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ECLC '97 Conference—European Conference on Liquid Crystal Science and Technology

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Conference Reports

The conference was held in Zakopane, the picturesque winter capital of Poland in the north foothills of the Tatra mountains. More than 270 participants from nearly all corners of the liquid crystal world, with the most numerous contingent from Central Europe and CIS countries, gathered at the historic Koscielisko Center founded by Madame Maria Curie. Participants had an opportunity to attend over 70 oral and about 300 poster presentations organized in eight sessions covering a wide spectrum of interests from the synthesis of novel materials, chiral liquid crystals, molecular dynamics, phase transitions, display devices and applications, to polymer and lyotropic liquid crystals. In order to conform with the no-parallel-sessions tradition of past Winter European Conferences the organizers had to extend the duration of the meeting to a marathon six days. Fortunately, the conference was well organized, and although snow was not present below 2000 m in Europe for most of the winter, the sunny weather and the gorgeous views of the Tatra mountains encouraged walking excursions between sessions, allowing the participants a respite from the ordeal.

The conference was dominated by two pivotal themes, presentations devoted to ferroelectric (FLC) and antiferroelectric (AFLC) liquid crystals with a particular emphasis on their applications to novel liquid crystalline displays on the one hand, and a broad range of material characterization studies, on the other.

The phrase 'potential applications' was heard and seen frequently, clearly indicative of today's increasingly application oriented liquid crystal research. A brief review of applications of ferroelectric liquid crystal mixtures was given by Lagerwall; Uchida reviewed recent technical achievements in, e.g. in-plane switching and electric control of birefringence. Chigrinov summarized the present-day photo-aligning methods of orienting polymer layers for display applications. The time and thermal

ECLC '97 Conference — European Conference on Liquid Crystal Science and Technology

**Zakopane, Poland,
2–8 March 1997**

*Report by Dagmara Sokolowska,
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stability problems are well solved, and control of the anchoring strength and possibility of local changes of the local easy axis direction make the method even more attractive. Other application-oriented lectures covered nonlinear optics applications (Walba), reflective displays (Seki), the possibility of building stereo glasses (Belyaev), colour filters (Shao), phase retarders (Schirmer), and pressure monitoring systems (Wolinski).

Excellent examples of contemporary applied research oriented towards answering the most urgent technical and chemical problems such as viewing angle enhancement (Uchida, Fukuda), LC application in portable communication systems (Uchida, Seki), large scale display technology, with a grand if not apocalyptic vision of future applications (Uchida), and the chemical synthesis strategy for obtaining FLC with precisely predefined optical properties (Thurmes, Walba) were given. The European contribution to information visualization technology ranged from experimental work on spontaneous polarization (Stegemeyer, Guillon), polymer-dispersed liquid crystals (Klosowicz), a new optical technique of information writing and storage (Simoni), to theoretical modelling of

FLC and AFLC (Stegemeyer, Zeks, Osipov, Photinos). A paper by Belayev was received with special attention which, in addition to presenting results of electro-optical studies of LC, devoted a substantial part of the talk to the human side of computer visualization techniques (virtual reality), a problem often overlooked by the scientist. In summary, these presentations clearly show how highly specialized LC systems in terms of their structure and of their chemical and physical characteristics are required to meet contemporary application requirements.

Moving away from more or less purely application oriented presentations, some talks were devoted to novel molecular structures, and as shown by Ungar, practically any known or imaginable phase structure can be realized by novel molecular architectures (fern-like, cone-like, etc.). Athanassopoulou presented, in turn, recent results of a search for ferromagnetism in the columnar discotic phase of Mn metallomesogens at very low temperatures (4.2 K).

Basic research work presented at the conference spanned a wide range of physical and chemical problems. Structural and dynamic properties of well known materials are studied (not necessarily in a systematic manner) as a function of external fields, temperature and pressure (Przedmojski, Urban, Jakli, Sastry). New materials, e.g., composites confining the LC geometry (Finotello), LC of banana shaped molecules (Rauch) or metallomesogens (Athanassopoulou) were searched for and their properties investigated. Besides classical methods of NMR, EPR and dielectric spectroscopies or high resolution ac calorimetry, new experimental techniques, e.g. experimentally involved but direct method for measuring the refractive index (Walczak) or measurements of chiral properties (Kuball) were used. Results of the most recent synthesis work for new materials (Glogarova, Stanczyk, Praefcke, Usol'tseva) were presented. Results of

systematic searches for new LC structures (Buka, Ungar, Kratzat—micelles) or for correlations between physical properties and chemical structure within homologous series of substances (Guillon—electro-optical parameters, Rauch—phase and ferroelectric parameters) were discussed.

However, the conference was in general dominated by oral presentations of essentially purely phenomenological studies with no attempt at convincing explanations or quantification of the observed results, interpreted with old, if not outmoded theories, and only occasional forays into proper modelling of the observed phenomena. Notable exceptions included presentations on modelling surface phenomena of the lyotropic LC, solidly supported by experimental results and/or numerical modelling (Galatola, Neto), and of Stark on topological defects in the water-surfactant-liquid crystal mixture, in particular hyperbolic hedgehog defects separating water rich regions. Osipov discussed different aspects of induced ferroelectricity in the nonchiral smectic C by a chiral dopant within the framework of molecular statistical theory.

Similar completeness characterized a substantial number of presentations on molecular dynamics studies often involving sophisticated contemporary experimental techniques (e.g. Sastry's talk of 2D-FT EPR studies) and theoretical modelling (Dunmur, Sastry, Shilov).

Despite the conference program announcements, presentations on biological systems were surprisingly few and a very stimulating invited lecture of Petrov on biophysical mechanisms present in membranes, such as flexoelectricity, electric conductivity, and capacitance was not enough to fill the gap alone.

The participation in the conference of a large number of graduate students was very encouraging as well as a substantial number of communications on internationally cooperative research. Young researchers mostly reported on their work during poster sessions. Many participants admired a poster by Brazovskaia on the analogies to quantum mechanics of the behaviour of a steel ball deposited on a free standing smectic film and excited by acoustic waves, a conceptually simple and very

instructive experiment. Zihel's poster presentation of cooperative work of scientists from many European countries and the USA on non-monotonic behaviour of optical phase retardation in a nematic layer was upgraded in the course of the meeting to an oral one and turned out to be one of the best given. A number of other reports also stemmed from international cooperation, e.g. Sastry reviewed results of an experimentally extremely challenging and time consuming study of spin-probe dynamics in liquid crystals by two-dimensional Fourier-transform EPR performed with the Freed group at Cornell University, and Urban lectured on a pressure dependence study carried out with the Wurflinger group at Ruhr University Bochum. Finotello discussed results of cooperative work (Garland group at MIT) on thermodynamic properties of liquid crystals in restricted geometries, in particular the influence of confinement on the NS and NI phase transitions.

Selected Conference contributions will be published as two separate issues of *Proceedings of SPIE*.

Metallomesogens are a relative young group of liquid crystals which add to the well-known characteristics of mesophase forming species the specific properties of metal complexes. The Fifth International Symposium on Metallomesogens, held at the beautiful Swiss Jura mountain site of Chaumont above Neuchâtel, provided the forum for presenting the state of the art in this increasing area of liquid crystal research. The symposium was carefully and pleasantly organized by R. Deschenaux, Neuchâtel.

Participants from 9 European and 4 overseas countries presented their contributions, starting with an introduction into structural investigation methods of metallomesogens, given by D. Guillon, Strasbourg. In a second part of his lecture, he presented his own investigations, among others on the continuous variation of packing parameters during transitions from columnar to cubic phases. The large group of metallomesogens with macrocyclic ligands was introduced by G.

Fifth International Symposium on Metallomesogens

**Neuchâtel, Switzerland,
3-6 June 1997**

*Report by Günter Lattermann,
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Lattermann, Bayreuth, who reported additionally on new results in the field of metallomesogens with related linear and branched ligands. Several authors presented further contributions on macrocyclic metallomesogens, i.e. tetrapalladium complexes (S. Diele, Halle; D. Singer, Washington), metallo-phthalocyanines (K. Ohta, Ueda), metalloporphyrins (Y. Shimizu, Ikeda; A. Suste, Exeter) and dibenzotetraannulenes (S. Forget, Orsay). It became obvious that apparently in this group of

metallomesogens still new developments are possible. This was additionally demonstrated by investigations on complexes with azacyclic ligands (A. Facher, Bayreuth) and by the report on metallacrowns, which seem to be very promising candidates for analogous metallomesogens with interesting magnetic properties (S. Pecoraro, Ann Arbor). A further group which attracts considerable attention are liquid crystalline ferrocenes, presented by contributions of S. Diele, Halle; T. Seshadri, Paderborn; M. Schweissguth, Neuchâtel and T. Turpin, Neuchâtel.

Besides new classes of ligands like di(hexadecyl) phosphate (F. B. Cukiernik, Nunez), tropolone derivatives (J. R. Chipperfield, Hull), *o*-phenylenediamine compounds (J. Szydłowska, Warsaw), and pyridine ligands (L. Y. Park, Williamstown), other contributions reported on cobalt soaps (Van Hecke, Claremont), polar copper complexes of low symmetries (N. Hoshino-Miyajima, Sapporo) and metallomesogens linked onto cyclic and