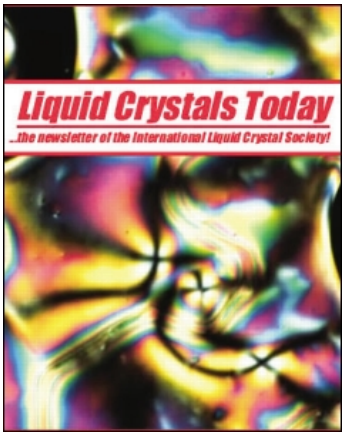

Liquid Crystals Today
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713681230

Meeting Report

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To cite this Article Sprunt, Sam(1996) 'Meeting Report', Liquid Crystals Today, 6: 3, 6 — 7
To link to this Article: DOI: 10.1080/13583149608055148
URL: http://dx.doi.org/10.1080/13583149608055148

MEETING REPORT

16th International Liquid Crystal Conference 24–28 June 1996

Report from

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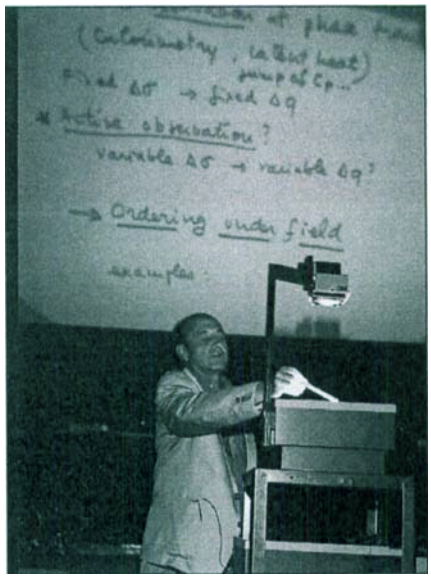
After twenty years the ILCC this year returned to its birth place in Kent State University. In comparison with the last time the ILCC visited Kent, it was much larger and at this year's conference nearly 750 participants from 40 countries contributed over 900 papers during the week. The conference was organized by Professors S. Kumar (chairman), J. West (vice-chairman), D. Finotello (secretary), and J. Fulghum (treasurer), while Professor William Doane, retiring director of the Liquid Crystal Institute at Kent State, served as honorary chairman.

The scientific programme featured five plenary lectures which reflected the diverse avenues of the liquid crystal science. Professor G. Durand (University of Paris, France) described an interesting set of experiments on electric-field induced nematic and smectic ordering in the isotropic phase of a liquid crystal. Pulsed ac fields were used to probe the dynamics of the nematic order parameter S, which revealed a reversible entropy transfer between S and the other degrees of freedom of the system. The dynamics of this process of entropic heating and cooling include a slow heat diffusion-limited regime, which is analogous to the phonon bottleneck phenomenon well known in low temperature magnetic systems. Professor U. Seifert gave a stimulating talk on the topology of giant vesicles, bilayer membranes of amphiphilic molecules. Minimizing the bending energy of the membrane subject to simple geometrical constraints gives rise to an amazing variety of membrane shapes. In non-spherical vesicles, dynamic fluctuations between different shapes—conformal diffusion—are theoretically predicted, and have been recently observed as pearling instabilities in tubular vesicles. Professor S. Zumer (University of Ljublijana, Slovenia) discussed the problem of liquid crystals in confining matrices (porous glasses, aerogels, polymer networks). His talk spanned issues ranging from molecular modelling of a nematic–solid interface and surface-induced ordering to a systematic study of nematic, chiral nematic, and hybrid smectic structures in narrow cavities. The same theoretical analysis can be used to show how surface interactions can nucleate defects in the direction of chevrons in surface-stabilized ferroelectrics. Rounding out the plenary talks were two presentations focusing on applications. Professor J. Patel discussed some interesting new devices including a liquid crystal Fabry–Perot resonator, which uses a novel scheme to control polarization sensitivity and to compensate for temperature drifts, and the use of simple nematics for beam steering and the shaping of very short optical pulses. Finally Professor R. Meyer (Brandeis University, USA) spoke about the development of a 'smart' (intensity sensitive) reflector based upon the combination of a cholesteric liquid crystal with a temperature-sensitive pitch and a light absorbing dye. The idea is a clever one: light absorbed by the dye heats up the cholesteric and shifts the reflection band of the cholesteric into the frequency range of the incident light; this in turn reduces the intensity that reaches the absorber, and provides feedback to stabilize the device. Other approaches based on polymer dispersed and polymer stabilized liquid crystals were presented, as well as a more conceptual scheme using nanometric lamellar layers (a sort of active multilayer dielectric).



Georges Durand delivering the first Plenary Lecture at the 16th International Liquid Crystal Conference, Kent 1996.

Invited and contributed talks were presented in 21 separate morning and afternoon sessions, and there were 12 large poster sessions. The talks and posters covered an enormous range of topics, including surfaces and interfaces, simulations, synthesis, polymer liquid crystals, composite systems, ferroelectrics, phase transitions, optical and nonlinear optical properties, biological and lyotropic systems, confined liquid crystals and devices. A sampling of some of the specific themes is given below:

Ferroelectrics: The role of biaxial correlations between mesogens in producing chiral structure; novel chiral instabilities and modulated structures in ferroelectric and antiferroelectric liquid crystals; the effects of chiral fluctuations in achiral phases and the phase behaviour of chiral–achiral mixtures; a demonstration of ferroelectricity in an achiral smectic with banana-shaped molecules; and new collective fluctuation modes in chiral liquid crystals.

Phase transitions: Multiple critical relaxation modes in the heat capacity at the fluid smectic–hexatic phase transition; the nature of short-range orientational order in the isotropic phase of chiral liquid crystals; non-Kosterlitz Thouless behaviour at the SmA–HexB transition in two-dimensional freely-suspended films; the crossover from conformal to non-conformal layer fluctuations in SmA films; and surface and polarization inversion transitions in free-standing ferroelectric films.

Lyotropics: The melting of in-plane order in single- and multiple-bilayer phospholipid tubules; a new model for cubic phase structure in ternary lyotropics; and the effects of cholesterol and proteins on director fluctuations and viscoelastic properties in biomembranes.

Polymer-LC composites: Anchoring effects and mechanisms of orientational order in polymer-dispersed liquid crystal droplets; alignment of chiral smectics in polymer networks; and methods to characterize network anisotropy in polymer stabilized LCs.

Optical properties: Optical field-induced reorientation in dye-doped nematics and chiral liquid crystals; 'sideways dimer' ferroelectric liquid crystals for nonlinear optics; photo-induced anisotropy in dye-doped alignment layers; and nonlinear susceptibility in blue phases.

Surfaces: Atomic force microscopy as a novel probe of structure at free LC surfaces and of the isotropic–nematic phase transition; LC anchoring energy on anisotropic photo-polymerized films; and surface-induced bulk alignment in nematics and smectics due to the effects of short- and long-range LC-substrate and LC–LC interactions.

There were several new features at the 16th ILCC. Two pre-conference short courses were held, and both were oversubscribed. These were entitled 'Physical Characterization of Liquid Crystals' (organized by O. Lavrentovich) and 'Liquid Crystal Applications' (organized by J. Kelly). The first Educational Outreach session featured presentations by local elementary and high-school teachers, and a significantly expanded industrial exhibit programme received an impressive turn-out. Finally, the conference programme was made available for the first time on the world wide web.

The 16th ILCC was closed by Professor A Fukuda, the newly elected president of the society, and all went away looking forward to Strasbourg, and the 17th ILCC!

Editor's Note:

Each of the 16 ILCCs has had its own character, and the wide variety of venues on 3 continents have given a rich store of memories for those attending. Often it is the surroundings that leave their mark, or the social programme or scientific breakthroughs leading to fundamental change in the development of liquid crystal science. So what will Kent 1996 be remembered for? Certainly the size of the conference, but more significantly the important place that Kent and its Liquid Crystal Institute occupies in the history of liquid crystals. A memorial session during the conference recalled the contributions of Glenn Brown, Dave Allender and Dick Hornreich to liquid crystals, and of course all had strong attachments to the LCI at Kent. The end of the conference also marked the retirement of the Director of the LCI, Bill Doane, who was Glenn Brown's successor. There will soon be a new LCI and a new Director, and all will wish the new team in its new building every success. We all look forward to the KSU Liquid Crystal Institute continuing its leading role in the science of liquid crystals.