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Ferroelectricity Newsletter / v.7:no.4 Fall 1999

Monterey, California, Naval Postgraduate School

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Ferroelectricity Newsletter

A quarterly update on what's happening in the field of ferroelectricity

Volume 7, Number 4

Fall 1999

LATEST DEVELOPMENTS

IN THE FIELD OF FERROELECTRIC LIQUID CRYSTALS

Just two months ago from the publication of this issue, a quarter of a thousand scientists, representing academia as well as industry and hailing from 28 different countries, met from Sunday, 29 August, to Friday, 3 September 1999, at the University of Technology in Darmstadt, Germany, to compose a vivid picture of the state of the art in the field of ferroelectric liquid crystals.

As you can see from the list of papers presented at the conference (see pages 4 to 14), the scope of topics spanned a wide range from research on fundamental physics to new applications.

An interesting feature, possibly worthy of imitation, were the poster presentations that outnumbered oral presentations 150 to 71. They informed conference participants of the most recent results in the application, chemistry, physics (by far the largest segment), and theory of ferroelectric and antiferroelectric liquid crystals. And what is probably crucial to in-depth exchange of information, the posters were on display during the entire duration of the conference.

As an overture to the conference early Sunday afternoon, four tutorials covering the fundamentals of chemistry, characterization, models, and dielectric investigations were held consecutively and attracted a sizeable contingent of scientists. The postlude, wrapping up the meeting on Friday at 11:00 am, was a panel discussion on the status and future of display technologies based on ferroelectric liquid crystals, moderated by Professor D.M. Walba.

The social events connected with the conference were also multifaceted, such as sightseeing tours to historical places (Heidelberg with its famous castle, the medieval monastery in Lorsch, the Romanesque cathedral of Speyer) and visits to the European Meteorological Satellite Center, the European Space Agency, and the Society for Heavy Ion Research.

Kudos to Professor Wolfgang Haase and his helpers for not only organizing a highly informative and smoothly running meeting but also providing for our readers the conference report and list of oral and poster presentations in such a timely fashion.

Rudolf Panholzer
Editor-in-Chief

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The *Ferroelectricity Newsletter* is published quarterly by the Naval Postgraduate School, Space Systems Academic Group, Monterey, California, with the support of the Office of Naval Research (ONR).

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CONFERENCE REPORT

7TH INTERNATIONAL CONFERENCE ON FERROELECTRIC LIQUID CRYSTALS (FLC 99)

The International Conference on Ferroelectric Liquid Crystals is a series of biannual meetings, first held at Arcachon, France, in 1985. The seventh meeting of the conference was held this year from 29 August to 3 September at the Darmstadt University of Technology, Germany.

It was organized by the Condensed Matter Group of the Institute of Physical Chemistry with the support of members of the Institute of Applied Physics and chaired by Professor W. Haase.

The meeting was attended by about 250 scientists from academia as well as industry, coming from 28 different countries. All in all, the presentations gave an excellent overview of the current state of ferroelectric liquid crystal research, ranging from fundamental physics to novel applications at a high scientific level.

Scientific Program

General topics of the conference were the physics, chemistry, and applications of ferroelectric and antiferroelectric liquid crystals, which were discovered in 1975 and 1989, respectively. These are exhibited by tilted smectic phases, usually comprised of chiral-molecules, and have promising advantages over today's nematic liquid crystal displays (LCD) as there are strongly increased switching speed and excellent contrast.

Technological problems involving the generation of grey scales and mechanical stability of Ferroelectric Liquid Crystal Displays (FLCD) seem to have been solved as evidenced by several prototype demonstrations from different companies. These demonstrations showed outstanding qualities with respect to viewing angle, contrast, brilliance of color, and image stability. Switching properties of FLCs in the microsecond range also allow for nondisplay applications as fast optical switches and shutters, electrically addressed light modulators or dynamic holography.

Oral Presentations

The 71 oral presentations were organized in several groups such as physics, chemistry, theory, and applica-

tions of ferroelectric liquid crystals, new effects, structures and phases, banana-shaped FLCs, TGB phases and lyotropics, elastomers, gels, and polymers.

Microsymposia

Specialized presentations were given in three parallel held microsymposia on flexoelectric polarization, special relaxation processes, and nondisplay applications of ferroelectric and antiferroelectric liquid crystals.

Scientific Discussions

Scientific discussions were strongly focused on the origin of ferroelectricity, especially the occurrence of ferro- and antiferroelectricity in achiral phases as well as thresholdless switching in antiferroelectrics, the so-called V-shaped switching.

Prototype demonstrations from different companies showed outstanding qualities with respect to viewing angle, contrast, brilliance of color, and image stability.

Poster Sessions

The scientific program was rounded out by more than 150 posters, on display during the entire time of the conference, presenting most recent results.

Tutorial Sessions

Four tutorial sessions, held in the afternoon of Sunday, 29 August, were very well attended. The topics were:

- Chemistry of ferroelectric and antiferroelectric liquid crystals, given by J. W. Goodby
- Characterization of ferroelectric liquid crystals by different physical methods, given by H. Takezoe
- Models for ferroelectric and antiferroelectric liquid crystals, given by B. Zeks
- Dielectric investigations on ferroelectric and antiferroelectric liquid crystals, given by S.

Wróbel.

The conference was concluded by a panel discussion on

CONFERENCE REPORT

the status and future of display technologies based on ferroelectric liquid crystals.

The strong interest of industry in the 7th International Conference on Ferroelectric Liquid Crystals was not only documented by the demonstrations and exhibitions of display applications and related devices, but also by the financial support and sponsoring of the meeting by academia and industry. The engagement of the Deutsche Forschungsgemeinschaft (German Science Foundation), the Fond der Chemischen Industrie (Foundation of the Chemical Industry), the Hessische Technologiestiftung (Hessen Foundation for Technology), the city of Darmstadt, and the Darmstadt University of Technology, among many others, is gratefully acknowledged.

Social Program

Besides the scientific program, conference attendees were invited to participate in a number of social events such as the conference excursion, offering a sight-seeing tour through Heidelberg, including a visit of the famous castle; or alternatively, a visit of the medieval monastery in Lorsch and the cathedral of Speyer; or visits to EUMETSAT (European Meteorological Satellite Center), ESOC (European Space Agency), and GSI (Gesellschaft für Schwerionenforschung – Society for Heavy Ion Research); as well a city tour of Darmstadt.

Seventy-one oral presentations were organized in several groups such as physics, chemistry, theory, and applications of ferroelectric liquid crystals, new effects, structures and phases, banana-shaped FLCs, TGB phases and lyotropics, elastomers, gels, and polymers.

All in all, the meeting was well received by its participants.

The next FLC conference will be held in 2001 in Washington, DC, USA.

Professor Dr. Wolfgang Haase
Dozent Dr. Ingo Dierking
Technische Universität Darmstadt
Institut für Physikalische Chemie
Darmstadt, Germany

Ferroelectricity Newsletter

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FLC 99 PAPERS

7TH INTERNATIONAL CONFERENCE ON FERROELECTRIC LIQUID CRYSTALS (FLC 99)

The Seventh International Conference on Ferroelectric Liquid Crystals took place from 29 August to 3 September 1999 at the Darmstadt University of Technology in Germany. The following is a list of topics and authors of the oral and poster presentations given at the conference. The proceedings of the conference will be published in special volumes of **Ferroelectrics**.

TUTORIALS

Chemistry of ferroelectric and antiferroelectric liquid crystals

J. W. Goodby

Characterization of ferroelectric liquid crystals by different physical methods

H. Takezoe

Models for ferroelectric and antiferroelectric liquid crystals

B. Zeks

Dielectric investigations on ferroelectric and antiferroelectric liquid crystals

S. Wróbel

**Microsymposium I:
LONGITUDINAL AND
FLEXOELECTRIC
POLARIZATION**

Spontaneous symmetry breaking leading to splay domains and longitudinal ferroelectricity in achiral freely suspended liquid crystal films

Pang, J., Link, D.R., Jiang, Q., MacLennan, J.E., Clark, N.A.

Longitudinal and transverse ferroelectric polarization in thin chiral and achiral smectic films

Andreeva, P.O., Dolganov, V.K., Gors, C., Fouret, R., Kats, E.I.

Competition between ferroelectric and flexoelectric polarization in

freely suspended smectic films

Schlauf, D., Bahr, Ch., Dolganov, V.K., Goodby, J. W.

Large tilt changes as origin of flexoelectrically induced polarization within a discrete phenomenological model of polar smectic liquid crystals

Cepic, M., Rovöek, B., Zekö, B.

Longitudinal polarization in freely suspended liquid crystal films.

McLennan, J.E., Link, D.R., Clark, N.A.

**Microsymposium II:
SPECIAL RELAXATION
PROCESSES IN FLCS
AND AFLCS**

Dielectric spectroscopy study of the transition into the hexatic phase in chiral smectics

Glogarov, M., Pocięcha, D., Gorecka, E., Rychetsk, I., Mieczkowski, J.

Low frequency relaxations in surface stabilized ferroelectric liquid crystals: Tikhonov regularization analysis

Wang, J.-M., Kim, J.-J.

Nonlinear dielectric relaxation spectroscopy of ferroelectric liquid crystals in the Sm C* phase

Kimura, Y., Hayakawa, R.

Determination of biaxial permittivities and elastic constants

of ferroelectric liquid crystals under applied DC field

Brown, C.V., Jones, J.C.

Antiferroelectric liquid crystals studied by complementary methods

Fafara, A., Marzec, M., Haase, W., Wróbel, S., Kilian, D., Godlewska, M., Czuprynski, K., Dabrowski, R.

The relaxation phenomena in antiferroelectric liquid crystals

Panarin, Yu.P., Kalinovskaya, O.E., Vij, J.K

**Microsymposium III:
NONDISPLAY APPLICATIONS OF FLCS**

FLCs used for polarization mode dispersion compensation in optical 10-Gb/s transmission system

Hinz, S., Sandel, D., Yoshida-Dierhoff, M., Mirvoda, V., Noe, R., Weyrauch, T., Haase, W.

Electrooptic switching dynamics of FLCs in a planar waveguide for integrated optics

Scalia, G., Hermann, D.S., Abbate, G., Lindgren, M.

Beam deflector using double-refraction in ferroelectric liquid crystal waveguides

Gros, E., Dupont, L.

High frequency and high voltage mode of deformed helix ferroelectric liquid crystals in a broad temperature range

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Pozhidaev, E.P., Pikin, S.A., Ganzke, D., Shevtchenko, S., Haase, W.

Reflective FLC OASLMs with dielectric mirrors

Onokhov, A.P., Beresnev, L.A., Isaev, M.V., Feoktistov, N.A., Konshina, E.A., Chaika, A.N., Ivanova, N.L.

2D random addressed liquid crystal spatial light modulators for intracavity laser beam steering

Soms, L., Beresnev, L.A., Isaev, M., Kornev, A., Onokhov, A., Pokrovskiy, V., Stoupanikov, V.

Liquid crystal devices as holographic elements for polychrome correction of telescope lens distortions

Berenberg, V.A., Leshchev, A.A., Vasil'ev, M.V., Venediktov, V.Yu., Haase, W., Onokhov, A.P., Beresnev, L.A.

GENERAL

Fluid biaxial banana phases: Applications from symmetry considerations

Cladis, P.E., Pleiner, H., Brand, H.R.

Deuteron NMR of ferroelectric and antiferroelectric liquid crystals

Blin, R., Zalar, B., Gregorovi, A., Simsi, M., Zidanaek, A., Neubert, M.

NEW EFFECTS

Ferroelectric liquid crystals induced by atropisomeric dopants: Probing the origin of polarization amplification in phenylpyrimidine hosts

Vizitiu, D., Lazar, C., Lemieux, R.P.

Photo-flexoelectric and photo-ferroelectric effects caused by banana-shape photo-isomers in nematic and ferroelectric liquid crystals

Blinov, L.M., Kozlovsky, M.V., Ozaki, M., Yoshino, K., Haase, W.

Photo-aligned orientation layers for ferroelectric LCDs

Fünfschilling, J., Stadler, M., Schadt, M.

CHEMISTRY

Liquid crystals with fluorinated terminal chains and antiferroelectric properties

Dabrowski, R.

The synthesis and properties of host materials with fluoro substituents in the core and in a terminal chain for high dielectric biaxiality FLC mixtures

Goodby, J.W., Hird, M., Jones, J.C., Lewis, R.A., Sage, I.C., Toyne, K.

Synthesis of a series of novel mesogen-functionalized dendritic macromolecules showing ferroelectricity

Busson, P., Örtengren, J., Gedde, U.W., Hult, A.

New antiferroelectric achiral mesogenic mixtures of polymer-monomers and their pyroelectric characterization

Soto Bustamante, E.A., Yablonskii, S.V., Weyrauch, T.

Ferroelectric steroidal liquid crystals

based on fluorocarbon chains
Shen, Y., Chen, H., Wen, J.

LYOTROPICS, ELASTOMERS, GELS, POLYMERS

Polar switching in discotic lyomesophases

Heppke, G., Katz, T., Krüerke, D., Sawade, H.

Organosiloxanes: A new route to control ferroelectricity and antiferroelectricity in liquid crystals using the same mesogen

Coles, H.J.

Fast switching by electrically commanded surfaces (ECS)

Komitov, L., Lagerwall, S.T., Stebler, B., Demus, D.

Ferroelectric liquid crystalline elastomers: From the analysis of the molecular dynamics to the design of nanomachines

Kremer, F., Brodowsky, H.M., Skupin, H., Gebhard, E., Zentel, R., Stein, R., Finkelmann, H.

Antiferroelectric liquid crystal gels
de la Fuente, M.R., Martin, E., Perez Jubindo, M.A., Artal, C., Ros, B., Serrano, J.L.

Light modulation characteristics of single-polarizer PDFLC cells

Zyryanov, V.A., Smorgon, S.L., Barannik, A.V., Pozhidaev, E.P., Andreev, A.L., Kompanets, I.N., Haase, W., Weyrauch, T.

BANANA-SHAPED FLCs

Molecular design and mesomorphic

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properties of several new achiral banana-shaped series

*Bedel, J.P., Achard, M.F.,
Laguerre, M., Rouillon, J.C.,
Marcerou, J.P., Nguyen, H.T.*

A stable ferroelectric smectic C phase composed of racemic molecules

*Walba, D.M., Körblova, E.,
Shao, R., Maclenan, J.E., Link,
D.R., Clark, N.A.*

Novel antiferroelectric banana-shaped liquid crystals without Schiff's base units

*Shen, D., Tschierske, C., Diele,
S., Wirth, I.*

Spontaneous formation of double-twisted helix in a banana-shaped liquid crystal

*Chien, L.-C., Lee, C.-K., Bai, F.,
Li, Y., Cheng, S.Z.D., Petschek,
R.*

Nonlinear boomerang-shaped liquid crystals derived from 2,5-bis(p-hydroxyphenyl)-1,3,4-oxadiazole

Samulski, E.T., Dingemans, T. J.

Conformational transitions of smectic phases formed by achiral bent-core molecules

*Jakli, A., Lischka, Ch., Weissflog,
W., Pelzl, G., Rauch, S., Heppke,
G.*

Antiferroelectric properties and helical superstructures of mesophases formed by bent molecules

*Pelzl, G., Diele, S., Wirth, I.,
Weissflog, W., Lischka, Ch.,
Kovalenko, L., Kresse, H.,
Schmalfuss, H., Dehne, H.,
Grande, S., Jakli, A.*

Evidence of columnar structure in compounds composed of banana-shaped molecules

*Sadashiva, B.K., Raghunathan,
V.A.*

STRUCTURES, PHASES

Structure of chiral smectic-C mesophases revealed by polarization-analyzed resonant X-ray scattering

*Mach, P., Pindak, R., Levelut, A.-
M., Barois, P., Nguyen, H.T.,
Baltes, H., Hird, M., Toyne, K.,
Seed, A., Goodby, J.W., Huang,
C.C., Furenlid, L.*

Theoretical analysis of the resonant X-ray scattering on the ferro-, antiferro- and ferrielectric phases of chiral smectic liquid crystals

*Gorkunov, M., Pikin, S.A.,
Haase, W.*

X-ray reflectivity study of the thin films of chiral and nonchiral antiferroelectrics

*Fera, A., Ostrovskii, B.I., Opitz,
R., de Jeu, W.H.*

Critical behavior of birefringence in the smectic-A phase of chiral smectics

*Muöevic, I., äkarabot, M.,
Kocevar, K., Heppke, G., Blinc,
R.*

TGB-PHASES

Experimental studies on the undulated twist grain boundary C* liquid crystal

*Parmod, P.A., Pratibha, R.,
Madhusadana, N.V.*

Experimental investigations and a

tentative model of a new TGBc mesophase

*Ribeiro, A.C., Barois, Ph.,
Galerne, Y., Guillon, D.*

MATERIALS, TECHNIQUES

FLC materials for active and passive matrix display

*Nonaka, T., Li, J., Ogawa, A.,
Hornung, B., Schmidt, W.,
Wingen, R., Dübal, H.-R.*

FLC materials optimized for high resolution magnified view and projection applications

*Wand, M., Thurmes, W., Vohra,
R.*

Printed FLCs on plastic substrates

*Frey, V., Randler, M., Lueder, E.,
Muecke, M., Brill, J., Frohna, M.*

Thresholdless anti-ferroelectric liquid crystal for reflective microdisplay applications

Lu, M., Yang, K.H., Sanford, J.L.

APPLICATIONS

Production of 2.7inch QVGA FLC SLMs

Kondoh, S.

Some applications of liquid crystal for switching and routing in long haul and high capacity networks

de Bougrenet de la Tocnaye, J.-L.

Phase modulating spatial light modulator using ferroelectric liquid crystals and their application

Crossland, W.A., Wilkinson, T.D.

TFT-LCD using antiferroelectric liquid crystals

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Yoshida, T., Ogura J., Takei M., Wakai H., Aoki H.

FLC Microdisplays

Clark, N., Crandall, C., Handschy, M., Malzbender, R., Meadows, M., Park, C., Xue, J.Z.

Recent progress in passive-matrix FLCs

Koden, M.

PHYSICS

Polarization charge self-interaction in chiral smectic C liquid crystals: High contrast analog response to electric field

N. A. Clark, J. E. Maclennan, P. Rudquist, R.F. Shao, D. Coleman, S. Bardon, D. R. Link, T. Bellini, X. H. Chen, D. M. Walba, J.P.F. Lagerwall, M. Buivydas, F. Gouda, S. T. Lagerwall

The balance between ferroelectric and antiferroelectric order - surface-stabilized thermodynamic phases

Lagerwall, S.T., Rudquist, P.

Electrooptical properties of thresholdless antiferroelectric liquid crystals and their application to high resolution TFT-LCD

Hasegawa, R., Yamaguchi, H., Fukushima, R., Takatoh, K.

Properties of ferroelectric phases determined using dielectric spectroscopy, infrared polarization spectroscopy, pyroelectrics, polarization and electrooptics

Vij, J.K., Panarin, Y., Kocot, A., Goodby, J.W., Nguyen, H.T.

V-shaped switching in smectic-C*-like liquid crystals: Physics and

application

Takezoe, H., Park, B., Nakata, M., Ogasawara, T., Shibahara, S., Ikeda, S., Takanishi, Y., Ishikawa, K.

Dynamics of the smectic layer directional instability

Dierking, I., Komitov, L., Lagerwall, S.T.

Influence of boundary condition of electrical and optical properties of ferroelectric liquid crystals

Yoshino, K., Nanbu, H., Oue, T., Simoda, Y., Nakayama, K., Uto, S., Ozaki, M.

THEORY

Computer simulations of liquid crystal mesophases investigating a generalized molecular asymmetry model

Neal, M.P., Parker, A.J.

Van der Waals pair interactions as an origin of chiral superstructures in achiral polar smectic liquid crystals

Cepic, M., Zeks, B.

Molecular origin of tilt in electroclinic liquid crystals

Spector, M., Heiney, P., Ratna, B., Xu, J., Selinger, R., Selinger, J., Shashidar, R.

Polarity, spontaneous polarization and propagation of tilt in smectics

Vanakaras, A.G., Terzis, A. F., Samulski, E.T., Photinos, D. J.

Molecular origins of anticlinic ordering in tilted smectics

Glaser, M.A., Clark, N.A., Nendel, M., Walba, D.M.

Molecular origin of ferroelectric and

antiferroelectric ordering in chiral and nonchiral smectics

Osipov, M.A.

POSTERS

Invited Contribution

V-shaped switching due to frustolectricity in antiferroelectric liquid crystals

Fukuda, A.

Application

The effect of substrate surface smoothness on the chevron layer structure of surface-stabilized ferroelectric liquid crystals

Furue, H., Takahashi, T., Kobayashi, S.

Gray levels in FLC based on static threshold

Pauwels, H., Zhang, H.

Phase modulation capability of deformed helix ferroelectric liquid crystals

Weyrauch, T., Beresnev, L.A., Hils, B., Dultz, W., Haase, W.

Liquid crystal confined mode fibre based devices: Technology and potential applications

Le Gall, M., Dupont, L., de Bougrenet de la Tocnaye, J.-L.

Temperature dependence of practical t-V mode FLC materials

Sako, T., Furukawa T., Kaneko, T., Sakaigawa, A., Koden, M.

Towards low birefringent achiral smectic C hosts for new display applications

Meier, J.G., Hird, M., Goodby,

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J.W., Lagerwall, S.T.

Spatial light modulator based on hydrogenated amorphous silicon/deformed helix ferroelectric liquid crystal structure: Influence of dielectric mirror

Vladimirov, F.L., Chaika, A.N., Collings, N.

Continuous gray scale of passively addressed FLC display cells

Pozhidaev, E.P., Andreev, A.L., Kompanets, I.N.

Antiferroelectric liquid crystal display with one polarizer in a reflective configuration

You, D.-H., Lee, J.-H., Lee, S.-D., Park, S.-S.

Truly tristable devices with antiferroelectric V-shape molecule material

Carboni, C., Straw, A., Al-Nadhiri, R.

Asymmetric switching and storage effects in ferroelectric gels and polymers

Kitzerow, H.-S., Röder, T., Strauss, J.

Spontaneous layer reorientation in smectic C liquid crystals

Lymer, K.P., Jones, J.C., Dunn, P.E., Richardson, R.M., Taylor, L.

The physics of tV_{MIN} ferroelectric liquid crystal displays

Jones, J.C., Brown, C.V., Dunn, P.E., Hughes, J.R., Lymer, K.P., Koden, M.

Fast switching electronic mixtures based on a series of chloroester

homologues

Xu, H., Davey, A.B., Wilkinson, T.D., Crossland, R.M.

X-ray studies of needle defects (the stripe texture) in the initial alignment state of high and low pre-tilt SSFLC devices

Dunn, P.E., Jenkins, D.A., Jones J.C., Richardson, R.M.

Main-chain ferroelectric liquid crystal polymers for second order nonlinear optics applications

Walba, D.M., Xiao, L., Shao, R., Clark, N.A., Keller, P.

Effects of phase coexistence on the electrooptic response in the antiferroelectric SmC*_a phase in materials exhibiting thresholdless switching in the smectic C* phase

Rudquist, P., Krüerke, D., Lagerwall, J.P.F., Lagerwall, S.T., Clark, N.A., MacLennan, J.E., Walba, D.M.

Light-controlled electrooptic response in a chiral smectic with sign reversal of the spontaneous or induced polarization

Komitov, L., Ichimura, K.

PTFE alignment of surface-stabilized FLC and AFLC materials

Quintana, X. Otón, J.M., Brunet, M., Lotoux, R.

Addressing waveforms for tristable AFLCs in active matrix displays

Quintana, X., Gayo, J.L., Rodrigo, C., Urruchi, V., Otón, J.M.

Design and application of liquid crystal spatial light modulators in Jenotiks optical signal processing

systems

Bartz, P., Breifelder, S., Gaertner, E., Gussek, P., Loeffler, W., Reichel, F., Seifert, R.

Chemistry

New chiral LC acrylates: Polar ordering in crystalline and smectic phases

Konstantinov, I.I., Yablonskii, S.V., Alexandrov, A.I., Magagnini, P.L.

A novel type of crystalline dimers by linking two banana-shaped mesogens

Dehne, H., Pötter, M., Kleist, M., Reinke, H., Weissflog, W., Diele, S., Pelzl, G., Wirth, I., Grande, S.

Racemic liquid crystals with an anticlinic smectic C structure

Parghi, D.D., Baylis, L., Gleeson, H.F., Kelly, S.M., Goodby, J.W.

Achiral liquid crystals with an anticlinic smectic C structure

Parghi, D.D., Kelly, S.M., Goodby, J.W.

A laterally fluoro-substituted banana-shaped liquid crystal showing antiferroelectricity

Heppke, G., Parghi, D.D., Sawade, H.

New IR, 4R-methan-3-one derivatives as chiral components of induced ferroelectrics

Pivnenko, M.N., Vashchenko, V.V., Petrenko, A.S., Krivoshey, A.I., Kutulya, L.A., Goodby, J.W.

The effect of confinements on phase behavior of some mixtures possess-

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ing smectic C_A phase

*Lapanik, V.A., Muravski, A.A.,
Timofeev, S.N., Yakovenko, S.
Ye., Drzewinski, W., Czuprynski,
K., Dabrowski, R.*

New series of chiral smectic chlori-
nated liquid crystals

*Bubnov, A.M., Hamplová, V.,
Kapar, M., Glogarová, M.,
Vanek, P.*

Cyanohydrone-containing side-chain
ferroelectric liquid crystalline
copolymers

*Chien, L.-C., Walz, A.J.,
Shenouda, I.G.*

Formation of double-twisted helix in
isoregic chiral smectic polyester

*Chien, L.-C., Bai, F., Li, Y.,
Cheng, S.Z.D., Petschek, R.*

Ferroelectric liquid crystalline phase
exhibited by biphenyl resorcyate
and vanillate derivatives

*Shivkumar, B., Sadahiva, B.K.,
Krishnaprasad, S., Shivkumar,
U., Lee, J.C.*

Twist grain boundary A phase in
[R]-[-]-1]methylheptyl-4'-(3"-
chloro-4"-n-alkoxybenzoyloxy)-
biphenyl-4-carboxylates

*Kasthuraiah, N., Sadashiva,
B.K., Nguyen, H.T., Rouillon,
J.C., Isaert, N.*

Influence of the electric field on
phase transition sequences of chiral
smectics

*Sarmento, S., Simeao Carvalho,
P., Carvalho, P.S., Chaves, M.R.,
Nguyen, H.T.*

New synthesis and smectic C phase
formation in liquid crystalline
biphenyls, terphenyls, and

quaterphenyls

*Bezborodov, V.S., Lapanik, V.I.,
Sasnouski, G.M.*

Novel 2',3',3'-trifluoroterphenyls
for high dielectric biaxiality achiral
host mixtures for ferroelectric
display devices

*Goodby, J.W., Gough, N., Hird,
M., Jones, J.C., Minte, V.*

Novel materials possessing a high
smectic C phase stability

Gough, N., Hird, M.

The synthesis and characterization
of a novel antiferroelectric material
possessing a 2,3,4-trifluorophenyl
core

*Goodby, J.W., Gough, N., Hird,
M., Parghi, D.D.*

The synthesis of novel poly-
oxetanes with broad smectic C
phases and an electrooptical study
of the precursor oxetane monomers

*Cowling, S.J., Toyne, K.J.,
Goodby, J.W.*

New ferroelectric liquid crystalline
dendrimers

*Zhu, X., Vinokur, R.A., Boiko,
N.I., Rebrov, E.A., Muzafarov,
A.M., Shibaev, V.P.*

Molecular design, mesomorphic
properties and electrooptic behavior
of new achiral dimesogen series

*Bedel, J.P., Acgard, M.F.,
Laguerre, M., Rouillon, J.C.,
Marcerou, J.P., Nguyen, H.T.*

Synthesis and properties of
perfluoroalkylated bent-core liquid
crystals

*Kovalenko, L., Weissflog, W.,
Lose, D., Diele, S., Pelzl, G.,
Grande, S., Schmalzfuss, H.,*

Kresse, H.

Novel fluorinated ferroelectric and
antiferroelectric organosiloxane
liquid crystals

*Perkins, S.P., Lehmann, P.,
Robinson, W.K., Shoosmith, D.E.,
Coles, H.J.*

Ferroelectric liquid crystal elas-
tomers

*Gebhard, G., Tolksdorf, C.,
Zentel, R.*

Searching for S_C* and S_{CA} phases in
side chain liquid crystalline
polyoxetanes by means of changes
on a flexible spacer between two
mesogens

*del Campo, A., Bello, A., Perez,
E., Benavente, R.*

Frustrated phase condition: A way to
room temperature FLC polymers
with low switching voltage?

*Kozlovsky, M.V., Pozhidaev, E.P.,
Darius M.*

Synthetic routes to ferroelectric
crystal polymers, FLC copoly-
acrylates

*Vargha V., Pozsgay, A.G.,
Valentini, P.*

Physics

Polarization measurements reflecting
the effect of polymer networks on
phase symmetry of a chiral liquid
crystal

*Dierking, I., Osipov, M.A.,
Lagerwall, S.T.*

A synchrotron X-ray study of the
smectic layer directional stability

*Dierking, I., Gülsen, B.,
Lagerwall, S.T. Ober, C.K.*

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Electrooptic and ionic measurements of a novel AFLC mixture

Parghi D.D., Zhang, H., D'have, K., Lewis, R.A., Matuszczyk, M., Pauwels, H., Heppke, G.

On the coexistence of SmC* and SmC_a phases in binary chiral-dopant antiferroelectric mixtures

Parghi, D.D., Lagerwall, J.P.F., Heppke, G.

On the collective or noncollective nature of the lower dielectric mode of antiferroelectric liquid crystals

Lagerwall, J.P.F., Fütterer, T., Moro, D., Heppke, G.

Electrooptic and dielectric properties of new binary antiferroelectric liquid crystal mixtures

Lagerwall, J.P.F., Anderson, G., Matuszczyk, T., Dabrowski, R., Drzewinski, W., Perkowski, P., Raszewski, Z.

Spontaneous polarization and response time of polymer dispersed ferroelectric liquid crystal (PDFLC)

Kundu, S., Roy, S.S., Pal Majumder, T., Roy, S.K.

Studies on the dielectric behavior of ferroelectric liquid crystal material having a TGBA phase

Kundu, S., Pal Majumder, T., Roy, S.K., Darius, M., Haase, W.

Some specific features of V-shape switching in homologous series of 4(1methylheptyloxycarbonyl)phenyl-4'-(fluoroalkanoyloxyalkoxy)-and-4-(fluoroalkoxyalkoxy)biphenyl-4'carboxylates

Kononov, V.A., Muravski, A.A., Yakovenko, S.Ye., Drzewinski,

W., Czuprynski, K., Dabrowski, R.

Raman studies of orientational ordering in MHPOBC

Yakovenko, S.Ye., Minko, A.A., Pelzl, J.

Molecules rigid cores and aliphatic chains rotational viscosity in the smectic C* phase

Pozhidaev, E.P., Shevtchenko, S.A., Andreev, A.L., Kompanets, I.N.

Saturation voltage and elastic energy of polymer dispersed ferroelectric liquid crystal films

Andreev, A.L., Pozhidaev, E.P., Kompanets, I.N., Fedosenkova, T.B., Zyryanov, V.Ya., Smorgon, S.L., Weyrauch, T., Haase, W.

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Polarized FT-IR study on SmC_B* of AFLCs and SmC* of FLCs

Hatano, J., Kubo, M., Hoshino, T., Tatemori, S., Uehara, H., Saito, S., Saito, H., Okabe, E.

SmC_a* domains in SmC_B* phase of antiferroelectric liquid crystals

Tatemori, S., Uehara, H., Hatano, J., Saito, H., Saito, S., Okabe, E.

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Characteristic optical reflection of freely suspended ferroelectric liquid crystal film under an AC electric field

Uto, S., Matsumoto, Y., Oue, T., Ozaki, M., Yoshino, K.

Electronic electrooptic study in photopolymers derived from ferroelectric liquid crystals

Pereda, N., Etxebarria, J., Folcia, C.L., Ortega, J., Artal, C., Ros, M.B., Serrano, J.L.

Traveling polarization walls in smectic C* films

Langer, C., Stannarius, R.

Nonlinear electrooptical study of the ALFC in the vicinity of the SmA-SmC_A* phase transition

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Helix unwinding and field-induced transition in ALFC with the direct SmA-SmC_A* ordering

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Vilfan, M., Copic, M., Musevic, I., Bourny, V., Nguyen, H.T.

Linear and quadratic electrooptic effects in antiferroelectric liquid crystals

Kuczynski, W., Dardas, D., Goc, F., Hoffmann, J.

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Electric-field induced birefringence in a ferroelectric and antiferroelectric liquid crystal

Conradi, M., Kityk, A.V., Skarabot, M., Blinc, R., Musevic, I.

Influence of electric field on freely suspended films of M12/10 ferroelectric liquid crystals with a 2-alkoxypropionate unit studied by ellipsometry

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The lack of selective reflections by TGB structures

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Matsuhashi, N., Kobayashi, H., Okumoto, Y., Akahane, T.

“Thresholdless antiferroelectricity” and second harmonic generation: A comment

Hermann, D.S., Clark, N.A.

Bias effect on dielectric properties of S*C_a phase

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Optical reflectivity and ellipsometry studies of the Sm-C_a* phase

Johnson, P.M., Pankratz, S., Mach, P., Nguyen, H.T., Huang, C.C.

Structure of the chiral smectic C_a phase

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Optic, electrooptic, and dielectric properties of novel antiferroelectric liquid crystal mixtures

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Reflective type FLC optically addressed spatial light modulators with pixelated metal mirror and light-blocking layer

Onokhov, A.P., Konshina, E.A., Feoktistov, N.A., Beresnev, L.A., Haase, W.

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Link, D.R., Chattham, N., Clark, N.A., Kuorblova, E., Walba, D.M.

Electromechanical effects in free standing FLC elastomer (FLCE) films as determined by interferometric measurements

Lehmann, W., Kremer, F.,

Gebhard, E., Zentel, R.

Structure and reorientation dynamics in FLC elastomers (FLCE) as measured by polarized time-resolved FTIR spectroscopy

Skupin, H., Shilov, S.V., Kremer, F., Gebhard, E., Zentel, R.

Twin textures in chiral smectic liquid crystals

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Brodowsky, H.M., Kremer, F., Gebhard, E., Zentel, R.

Microprobe Raman studies of the dynamics of liquid crystals

Clarke, M.J., Meyer, S.C., Coles, H.J.

Tilt angle and optical anisotropy measurement of organosiloxane liquid crystals

Noot, C., Robinson, W.K., Perkins, S.P., Coles, H.J.

Photoferroelectric smectic C* liquid crystal mixtures

Langhoff, A., Gießelmann, F.

Pyroelectric and dielectric properties of siloxane-based liquid crystals

Naciri, J., Crandall, K., Shenoy, D., Shashidhar, R.

V-shaped switching studies by polarized FT-IR measurements

Takahashi, M., Park, B., Nakata, M., Takanishi, Y., Ishikawa, K., Takezoe, H.

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Study of molecular orientation in a smectic liquid crystal showing V-shaped switching 4 x 4 matrix method

Ogasawara, T., Takanishi, Y., Ishikawa, K., Takezoe, H.

Study of the structure of subphases in antiferroelectric liquid crystals by 4 x 4 matrix method

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The degree of the chirality in bent-shaped liquid crystals

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Takanishi, Y., Ishikawa, K., Takezoe, H., Iida, A.

Molecular dynamics in an antiferroelectric liquid crystal MHPOBC as observed by time-resolved infrared spectroscopy

Takahashi, M., Takanishi, Y., Ishikawa, K., Takezoe, H.

Spontaneous optical resolution due

to chirality in a smectic liquid crystalline phase of a racemic diastereomer

Takanishi, Y., Takezoe, H., Kobayashi, I., Suzuki, Y., Yajima, T., Terada, M., Mikami, K.

High frequency dielectric measurements in ferro- and antiferroelectric liquid crystals

Sato, D., Takanishi, Y., Ishikawa, K., Takezoe, H.

Flexoelectric polarization of a nematic mixture containing a bent-shaped dopant

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Directed design of an achiral antiferroelectric smectic phase using H-bonded dimer mesogens

Walba, D.M., Körblová, E., Shao, R., MacLennan, J.E., Link, D.R., Clark, N.A.

Study of LB films based on LC pyroelectrics: Structure and forecasting

Alexandrov, A.I., Dronov, V.M., Konstantinov, I.I., Pashkova, T.V.

An investigation into the director structure in the electroclinic effect at the SMA-SMC phase transition

Beldon, S.M., Elston, S.J., Brown C.V., Beccherelli, R.

Ferroelectric switching of chiral dischotic lyomesophases

Sawade, H., Heppke, G., Krüerke, D., Rudquist, P., Lagerwall, S.T.

Dielectric properties of smectic C* phase with helic twist inversion

Pociecha, D., Szydłowska, J., Glogarová, M., Gorecka, E.

Polarized infrared spectroscopy of a fluoroether smectic C mesogen

Fernsler, J.G., Glaser, M.A., Clark, N.A., Nendel, M.

Transition between antiferroelectric and ferroelectric liquid crystal order at the LC-solid interface

Coleman, D.A., Bardon, S., Radzihovsky, L., Clark, N.A.

Time-resolved investigation of the ferroelectric switching process of a columnar liquid crystal

Shilov, S.V., Müller, M., Krüerke, D., Skupin, H., Heppke, G., Kremer, F.

A comparison of orientational behavior and rotational bias in SmC*, SmC_A* and SmC_γ* of an antiferroelectric crystal studied by FTIR spectroscopy

Jamshidi, M.M., Vij, J.K., Sirgaev, A., Nguyen, H.T.

Investigation of subphases in an antiferroelectric liquid crystal material

Kalinovskaya, O.E., Panarin, Yu.P., Vij, J.K., Parghi, D.D., Hird, M., Goodby, J.W.

The structural transformations with temperature and electric field in antiferroelectric liquid crystals

Panaarin, Yu.P., Kalinovskaya, O.E., Vij, J.K., Parghi, D.D., Hird, M., Goodby, J.W.

On the V-shaped switching in antiferroelectric liquid crystals

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A correlation between surface effect and pitch value of FLC materials by the dielectric method

*Biradar, A.M., Bawa, S.S.,
Chandra, S., Haase, W.*

High temperature antiferroelectric smectic phase composed of banana-shaped achiral molecules

Wróbel, S., Haase, W., Kilian, D., Chien, L.-C., Chong-Kwang, L.

Photoinduced layer switching and anomalous layer dynamics in azo-dye doped antiferroelectric liquid crystals having N*-C* phase sequence

*Ozaki, M., Matsui, T.,
Nayakama, K., Yoshino, K.*

Bistable electrical switching, electrooptic and dielectric studies of highly twisted ferroelectric liquid crystal mixture

*Mukherjee, A., Srivastava, S.L.,
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Ferroelectricity in columnar mesophases of vanadyl complexes

*Kilian, D., Knawby, D.,
Athanasopoulou, M.A., Swager, T.M., Wróbel, S., Haase, W.*

Dielectric modes in antiferroelectric and ferroelectric phases

Kilian, D., Haase, W.

Decoration of solid state ferroelectric domains with the help of ferroelectric liquid crystals

Ivanoc, N.R., Pikin, S.A., Ganzke, D., Weyrauch, T., Haase, W.

Fast switchable electrooptic lenses based on nematic and ferroelectric liquid crystals

*Glöckner, R., Hain, M.,
Stankovic, T., Tschudi, Th.*

Dielectric relaxation and electrooptical study of ALFCs with fluorinated chain

Kocot, A., Wrzalik, R., Ciekak, B., Merkel, K.

Rotational bias of antiferroelectric liquid crystals studied by polarized FTIR spectroscopy

Kocot, A., Wrzalik, R., Ciekak, B., Korlacki, R.

Shape and orientation of the chiral dipole in ferroelectric liquid crystals studied by solid state ¹³C-NMR

Schacht, J., Zugmaier, P.

The pretransitional effect and helix unwinding process in homogeneously aligned antiferroelectric liquid crystals

*Lee, N.-S., Park, G., Lee, J.-H.,
Lee, S.-D.*

The influence of polar surface anchoring on switching in antiferroelectric liquid crystals

Mottram, N.J., Elston, S.J.

Investigation of the apparently thresholdless behavior in the high temperature range of an antiferroelectric liquid crystal mixture

Beccherelli, R., Elston, S.J.

Layer distortions in smectic C* liquid crystals induced by an electric field

Stewart, I.W.

Polarized FTIR spectroscopic study of a high-temperature ferroelectric phase of an antiferroelectric liquid crystal

Sigarev, A.A., Vij, J.K., Panarin, Yu.P., Goodby, J.W.

Memory-free planar anchoring of cholesteric and TGB phases on a solid substrate

*Martinot-Lagarde, P., Stoenescu, D.N., Dozov, I., Nguyen, T.,
Barois, P. Navaille, L., Nobili, M.*

Theory

Phase transitions and phase diagrams in AFLCs: Semi-phenomenological model

*Pikin, S.A., Gorkunov, M.,
Kilian, D., Haase, W.*

Molecular interaction between a pair of some smectic and ferroelectric liquid crystals

*Yayloyan, S.M., Bezhanova, L.S.,
Abrahamyan, E.B.*

Monte Carlo studies of thermodynamic properties of some smectic and ferroelectric liquid crystals

*Yayloyan, S.M., Bezhanova, L.S.,
Abrahamyan, E.B.*

Bistable switching in nematic cells with a ferroelectric liquid crystalline film

Nakagawa, M.

From XY symmetry to Ising symmetry in successive phase transitions of antiferroelectric smectics

Tanaka, S., Yamashita, M.

Ordering of azimuthal angle of molecular tilt - ANNX model with biquadratic interaction

Yamashita, M., Tanaka, S.

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Molecular dynamics study on structure and stability of antiferroelectric smectic materials

Miyazaki, T., Hayashi, H. Yamashita, M.

On the possibility of an enhanced second harmonic generation in chiral smectics under diffraction of the fundamental wave

Belyakov, V.A., Copic, M.

Step-by-step thinning of free-standing smectic A films with the Gennes model of presmectic liquid

Gorodetsky, E.E., Pikina, E.S., Podnecs, V.E.

Smectic C_α phase in free-standing films

Rovsek, B., Cepic, M., Zeks, B.

Switching dynamics in surface stabilized smectic-C chevron cells

Vaupotic, N., Copic, M.

Mode polarization chiral antiferroelectric smectic liquid crystals

Vaupotic, N., Cepic, M., Zeks, B.

Forcefield development and molecular dynamics simulation of the smectic phases of MHPOB

Schmauder, F., Yakovenko, S.Ye., Geiger, A.

Phase transitions in biaxial banana phases

Pleiner, H., Brand, H.R., Cladis, P.E.

Microscopic organization of a smectic C mesogen

Glaser, M.A., Fernsler, J.G., Clark, N.A., Fung, B.M.

A possible phenomenological description of smectic C^* - smectic C^* - smectic C^* - smectic C^* phase sequence

Loginov, E.B., Haase, W.

MRS ANNOUNCES NEW EDITION TO SERIES ON FERROELECTRIC THIN FILMS

The newest volume in a popular series from the Materials Research Society (MRS), *Ferroelectric Thin Films VII*, documents symposium reports from the 1998 MRS Fall Meeting in Boston, MA, and contains 113 papers, 770 pages.

This volume, the seventh in the series, presents the latest technical information on ferroelectric thin films from an international array of academia, government organizations, and industry. Recent results in DRAM and FERAM devices, as well as enhancements in materials performance for these applications are reported. Advances in integration issues are also discussed, including new electrode technologies, annealing procedures, and fabrication methods. The development of ferroelectric thin films for piezoelectric, pyroelectric, and optical applications is reviewed. And improved film fabrication procedures, including chemical vapor deposition and chemical solution deposition, are featured. Topics include: BST and DRAM; integration and electrodes;

bilayered ferroelectrics; Pb-based ferro electrics; fundamental materials properties and superlattices; ferroelectric gate materials and devices, piezoelectric, electrostrictive, pyroelectric, and giant magnetoresistive materials; and ferroelectrics for microwave and optical applications.

Edited by Robert E Jones (Motorola), Robert W. Schwartz (Clemson University), Scott R. Summerfelt (Texas Instruments, Inc.), and In K. Yoo (Samsung Advanced Institute of Technology), *Ferroelectric Thin Films VII* [ISBN 1-55899-447-5] is Volume 541 in the MRS Symposium Proceedings Series and is available in hardcover for \$78.00 (MRS members), \$89.00 (U.S. list), and \$98.00 (Non-U.S. list).

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Correct Website for

WORKSHOP ON FUNDAMENTAL PHYSICS OF FERROELECTRICS

to take place on 13-20 February 2000 in Aspen, Colorado, USA:

The correct website is: <http://www.gl.ciw.edu/GL-Conferences.html>

The email address of Ronald Cohen, organizer, is: cohen@gl.ciw.edu

UPCOMING MEETINGS

**13th IEEE International Micro Electro Mechanical Systems Conference (MEMS-2000)
23 -27 January 2000**

World Convention Center SUMMIT, Miyazaki, Japan

Sponsored by the IEEE Robotics and Automation Society and the Micromachine Center, MEMS-2000 is one of the most exciting meetings focusing on interdisciplinary research topics on micro electro mechanical devices and systems fabricated on the micrometer to millimeter scale. MEMS, which emerged in the 1980s, continues to grow. Sensors and actuators as MEMS key components are likely to break new ground in the next decade. In addition, new products are introduced into the market including optical devices and storage devices. MEMS-2000 provides excellent opportunities to get together for discussing the trend of the future and the status of current MEMS.

Topics**Basic Research**

- Fabrication Technologies: Bulk and surface micromachining; high aspect ratio microstructures; electroplated microstructures; thin films; lithography; new fabrication methods for microparts
- Assembly and Packaging: Bonding; interconnection; preassembly and self-assembly, MEMS-related packaging for commercial use
- Experiments in Microdomain: Fluid dynamics; electrostatic and electromagnetic fields; microoperation of small objects; testing and characterization of mechanical properties of materials; device performance
- Theory and Simulation: Microrobotics; scaling; device physics; field and system modeling; computation
- Design Tools: CAD/CAM for MEMS fabrication and analysis

Application

- Actuators: New actuation principles; microactuators for small-scale machines; concentrated microactuators for large-scale machines
- Sensors: Devices detecting strain, force, pressure, flow, acceleration, position, temperature, chemicals, etc.; sensing systems such as environmental and intelligent sensors
- System Configurations: Distributed microsystems; integration of microsensors and microactuators; interfacing of MEMS with the external world
- Optical Systems: Microoptics; telecommunication use; measurement systems; devices for the generation, modulation, and detection of light
- Fluidic Systems: Pumps; valves; microchannels; mixers; micro total analysis systems
- Data Storage: Disk storage; new concepts for storage
- Medical Engineering: Surgical and electrical devices; patient monitoring
- Scientific Instruments: Switches and relays; microrobots; process monitoring and control devices

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UPCOMING MEETINGS

International Conference on Metallurgical Coatings and Thin Films (ICMCTF-2000)
New Horizons Symposium
10 - 14 April 2000
San Diego, California, USA

The intent of this symposium is to focus on emerging thin film technologies that are relevant to ICMCTF, but are not typically covered. The symposium will highlight new developments in the areas covered by each session with an emphasis on new materials and processes, novel applications and current challenges and opportunities. One of the goals of this symposium is to provide a forum for participants in industrial and academic environments for discussing the impact and applications of these emerging thin film technologies or their respective areas. An evening poster session will be held in conjunction with the oral sessions.

Sessions

H1. Magnetic Materials

Session Chair: Steve Bozeman (Seagate)

Recording Heads: The 60 percent compound annual growth rate in storage devices continues to drive the need to develop improved thin film magnetic materials. Papers will describe progress in this area, including thin films for magnetic media and recording heads, applications of CMR/GMR structures, magnetic memories, MMIC devices, thin film magnets, and ferrites.

H2. Novel Materials for MEMS

Session Chairs: Dave Nagel (George Washington University) and John Givens (Thomas West, Inc.)

The design and fabrication of MEMS devices is a multi-billion dollar industry which is expected to double every two to four years. The combination of thin films with MEMS structures offers great opportunities for novel applications and has just begun to be explored. Papers will deal with the development and applications of novel thin film materials combined with MEMS structures, including MEMS for sensor and biomedical applications, RF MEMS technologies and issues related to interconnects and packaging of MEMS devices.

H3. Ferroelectric DRAMs

Session Chair: Jim Horwitz (U.S. Naval Research Laboratory)

Thin films of ferroelectric materials have provided numerous novel applications in varied areas such as data storage and high performance RF devices. This session includes topics ranging from novel deposition techniques for ferroelectric thin films to their numerous applications. Papers will deal in the areas of ferroelectric nonvolatile random-access memories, ferroelectric based sensors, frequency agile microwave devices, and piezoelectric actuators.

H4. Novel Materials and Processes

This session will address novel and emerging topics in thin film technologies outside the areas covered by the other sessions on this symposium, such as nonoclusters, sensor coatings, polymer coatings, and novel thin film deposition techniques and processes.

Contact

More information about the conference can be found at the ICMCTF 2000 website:

<http://www.vacuum.org/icmctf/icmctf.html>

UPCOMING MEETINGS

4th International Symposium on Micro Total Analysis Systems (μ TAS 2000)**14 - 18 May 2000****University of Twente in Enschede, The Netherlands**

At μ TAS 2000, research and development of new technologies, methods and devices, systems aspects and application areas such as clinical diagnostics, point of care testing, drug discovery and process control will be presented. Special attention will be paid to analytical chemical as well as micro- and nanofluidics aspects. The meeting will use a single session workshop format, interspersed with poster sessions. A small-scale, noncommercial exhibition will be organized for institutions and companies interested to present their results in μ TAS R&D.

Topics

- Physics of Microfluidics: Fundamentals, simulation, modeling; characterization techniques; fluidic components
- Microfabrication Technology: Plastic technology; new silicon techniques, new materials
- Analytical Chemical Aspects: New analytical methods; fundamentals
- Detectors, Sensors, Arrays: Optical sensing; electrochemical sensing; sensor arrays
- Applications: Diagnostics, drug screening; cell analysis; environmental/process monitoring; combi-chem
- Systems Aspects: System integration, system concepts
- DNA Analysis: PCR/CE arrays; micromachined tools; optical techniques

Contact

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Website

<http://www.el.utwente.nl/mesa/mutas2000>

3rd SIAM Conference on Mathematical Aspects of Materials Science**21 - 24 May 2000****Philadelphia, Pennsylvania, USA**

The conference gathers an interdisciplinary community of scientists working on mathematical and computational aspects of materials science. The sessions will provide a forum for development on:

- Analysis of moving interfaces
- Macroscopic consequences of microstructure
- Defects in materials

A second goal is to highlight recent accomplishments in:

- Materials design, synthesis and processing
- Nanoscale structures
- Growth and morphology of thin films
- Electromagnetic materials

A third goal is to identify promising directions for new developments of a mathematical or computational nature in areas such as:

- Multiscale analysis of materials: From atomic to continuum
- Nanoscale structure
- Liquid crystals, glasses and polymers
- Soft materials and biomaterials

UPCOMING MEETINGS

Materials science is an interdisciplinary subject. The conference welcomes scientists and mathematicians from a broad range of backgrounds, including for example, mechanics, physics, engineering, mathematical analysis, computational science, and biology.

Contact

SIAM, 3600 University City Science Center, Philadelphia, PA 19104-2688; phone: +215-382-9800;
fax: +215-386-7999; email: meetings@siam.org

Website

<http://www.siam.org/meetings/ms00>

**8th International Meeting on Chemical Sensors
3 - 5 July 2000
Basel, Switzerland**

The meeting is an interdisciplinary forum on all aspects – physics, materials science, chemistry, development and applications – of chemical sensors.

Topics

- Sensing principles and mechanisms
- Novel approaches to sensing
- Signal processing
- Electromechanical devices
- Acoustic sensors
- Humidity sensors
- Environmental monitoring
- New materials development
- Sensor fabrication technology
- Optical devices
- Biosensors
- Gas sensors
- Analytical microsystems
- Process control sensing

Proceedings

Authors are invited to submit full papers for inclusion in a special issue of the Elsevier journal *Sensors and Actuators B: Chemicals* which will be published after the conference. Acceptance of papers is subject to peer review.

Contact

IMCS 2000 Conference Secretariat, Phillipa Orme, 12 Church Street, West Hanney, Nr. Wantage, Oxon, OX12 0LN, UK
phone/fax: +44-1235-868-811; email: p.orme@dial.pipex.com

Website

<http://www.elsevier.nl/locate/imcs2000>

Volume 221, Numbers 1-4 (1999) and Volume 222, Numbers 1-4 (1999) of *Ferroelectrics*
contain the proceedings of the

Fifth International Symposium on Ferroic Domains and Mesoscopic Structures (ISFD-5)

held at Pennsylvania State University, Pennsylvania, USA
6 -10 April 1998

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Upcoming Meetings

Ferroelectrics Workshop in Puerto Rico, Guánica, Puerto Rico	13-14 May 99	No.1, p.22
7th International Conference on Ferroelectric Liquid Crystals, Darmstadt, Germany	29 Aug-3 Sep 99	No.1, p.23
European Conference on Macromolecular Physics, Potsdam, Germany	30 Sep-2 Oct 99	No.1, p.23
15th Russian Conference on Physics of Ferroelectrics, Azov, Russia	14-18 Sep 99	No.2, p.17
Piezotechnique 99, Azov, Russia	14-18 Sep 99	No.2, p.18
Materials Research Society 1999 Fall Meeting, Boston, Massachusetts, USA	29 Nov-3 Dec 99	No.2, p.19
SPIE's 1999 Symposium and Education Program on Microelectronic Manufacturing, Santa Clara, California, USA	19-23 Sep 99	No.3, p.11
Workshop on Fundamental Physics of Ferroelectrics, Aspen, Colorado, USA	13-20 Feb 00	No.3, p.12
12 International Symposium on Integrated Ferroelectrics, Aachen, Germany	12-15 Mar 00	No.3, p.13
5th International Conference on Organic Nonlinear Optics, Davos, Switzerland	12-16 Mar 00	No.3, p.14
Materials Research Society 2000 Spring Meeting, San Francisco, California, USA	24-28 Apr 00	No.3, p.15
5th European Conference on the Application of Polar Dielectrics, Jurmala, Latvia	27-30 Aug 00	No.3, p.17
Electroceramics VII, Portoroz, Slovenia	3-6 Sep 00	No.3, p.18
3rd Asian Meeting on Ferroelectrics, Hong Kong, China	12-15 Dec 00	No.3, p.19
13th IEEE International Micro Electro Mechanical Systems Conference, Miyazaki, Japan	23-27 Jan 00	No.4, p.15
International Conference on Metallurgical Coatings and Thin Films, New Horizons Symposium, San Diego, California, USA	10-14 Apr 00	No.4, p.16
4th International Symposium on Micro Total Analysis Systems, Enschede, The Netherlands	14-18 May 00	No.4, p.17
3rd SIAM Conference on Mathematical Aspects of Materials Science, Philadelphia, Pennsylvania, USA	21-24 May 00	No.4, p.17
8th international Meeting on Chemical Sensors, Basel, Switzerland	3-5 Jul 00	No.4, p.18

Conference Reports

7th International Conference on Ferroelectric Liquid Crystals, Darmstadt, Germany	29 Aug-3 Sep 99	No.4, p.2
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2nd Asian Meeting on Ferroelectrics International (AMF-2), Singapore	7-11 Dec 98	No.1, p.4
11th International Symposium on Integrated Ferroelectrics (ISIF-99), Colorado Springs, Colorado, USA	7-10 Mar 99	No.2, p.2
6th Japan-CIS/Baltic Symposium on Ferroelectricity (JCBSF-6), Noda, Japan	22-25 Mar 98	No.3, p.2
7th Symposium on Ferroelectric Semiconductors (IMFS-7), Rostov-on-Don, Russia	25-27 Sep 96	No.3, p.8
7th International Conference on Ferroelectric Liquid Crystals (FLC-99), Darmstadt, Germany	29 Aug-3 Sep 99	No.4, p.4

Features, Special Reports

Prof. L. Eric Cross, "Changing Conditions for Younger Scientists Entering the Ferroelectric Field"	No. 1, p.2
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Versailles Project on Advanced Materials and Standards	No. 2, p.14

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CALENDAR OF EVENTS 1999

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|--------------------|--|
| Nov. 29-
Dec. 3 | <ul style="list-style-type: none"> • MRS 1999 Fall Meeting, Boston, Massachusetts, USA (see <i>Ferroelectricity Newsletter</i>, Vol. 7, No. 2, p. 19) |
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EVENTS IN 2000

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|-----------|---|
| Jan 23-27 | <ul style="list-style-type: none"> • 13th IEEE International Micro Electro Mechanical Systems Conference (MEMS-2000), Miyazaki, Japan (see p. 15) |
| Feb 13-20 | <ul style="list-style-type: none"> • Workshop on Fundamental Physics of Ferroelectrics, Aspen, Colorado, USA, (see <i>Ferroelectricity Newsletter</i>, Vol. 7, No. 3, p. 12) |
| Mar 12-15 | <ul style="list-style-type: none"> • 12th International Symposium on Integrated Ferroelectrics (ISIF 2000), Aachen, Germany (see <i>Ferroelectricity Newsletter</i>, Vol. 7, No. 3, p. 13) |
| Mar 12-16 | <ul style="list-style-type: none"> • 5th International Conference on Organic Nonlinear Optics (ICONO'5), Davos, Switzerland (see <i>Ferroelectricity Newsletter</i>, Vol. 7, No. 3, p. 14) |
| Apr 10-14 | <ul style="list-style-type: none"> • International Conference on Metallurgical Coatings and Thin Films (ICMCTF-2000), New Horizons Symposium, San Diego, California, USA (see p. 16) |
| Apr 12-14 | <ul style="list-style-type: none"> • Symposium Ferroelectrics UK 2000, Cirencester, UK (Website: http://www.eeie.sbu.ac.uk/congress2000) |
| Apr 24-28 | <ul style="list-style-type: none"> • MRS 2000 Spring Meeting, San Francisco, California, USA (see <i>Ferroelectricity Newsletter</i>, Vol. 7, No. 3, p. 15) |
| May 14-18 | <ul style="list-style-type: none"> • 4th International Symposium on Micro Total Analysis Systems (μTAS 2000), Enschede, The Netherlands, (see p. 17) |
| May 21-24 | <ul style="list-style-type: none"> • 3rd SIAM Conference on Mathematical Aspects of Materials Science, Philadelphia, Pennsylvania, USA (see p. 17) |
| Jul 3-5 | <ul style="list-style-type: none"> • 8th International Meeting on Chemical Sensors, Basel, Switzerland (see p.18) |
| Aug 27-30 | <ul style="list-style-type: none"> • 5th European Conference on the Application of Polar Dielectrics (ECAPD-5), Jurmala, Latvia (see <i>Ferroelectricity Newsletter</i>, Vol. 7, No. 3, p. 17) |
| Sep 3-6 | <ul style="list-style-type: none"> • Electroceramics VII, Portoroz, Slovenia (see <i>Ferroelectricity Newsletter</i>, Vol. 7, No. 3, p. 18) |
| Dec 12-15 | <ul style="list-style-type: none"> • 3rd Asian Meeting on Ferroelectrics (AMF-3), Hong Kong, China (see <i>Ferroelectricity Newsletter</i>, Vol. 7, No. 3, p. 19) |