive matrix display employing their naphthalene based materials in which zig-zag-free (Bookshelf) SSFLC textures are obtained via layer expansion with decreasing temperature.



Part of the beautifui campus at Boulder, close to the Rocky Mountains

FLC 91 was also an exciting meeting for the chemistry contingent. Perhaps most interesting was the report by Nippon Telephone and Telegraph (S Tsuru at al) of FLC mesogens for which the ferroelectric polarization density is very close to the sum of all the transverse dipoles in the structure! These results demonstrate the high degree of order present in FLCs, and bode well for novel applications such as nonlinear optics (NLO), where a very high degree of polar order is advantageous. And speaking of the latter, it was of interest to note that FLCs possessing the same magnitude of the polarization can in fact differ in second order NLO susceptibility $x^{(2)}$ by at least a factor of 10 as shown by results reported from the University of Colorado group (D Walba et al) and from Osaka University (Ozaki et al). These results are in good agreement with the organic way of thinking about the molecular origins of $x^{(2)}$ and the polar order exhibited by FLCs.

In the category of most novel chemical structures incorporated into FLC, the lactone units of Dianippon Ink (T Hiyama et al) and Sharp (M Koden), and the cyanocyclopropanes of Hiyama et al and the β-lactams of G Scherowsky et al (Tech Univ of Berlin) are certainly noteworthy. Add the di-fluoroalkoxy units presented by Displaytech (M Wand et al), and one can see that stereocontrolled synthesis has an important role in the FLC field.

In the area of FLC physics, H Toriumi (Univ of Tokyo) and H Coles (Univ of Manchester) presented dynamic infrared and Raman spectra which indicated that FLC molecules undergo conformation change during the molecular reorientation of electro-optic switching.

Finally there were provocative new results on the now famous antiferroelectric phases, particularly the "Devil's Staircase" structural model reported by H Takezoe (Tokyo Inst of Tech) and the report by G Heppke (Tech Univ of Berlin) of evidence for an antiferroelectric structure in an FLC polymer material. Could an SSFLC cell with fractal grey scale capability be only a few steps up the stairs? The growing importance of static and dynamic dielectric properties in FLC physics was highlighted by the work presented by the Malvern Group (J C Jones et al) on dielectric biaxiality and the beautiful relaxation results of Kremer at al (Univ of Mainz), showing that the short time reorientational dynamics about the molecular long axis is nearly the same in the nematic, smectic A and smectic C phases.

The conference proceedings submitted will appear in the journal *Ferroelectrics* late in 1991. Copies of all Abstracts of papers presented at FLC 91 can be obtained for $50 by writing to:

FLC 91, Department of Physics, University of Colorado, Boulder, CO 80309, USA.

The next FLC Conference will be chaired by Atsuo Fukuda of Tokyo Institute of Technology, and held in Japan in 1993.