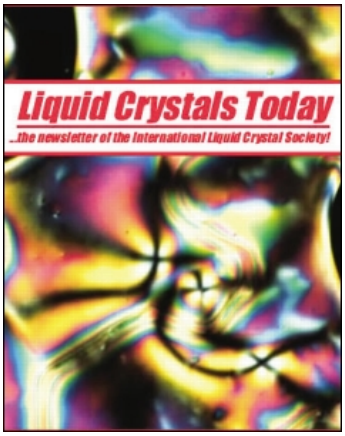


**Liquid Crystals Today**
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713681230

# 2nd Ukrainian Liquid Crystal Conference, Christmas 92, Kiev, Ukraine

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**To cite this Article** Gerasimov, A. A.(1993) '2nd Ukrainian Liquid Crystal Conference, Christmas 92, Kiev, Ukraine', Liquid Crystals Today, 3: 1, 6 — 7
**To link to this Article: DOI:** 10.1080/13583149308628612
**URL:** http://dx.doi.org/10.1080/13583149308628612

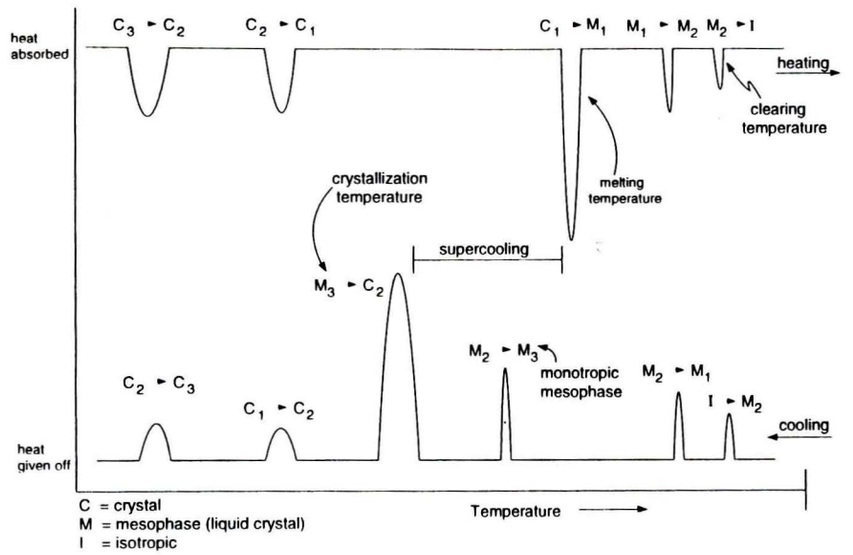
# Scientific Notes

## Misinterpretations of DSC Data

*Mary E Neubert, Liquid Crystal Institute, Kent State University, Kent, OHIO 44242, USA*

Several recent examples in the liquid crystal literature of incorrect interpretations of DSC scans suggest that a review of the basics of interpreting DSC scans is needed. I have drawn two DSC scans for a theoretical material in the figure shown here to illustrate my points.

It is a well known fact that most melts of both inorganic and organic compounds supercool when cooled, which means that they crystallize at a lower temperature than they melt. This is what makes it possible to observe monotropic liquid crystalline phases. It is also quite common to observe crystal-to-crystal changes which often are mistaken for mesophase transitions. The possible combinations of crystal changes that can occur are quite varied; one example is shown in the figure.




Sometimes different crystal forms give different melting temperatures, making it possible for a mesophase to be enantiotropic with the lower melting temperature and monotropic with the higher melting temperature. On the other hand, liquid crystalline phases rarely supercool (I have never seen one that does). Thus, if a phase that is formed on cooling is reheated and returns to the previous phase within 0.6°, it is probably a mesophase. If it does not, it is probably a crystalline phase. Sometimes supercooling to a crystalline phase is small, making it difficult to differentiate between a crystalline phase and a mesophase. Crystallization temperatures depend on how the sample is cooled and tend to vary from run to run. Fluctuations in mesophase transitions are smaller unless the sample decomposes.

Usually the melting and crystallization transitions have the largest $\Delta H$ values in a DSC scan. When they do not, it is usually because there are several crystal changes. Peaks below the largest $\Delta H$ peaks should always be suspected to be crystal forms until other data such as x-ray are available to support a mesophase identification. It is not unusual to find that immediately reheating a cooled sample gives a different DSC scan. This is because the sample has not yet returned to the same crystal form that occurred in the original scan. Often allowing the sample to set overnight will accomplish this by giving a repeat of the original scan.

A better definition for monotropic phases is that they are phases observed below the melting temperature, not just phases observed on cooling. Monotropic phases can be reheated and should return immediately to the previous phase on reheating, confirming that they are indeed mesophases and not crystals. Sometimes monotropic phases occur near the melting temperatures but always below it. Also, it is unusual to observe crystallization occurring at the same time as a mesophase forms.

The identification of mesophases by microscopic textures is an extremely useful tool but its limitations should be kept in mind. Identifying more highly ordered smectic phases is not always easy for even the highly trained person. Such a person gains the necessary skills by looking at many hundreds of compounds with a wide variety of phases. There is no

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# Meeting Reports

## 2nd Ukrainian Liquid Crystal Conference, Christmas 92, Kiev, Ukraine

*Report from A A Gerasimov, Institute for Single Crystals, Kharkov, Ukraine.*

The liquid crystal community from 12 scientific and industrial groups of Ukraine was represented by 53 delegates who presented 23 oral reports. The scientific area of the conference programme was wide-ranging and involved various topics reflecting the interests of the research groups.

Much of the work was on surface phenomena in liquid crystals. Particularly, T Marusii (Kiev) presented reports on the orientation of liquid crystals by the UV-induced easy axis in surface film of polyvinylcinnamate. Yu Resnikov (Kiev) talked about the surface orientation effect in nematics due to light-induced changes of boundary conditions in orienting films doped with dye molecules . The theory of the influence of anchoring energy on phase behaviour and configurational transitions of nematics in cylindrical pores was presented by A Kiselov (Chernigov).

Some reports dealing with non-linear optical effects in liquid crystals were also presented. G Klimusheva (Kiev) reported results of fast-time resolution hologram recording in induced cholesterics and V Reshetnyak (Kiev) presented a paper on the molecular theory of anomalous low light-induced reorientational threshold effects in nematics doped by dyes.

A few papers were presented on the theory of liquid crystals. V Kuzmin (Odessa) talked about the quantitative aspects of chirality and the correlation between dissymmetry functions and twisting power for various types of OAD. A Gerasimov (Kharkov) presented a molecular theory of smectic mesomorphism that took into account both steric and dispersive interactions as well as the effects of the conformational dynamics of mesogenic molecules.

The results of theoretical investigations into the cholesteric-nematic transition due to an electric field for induced cholesterics was presented by Yu Terentieva (Kiev). It was shown that broken concentrational uniformity leads to a power singularity for helical pitch instead of the logarithmic dependence predicted by de Gennes. S Shiyanovskii (Kiev) talked about some anomalies of conductivity in liquid crystals under irradiation.

*(continued on p 7)*

# FORTHCOMING MEETINGS

| DATE: | CONFERENCE: | VENUE: | CONTACT: |
|---|---|---|---|
| **1993** | | | |
| **13 — 17 April** | NATO Advanced Workshop on Spatio-temporal Patterns in Non-equilibrium Complex Systems | Santa Fé, New Mexico | ***Brenda Buck***, Liquid Crystal Institute, Kent State University, KENt, OHIO 44242, USA. Fax: 1-216-672-2796 |
| **20 — 22 May** | Hauptversammlung der Deutschen Bunsen-Gesellschaft: Flüssigkristalle | Leipzig, Germany | ***Prof H Stegemeyer***, Dept of Chemistry, Univ of Paderborn, POB 1621, D-4790 PADERBORN, GERMANY Fax: 49-5251-602519 |
| **3 — 5 June** | Third International Symposium on Metallo-Mesogens | Castellon, Spain | ***Dr Mercedes Marco***s, Quimica Organica, Facultad de Ciencas-IMCA, Universidad de Zaragoza-CSIC, 50009- ZARAGOZA, SPAIN Fax: 34-76-567920 |
| **21 — 25 June** | Gordon Conference on Liquid Crystals | Wolfeboro, Mass, USA | ***Prof J W Doan***e, Liquid Crystal Institute, Kent State University, KENT, OHIO 44242-0001, USA Fax: 1-216-672-2796 |
| **5 — 8 July** | 1er Workshop Iberoamericano sobre fluidos anisotopicos y sus applicaciones | Cordoba, Argentina | ***Dr Daniel Pusiol,*** FaMAF — Univ. Nac. de Cordoba, 5000 CORDOBA, ARGENTINA |
| **18 — 21 July** | First International Conference on Materials Chemistry | Aberdeen, Scotland UK | ***Prof A West***, Dept of Chemistry, Univ of Aberdeen, ABERDEEN AB9 2UE, Scotland, UK Fax: 44-224-272938 |
| **18 — 22 Sept** | 2nd Conference on Liquid Matter | Firenze, Italy | ***Dr Marco Zoppi,*** Ist. di Elettronica Quantistica, Consiglio Nazionale delle Richerche, Via Pantiatichi, 56/30 1-50127 FIRENZE, ITALY Fax: 39-55-414612 |
| **27 Sept — 1 Oct** | Europhysics Conference on Macromolecular Physics 1993: Transitions in Oligomer & Polymer Systems | Ulm, Germany | ***Prof Dr H G Kilian***, Universität Ulm, Experimentelle Physik, Albert-Einstein Allee 11, D-7900 ULM, GERMANY FAX: 49-731-502-3036 |
| **28 Sept — 1 Oct** | FLC '93, Tokyo: Fourth International Conference on Ferroelectric Liquid Crystals | Tokyo, Japan | ***Prof Atsuo Fukuda***, Tokyo Inst. of Tech., Faculty of Engineering, Dept of Org. & Polymeric Materials, O-okayama, Meguro-ku, Tokyo 152, JAPAN Fax: 81-3-3748-5369 |
| **4 — 8 October** | V International Meeting on Optics of Liquid Crystals | Lake Balaton, Hungary | ***Dr I Janossy***, Central Research Inst. for Physics, H-1525 BUDAPEST 114, PO Box 49, HUNGARY Fax: 36-1-1695-380 |
| **1994** | | | |
| **6 — 9 September** | International conference on Liquid Crystal Polymers | Beijing, P R China | ***Dr X J Wang,*** Beijing ERC of LC Technology & Dept of Chemistry, Tsinghua University BEIJING 100084, P R CHINA FAX: 86-1-2564372 |

## 2nd Ukrainian Conference

*(continued from p6)*

Some reports dealt with the synthesis and studies of the physico-chemical prop-erties of new mesogenic molecules and components of liquid crystal materials. Yu Fialkov (Kiev) presented new types of mesogenic molecules based on fluorine derivatives of benzodioxole. T Sidelnikova (Odessa) discussed the synthesis, chemical structure and mesogenic properties of 2,5 disubstituted 1,3 dioxanes, and the results of studying chiral dopant effects on the thermostability of liquid crystals based on cyano-mesogens were presented by A Fedoryako (Kharkov). Dealing with the applications of liquid crystals, A Gerasimov (Kharkov) presented new results of studies on the electrooptic characteristics of the cholesteric-nematic mixtures having Bragg reflection in a visible light region. He demonstrated large size front-lit displays that used the effect of cholesteric texture bistability at zero field. The results are very close to those obtained on PSCT cells proposed by J Doane *et al*. However, another type of liquid crystal material, (usually ChNM doped with special molecules that stabilise both focal conic and planar texture), gives improved optical characteristics and response time without using polymer gel, and gives some technological advantages in the manufacturing process. M Kurik (Kiev) reported on the peculiarities of the crystallisation process in a natural lyotropic liquid crystal. ■