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Advances in Liquid Crystalline Materials and Technologies

Editors: Patrick T. Mather, Dirk J. Broer, Timothy J. Bunning, David M. Walba and Rudolf Zentel

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Advances in Liquid Crystalline Materials and Technologies

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EDITORS:

Patrick T. Mather

University of Connecticut
Storrs, Connecticut, U.S.A.

Dirk J. Broer

Philips Research
Eindhoven, The Netherlands

Timothy J. Bunning

Air Force Research Lab, AFRL/MLPJ
Wright Patterson AFB, Ohio, U.S.A.

David M. Walba

University of Colorado
Boulder, Colorado, U.S.A.

Rudolf Zentel

Universität Mainz
Mainz, Germany



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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 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 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.

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.

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

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