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Final Report  
F49620-01-1-0418  
"Liquid Crystalline Symposium"  
PI: Patrick T. Mather, University of Connecticut  
14 August 2003

I. At the Fall 2001 MRS Meeting, the symposium "CC: Advanced in Liquid Crystalline Materials and Technologies" was held under partial sponsorship of AFOSR under contract F49620-01-1-0418 with Dr. Charles Lee as program manager. Sponsorship allowed participation (via registration payments) of the invited speakers whose names, affiliations, and presentation titles are listed below. In section II of this report is included the preface to the proceedings volume while Section III shows the book cover.

- (a) Prof. J. Kornfield, California Institute of Technology, "MEASUREMENT OF A TUMBLING PARAMETER LESS THAN NEGATIVE ONE IN A CALAMITIC LIQUID CRYSTAL SOLUTION"
- (b) Prof. W. Burghardt, Northwestern University, "X-RAY SCATTERING STUDIES OF MOLECULAR ORIENTATION IN NEMATIC POLYMERS AND SURFACTANTS IN TRANSIENT SHEAR FLOWS"
- (c) Peter Palffy-Muhoray, Kent State University, "TUNABLE MIRRORLESS LASING IN CHOLESTERIC LIQUID CRYSTALLINE ELASTOMERS"

II. MRS Proceedings Volume 709, "Symposium CC: Advances in Liquid Crystalline Materials and Techniques," Ed. P.T. Mather, D.J. Broer, T.J. Bunning, D.M. Walba, R. Zentel (2002).

Advances in Liquid Crystalline Materials and Technologies  
Proceedings Preface

P.T. Mather, D.J. Broer, T.J. Bunning, D.M. Walba, R. Zentel, *Editors*

Research in the physics, chemistry, and technology of liquid crystals (LCs) is alive and well, as demonstrated by the vitality of this recent LC symposium and the accompanying volume. While symposia focused on liquid crystal (LC) materials science have a strong tradition of excellence at MRS meetings, organizers and attendees of the Fall 2001 MRS Symposium CC agreed that this was an especially excellent conference. Talks spanned a very diverse set of LC-related topics, ranging from reports on the latest hot research areas, including flexoelectrooptics, V-shaped switching, chiral discotics, and banana phases, to the most recent developments in LC-polymer composite systems and LC gels.

The LC-polymer connection has been an active research area for many years, but based upon results presented at this symposium one may conclude that the field is seeing an impressive acceleration in the pace of innovation. Presentations included description of tunable lasers based upon dye-doped cholesteric LC elastomers, where stretching of the elastomer films changes the wavelength of the emitted laser light. This phenomenon takes advantage of the spontaneously formed 1D photonic bandgap present in chiral LCs, which is similar in its optical properties to

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the famous Scarab beetle shells, known for beautiful selective reflection colors. Other presentations at the symposium were reminiscent of the scarabs. By careful tuning and control of photopolymerization materials and conditions, thin films capable of nearly magical behavior can be created.

Other highlights included descriptions of the remarkable control of crystal and polymer morphology achievable using LC templates, interesting LC anchoring behavior observed on polyacrylates grown from LC/monomer mixtures, progress in fabrication of switchable gratings in LC-polymer composites, and demonstration of LC alignment using specially designed polymers dissolved in the LC sample itself, with no surface treatment required. Much of this work has potential applicability ranging from sophisticated photonics and beam-steering to creation of "electronic paper."

The symposium organizers would like to express our heartfelt thanks for financial support provided by the Air Force Research Laboratory and Air Force Office of Scientific Research.

### III. Proceedings Volume Cover and Preface

*Note:* Preface Text is same as above in Section II.

The image shows the front cover of a book on the left and its preface on the right. The cover is black with white text. At the top, it says 'Volume 709'. The main title is 'Advances in Liquid Crystalline Materials and Technologies'. Below the title, the editors' names are listed: Patrick T. Mather, Dirk J. Broer, Timothy J. Bunning, David M. Walba, and Rudolf Zentel. The preface page is white with black text. It starts with the word 'PREFACE' in all caps. The text describes the symposium, the topics discussed, and the organizers' thanks. It also lists the editors' names and the date 'March 2002'. At the bottom of the preface page, the number 'xi' is printed.

**Volume 709**

**Advances in Liquid Crystalline  
Materials and Technologies**

**EDITORS**  
Patrick T. Mather  
Dirk J. Broer  
Timothy J. Bunning  
David M. Walba  
Rudolf Zentel

**PREFACE**

Research in the physics, chemistry, and technology of liquid crystals (LCs) is alive and well, as demonstrated by the vitality of this recent LC symposium and the accompanying volume. While symposia focused on liquid crystal (LC) materials science have a strong tradition of excellence at MRS meetings, organizers and attendees of Symposium CC, "Advances in Liquid Crystalline Materials and Technologies," held November 26-29 at the 2001 MRS Fall Meeting in Boston, Massachusetts, agreed that this was an especially excellent conference. Talks spanned a very diverse set of LC-related topics, ranging from reports on the latest hot research areas, including flexoelectrooptics, V-shaped switching, chiral disclotics, and banana phases, to the most recent developments in LC-polymer composite systems and LC gels.

The LC-polymer connection has been an active research area for many years, but based upon results presented at this symposium one may conclude that the field is seeing an impressive acceleration in the pace of innovation. Presentations included a description of tunable lasers based upon dye-doped cholesteric LC elastomers, where stretching of the elastomer films changes the wavelength of the emitted laser light. This phenomenon takes advantage of the spontaneously formed 1D photonic bandgap present in chiral LCs, which is similar in its optical properties to the famous Scarab beetle shells, known for beautiful selective reflection colors. Other presentations at the symposium were reminiscent of the scarabs. By careful tuning and control of photopolymerization materials and conditions, thin films capable of nearly magical behavior can be created.

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xi