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Director's Report, 2001-2002

The Liquid Crystal Institute marked the end of an era in 2002. The Science and Technology Center for Advanced Liquid Crystalline Optical Materials (ALCOM) reached the end of its 11-year grant from the National Science Foundation. The ALCOM Center is a collaboration of three northeast Ohio universities, Kent State University, Case Western Reserve University and the University of Akron. This collaboration combines the extensive liquid crystal and polymer expertise at the member universities.

From these 11 years of support came many accomplishments including liquid crystal start-up companies, an industrial partnership program that has maintained annual membership of over 30 companies, education outreach that has reached hundreds of students and teachers in Northeast Ohio and across the country, almost a dozen liquid crystal short courses for participants from industries and universities, 14 symposia highlighting current liquid crystal topics, over 30 patents and nearly 900 publications.

ALCOM major accomplishments spotlight the importance of collaborations that reach across disciplinary and institutional boundaries. Reviewing the eleven years of ALCOM offers numerous opportunities to observe a new discovery or area of research move from the laboratory to the marketplace. The evolution of new research areas draws on the wide range of capabilities and expertise within ALCOM and includes researchers outside the Center. ALCOM continues with State and industrial support.

The Liquid Crystal Institute is moving beyond the ALCOM Center as we continue to seek support for the LCI. This past year we applied for 27 grants totaling over $23 million; 13 grants were awarded and 8 are pending. We have applied for a congressional appropriation for a Center for Liquid Crystal Science. This center will collaborate with federal research laboratories and industry to develop liquid crystal materials and devices for advanced optical, biological and medical applications and will be based on interdisciplinary research in the fields of biology, chemistry and physics.

The State of Ohio awarded funding for the Liquid Crystal Institute to hire an eminent scholar in theoretical condensed matter physics. The program is designed to recruit academic leaders to strengthen and expand existing university research and economic development and to improve workforce education and training. We are currently seeking an outstanding scientist to fill the position. We see this scholar playing an important role in advancing our research programs and building broad collaborations.

Our research staff continues to interact with and be recognized by the international liquid crystal community. LCI senior research fellow Mary E. Neubert received the Freedericksz Medal, the highest honor from the Former Soviet Union Liquid Crystal Society. Only two awards are given each year to a chemist and a physicist and usually only to members of their society; however, nonmembers may be awarded the medal by special decision of the society's board. Mary has been at the LCI for 30 years and is well known in the international liquid crystal community for her synthesis of liquid crystalline materials.

Philip J. Bos was named Fellow of the SID at the 2002 Society for Information Display International Symposium. Peter Palfy-Muhoray, Bahman Taheri and Tamas Kosa received the 2001 State of Ohio Emerging Technology Award for their start-up company, AlphaMicron. Oleg D. Lavrentovich received the NorTech Innovation Award for his liquid crystal-based biodetection technology. Liang-Chy Chien served on two conference program committees and
chaired one session for two international liquid crystal conferences. Mary Neubert chaired a session at the International Ferroelectric Conference. Professors Lavrentovich and Palffy-Muhoray continue to serve as editors of *Liquid Crystals* and *Molecular Crystals and Liquid Crystals*, respectively.

Two of our graduate student received honors during the past year. Ivan Smalyukh received the International Liquid Crystal Society Multimedia Award for his presentation, "Imaging of Liquid Crystals in 3D: Fluorescent Confocal Polarizing Microscopy." He also received a conference travel scholarship from the Microscopy Society of America (MSA)-Royal Microscopical Society (RMS) and a travel grant from the American Physical Society. Shin Woong Kang received the Materials Research Society Graduate Student Silver Award at the MRS Fall Conference, Boston, MA, Nov. 26-30, 2001.

LCI continues the Technology Action Fund cleanroom training through the KSU College of Continuing Studies. Professor Michael Fisch conducted cleanroom training for 120 participants from NASA Glenn Research Center, Applied Medical Technologies and several Northeast Ohio LCD manufacturing companies. The 2½ day course combines classroom and cleanroom sessions to train non-scientific persons for work in a cleanroom environment. This innovative program demonstrates effective ways to utilize our research strengths to educate the workforce required for high technology industries to thrive in the region.

Scientists at the LCI are moving in new research directions using liquid crystals such as optical beam steering and optical sensors for military applications and pathogen detection systems for medical use. The future holds great promise for the Liquid Crystal Institute as we strive to be on the forefront of these emerging technologies and to build new and effective collaborations.

Finally, on a personal note, I have announced my intention to step down as director of the Liquid Crystal Institute. It has been an honor to head this dynamic organization and I look forward to working with the next director to continue to build and expand our programs and reputation.
Achievements and Recognition

Books

Electronic Media

Conference Chairs

Students
Ivan Smalyukh, CPIP graduate student: 1) International Liquid Crystal Society Multimedia Award for his presentation, "Imaging of Liquid Crystals in 3D: Fluorescent Confocal Polarizing Microscopy," 2) Microscopy Society of America (MSA)-Royal Microscopical Society (RMS) Conference Travel Scholarship; 3) American Physical Society, travel grant to attend Conference on Opportunities in Biology for Physicists.

Shin Woong Kang received the Materials Research Society Graduate Student Silver Award at the MRS Fall Conference, Boston, MA, Nov. 26-30, 2001.

Regional
Professors Peter Palffy-Muhoray, Bahman Taheri, Tamas Kosa, 2001 State of Ohio Emerging Technology Award

Professor Oleg D. Lavrentovich, *NorTech Innovation Award* for liquid crystal-based biodetection technology

International
Mary E. Neubert, Freedericksz Medal from the Former Soviet Union Liquid Crystal Society for her work in synthesis of liquid crystals.


Oleg D. Lavrentovich, Co-editor, *Liquid Crystals Today*

Peter Palffy-Muhoray, Vice President, International Liquid Crystal Society and Regional Editor, *Molecular Crystals and Liquid Crystals*
Major Funding Sources
ALCOM Center (NSF, State of Ohio)
Federal Funding Sources
ALCOM Industrial Partnership Program
(in thousands)

Expenditures 1990 - 2002
(in thousands)
Summary of LCI Accomplishments, 2000-2001

Ph.D. Degrees awarded 7
M.S. Degrees awarded 1

Grants and Contracts
Expenditures $2.5 Million
Renewals and New Awards 55

Students Supported
Graduate 44
Undergraduate 7

Postdoctoral Researchers (FTE) 13
Visitors (Research Program) 14

Publications
Journals and Book Chapters 78
Juried, Proceedings, Technical Reports 19

Presentations
Professional Societies 49
Academic and Other 30

Patents Awarded 4
Industrial Visitors 35 Companies represented

ALCOM IPP Members 33

Outreach Activities
Short course, September 25-28, 2001
Liquid crystal display at KSU Geauga Campus, Jan.-Feb. 2002
K-12 Education tours, presentations and workshops
LCI Scientists Honored

Dr. Mary E. Neubert, Senior Research Fellow at the Liquid Crystal Institute, received the Freedericksz Medal from the Former Soviet Union Liquid Crystal Society at the 19th International Liquid Crystal Conference in Edinburgh, Scotland. Dr. Neubert was honored for her work in synthesis of liquid crystals.

Governor Bob Taft presented AlphaMicron founders, Tamas Kosa, Bahman Taheri and Peter Palffy-Muhoray with the *Emerging Technology Award* at the 2001 Thomas Edison and Emerging Technology Award Ceremony. The award recognizes the significant accomplishments of small technology-oriented companies in Ohio. Dr. Palffy-Muhoray is a Professor and Drs. Kosa and Taheri are Adjunct Assistant Professors in the KSU Chemical Physics Interdisciplinary Program.

Professor Satyendra Kumar received an award from the Ministry of Science and Technology of Korea for his invention with Dr. Valery Vorflusev. The award is given for excellence in the field of electronic displays. Two awards each are given to industrial and university researchers. Professor Kumar received the only award given outside of Korea.
Education Outreach

Students participated in the NSF Research Education for Undergraduates (REU) program experience working in a cleanroom environment as part of their training at Kent State University. Chemistry professors Robert Twieg and Arne Gericke were awarded the REU grant and LCI scientists participated as mentors. Each student was assigned to a specific mentor and research project. Students came from universities in Ohio, Colorado and California.

Scientific Solutions scientists, Hailiang Zhang and John Noto were the first to use the newly constructed research carrels near the cleanroom at the Liquid Crystal Institute. The three carrels have a semi-private office area with a laminar flow bench. A common area contains a computer and lab bench. The carrels provide an “office away from home” for scientists visiting the LCI to use the cleanroom and interact with LCI scientists.

A cleanroom training student is seen using the glass scriber to cut glass which she then took into the cleanroom to make a liquid crystal display. The students received classroom training and cleanroom experience as part of the 2½ day course.
Table 1: Liquid Crystal Institute Staff

<table>
<thead>
<tr>
<th>Name</th>
<th>Year Appointed</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>John L. West</td>
<td>1984</td>
<td>Director (1997); Professor of Chemistry (1997)</td>
</tr>
<tr>
<td>Philip J. Bos</td>
<td>1994</td>
<td>Associate Director (1997); Professor, Chemical Physics (2001)</td>
</tr>
<tr>
<td>Liang-Chy Chien</td>
<td>1989</td>
<td>Professor, Chemical Physics (2001)</td>
</tr>
<tr>
<td>Lynn Fagan</td>
<td>2001</td>
<td>Secretary</td>
</tr>
<tr>
<td>Patricia Franklin</td>
<td>2000</td>
<td>Secretary</td>
</tr>
<tr>
<td>Antal Jakli</td>
<td>1999</td>
<td>Senior Research Fellow</td>
</tr>
<tr>
<td>Marybeth Lipinski</td>
<td>2000</td>
<td>Grants Assistant (2001)</td>
</tr>
<tr>
<td>Oleg D. Lavrentovich</td>
<td>1992</td>
<td>Professor, Chemical Physics (2000)</td>
</tr>
<tr>
<td>Mary E. Neubert</td>
<td>1972</td>
<td>Senior Research Fellow (1976)</td>
</tr>
<tr>
<td>Peter Palffy-Muhoray</td>
<td>1983</td>
<td>Associate Director (1990); Professor of Chemical Physics (1994)</td>
</tr>
<tr>
<td>Donna Warner</td>
<td>1999</td>
<td>Clerical Specialist (Part-time)</td>
</tr>
<tr>
<td>Deng-Ke Yang</td>
<td>1992</td>
<td>Associate Professor, Chemical Physics (1999)</td>
</tr>
<tr>
<td>EMERITI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J. William Doane</td>
<td>1979-1996</td>
<td>Emeritus Director; Emeritus Professor of Physics (Retired, June 30, 1996)</td>
</tr>
<tr>
<td>Alfred Saupe</td>
<td>1968-1992</td>
<td>Emeritus Professor of Physics (Retired August 31, 1992)</td>
</tr>
<tr>
<td>Name</td>
<td>Dates</td>
<td>Institution</td>
</tr>
<tr>
<td>---------------------</td>
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<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Dena Mae Agra</td>
<td>Aug. 98-Aug. 01</td>
<td>University of the Philippines</td>
</tr>
<tr>
<td>Tohru Doi</td>
<td>Aug. 01-Oct. 02</td>
<td>Tosoh Corporation</td>
</tr>
<tr>
<td>Andrey G. Dyadyusha</td>
<td>Sept.-Nov. 2001</td>
<td>National Academy of Sciences, Ukraine</td>
</tr>
<tr>
<td>Tadayuki Kameyama</td>
<td>Dec. 99-Oct. 01</td>
<td>Nitto Denko Corp., Japan</td>
</tr>
<tr>
<td>Hirofumi Kubota</td>
<td>May 01-May 02</td>
<td>Matsuishita Elec. Indus. Co., Japan</td>
</tr>
<tr>
<td>Gi Dong Lee</td>
<td>Mar. 01-Feb. 03</td>
<td>Pusan University, Korea</td>
</tr>
<tr>
<td>N.V. Madhusudana</td>
<td>June-August 01</td>
<td>Raman Research Institute, India</td>
</tr>
<tr>
<td>Antonio Munoz</td>
<td>June 99-July 01</td>
<td>Univ. Autonoma Metropolitana-Iztapalapa, Mexico City</td>
</tr>
<tr>
<td>Geetha Nair</td>
<td>June-September 01</td>
<td>Liquid Crystal Research Center, India</td>
</tr>
<tr>
<td>Yuri Reznikov</td>
<td>March-May 2002</td>
<td>National Academy of Sciences of the Ukraine</td>
</tr>
<tr>
<td>Kenneth Singer</td>
<td>Jan.-May 02</td>
<td>Case Western Reserve University</td>
</tr>
<tr>
<td>Junho Song</td>
<td>March 01-Feb. 03</td>
<td>Samsung, Korea</td>
</tr>
<tr>
<td>Stephen Tytko</td>
<td>May-August 01</td>
<td>Baldwin Wallace College</td>
</tr>
<tr>
<td>Aniko Vajda</td>
<td>Nov. 2001</td>
<td>Hungarian Academy of Sciences</td>
</tr>
<tr>
<td>Xinyi Wang</td>
<td>Sept. 01-Jan. 02</td>
<td>Case Western Reserve University</td>
</tr>
<tr>
<td>Research Staff</td>
<td>Support Department; Grants</td>
<td></td>
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<td>-------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
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<tr>
<td><strong>Full Members</strong></td>
<td></td>
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</tr>
<tr>
<td>David W. Allender</td>
<td>Physics; ALCOM</td>
<td></td>
</tr>
<tr>
<td>Philip J. Bos</td>
<td>LCI/CP/IP; ALCOM; DARPA; Rockwell; NASA; NATO; industry</td>
<td></td>
</tr>
<tr>
<td>Liang-Chy Chien</td>
<td>LCI/CP/IP; ALCOM; OBR Banana; Boulder Nonlinear; ONR; ODOD; DAGSI/AFRL; industry</td>
<td></td>
</tr>
<tr>
<td>Daniele Finotello</td>
<td>Physics; ALCOM; OBR Research Challenge; NSF international</td>
<td></td>
</tr>
<tr>
<td>Antal Jakli</td>
<td>LCI/CP/IP; ALCOM</td>
<td></td>
</tr>
<tr>
<td>Jack R. Kelly</td>
<td>LCI/CP/IP; ALCOM; Nitto Denko</td>
<td></td>
</tr>
<tr>
<td>Satyendra Kumar</td>
<td>Physics; ALCOM; Research Challenge; industry</td>
<td></td>
</tr>
<tr>
<td>Oleg D. Lavrentovich</td>
<td>LCI/CP/IP; ALCOM; DARPA; Rockwell; NASA; PRF, DAGSI</td>
<td></td>
</tr>
<tr>
<td>Mary E. Neubert</td>
<td>LCI; ALCOM; Hughes; Boulder Nonlinear Systems</td>
<td></td>
</tr>
<tr>
<td>Peter Palffy-Muhoray</td>
<td>LCI/CP/IP; ALCOM; MURI; NSF Remote Experiment; NSF Hungary; NSF Brazil (2); NSF REU; NSF-EC</td>
<td></td>
</tr>
<tr>
<td>Samuel N. Sprunt</td>
<td>Physics; ALCOM; ONR; OBR Research Challenge</td>
<td></td>
</tr>
<tr>
<td>Robert J. Twieg</td>
<td>Chemistry; ALCOM; NIST; NSF REU</td>
<td></td>
</tr>
<tr>
<td>John L. West</td>
<td>LCI; Chemistry; ALCOM; DAGSI; Sarnoff; DARPA; NSF REU; TAF</td>
<td></td>
</tr>
<tr>
<td>Philip W. Westerman</td>
<td>NEOUCOM; OBR Research Challenge</td>
<td></td>
</tr>
<tr>
<td>Deng-Ke Yang</td>
<td>LCI/CP/IP; ALCOM; Santec; Matsushita</td>
<td></td>
</tr>
</tbody>
</table>

*Grant name indicates that a portion of the investigator’s salary was provided by grant(s), either as a cost share or direct charge (academic year or summer)
<table>
<thead>
<tr>
<th>Research Staff</th>
<th>Support Department; Grant</th>
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<tbody>
<tr>
<td>Alan Baldwin</td>
<td>Physics Research Engineer</td>
</tr>
<tr>
<td>Barrick, George</td>
<td>LCI; Rockwell-Bos</td>
</tr>
<tr>
<td>Camacho-Lopez, Miguel (12/01)</td>
<td>LCI; ALCOM-Palffy-Muhoray</td>
</tr>
<tr>
<td>Catanescu, Otilia</td>
<td>LCI; ALCOM; Samsung; DARPA - Chien</td>
</tr>
<tr>
<td>Xiaoman Dai</td>
<td>LCI; Beamsteering-Neubert</td>
</tr>
<tr>
<td>Michael R. Fisch</td>
<td>LCI; DARPA-West; ODOD TAF (CCS)</td>
</tr>
<tr>
<td>Anatoly Glushchenko</td>
<td>LCI; DARPA-West</td>
</tr>
<tr>
<td>Maxwell Godfrey</td>
<td>LCI; ALCOM Education-Palffy-Muhoray</td>
</tr>
<tr>
<td>Andrii Golovin</td>
<td>LCI; Rockwell-Lavrentovich</td>
</tr>
<tr>
<td>Tomohiro Ishikawa (8/01)</td>
<td>LCI; PRF; NASA-Lavrentovich</td>
</tr>
<tr>
<td>Tamas Kosa (Adjunct)</td>
<td>LCI; CPIP</td>
</tr>
<tr>
<td>Liubov Kreminska</td>
<td>LCI; DARPA; NASA-Lavrentovich</td>
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<tr>
<td>Marina Lavrentovich</td>
<td>LCI; Moxtex; Nitto Denko</td>
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<td>Gi-Dong Lee</td>
<td>LCI; Samsung-Bos</td>
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<tr>
<td>Soon Nam Lee</td>
<td>LCI; BNL-Neubert; BNL-Chien</td>
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<tr>
<td>Jonathan Ruth</td>
<td>LCI; IPP; ALCOM-Bos</td>
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<tr>
<td>Tatiana Sergan</td>
<td>LCI; ALCOM; Moxtex-Kelly</td>
</tr>
<tr>
<td>Vassili Sergan</td>
<td>LCI; DARPA-Bos</td>
</tr>
<tr>
<td>Bahman Taheri (Adjunct)</td>
<td>LCI; CPIP</td>
</tr>
<tr>
<td>Charles Titus (6/02)</td>
<td>LCI; Rockwell; NASA-Bos</td>
</tr>
<tr>
<td>Tibor Toth-Katona</td>
<td>Physics; NSF-Gleeson; LCI</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Technicians and Engineers</th>
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<tbody>
<tr>
<td>James Franci</td>
<td>Gregory Magyar</td>
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<tr>
<td>Karen Hullihen</td>
<td>Aaron Norton</td>
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<tr>
<td></td>
<td>Liou Qiu</td>
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<tr>
<td></td>
<td>Hugh Wonderly (9/01)</td>
</tr>
<tr>
<td>Student Employees</td>
<td>Student Summer Interns</td>
</tr>
<tr>
<td>Ryan Stayshich</td>
<td>Ryan Grams</td>
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<tr>
<td>Dave Zamos</td>
<td>Jason Morgan</td>
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<td></td>
<td>Ryan Nosler</td>
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<td></td>
<td>John Holler</td>
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<tr>
<td></td>
<td>Caroll Moya</td>
</tr>
<tr>
<td>Graduate Students</td>
<td>Department; Support Source (Advisor)</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>----------------------------------------------------------</td>
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<tr>
<td>Bharat Acharya</td>
<td>Physics; ALCOM (Kumar)</td>
</tr>
<tr>
<td>Volodymyr Bodnar</td>
<td>CPIP (West)</td>
</tr>
<tr>
<td>Erica Bramley Montbach</td>
<td>CPIP; DuPont (Bos)</td>
</tr>
<tr>
<td>Ebru Aylin Buyuktanir</td>
<td>CPIP</td>
</tr>
<tr>
<td>Wenyi Cao</td>
<td>CPIP, MURI, NSF (Palffy-Muhoray)</td>
</tr>
<tr>
<td>Roland Ennis</td>
<td>CPIP, ALCOM, Remote Ed., Anteon (Palffy-Muhoray)</td>
</tr>
<tr>
<td>Nate Hall</td>
<td>Physics (Kumar)</td>
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<tr>
<td>David Heineman (12/01)</td>
<td>CPIP; ALCOM (West)</td>
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<tr>
<td>Yuanming Huang (10/02)</td>
<td>CPIP; ALCOM, OBR/Banana (Jakli)</td>
</tr>
<tr>
<td>Tao Jin</td>
<td>Physics; ALCOM (Finotello)</td>
</tr>
<tr>
<td>Shin-Woong Kang</td>
<td>CPIP; ONR, ALCOM, Univ. Fellowship (Sprunt, Chien)</td>
</tr>
<tr>
<td>Asad Khan</td>
<td>CPIP (Yang)</td>
</tr>
<tr>
<td>Sang Hwa Kim</td>
<td>CPIP; Hughes, ALCOM, DAGSI (Chien)</td>
</tr>
<tr>
<td>Guangxun Liao</td>
<td>CPIP; Sarnoff, Moxtex (Kelly, West)</td>
</tr>
<tr>
<td>Hui Liu</td>
<td>CPIP</td>
</tr>
<tr>
<td>Oleg Pishnyak</td>
<td>CPIP; Rockwell (Lavrentovich)</td>
</tr>
<tr>
<td>Salman Saeed (8/02)</td>
<td>CPIP (Bos)</td>
</tr>
<tr>
<td>Tod Schneider</td>
<td>CPIP; ALCOM, PR Fund (Lavrentovich)</td>
</tr>
<tr>
<td>Alexander Semyonov</td>
<td>CPIP; ALCOM; AFORS (Twieg)</td>
</tr>
<tr>
<td>Jianru Shi</td>
<td>CPIP; Rockwell; ALCOM (Bos)</td>
</tr>
<tr>
<td>Ivan Smalyuk</td>
<td>CPIP; NSF, ALCOM, PR (Lavrentovich)</td>
</tr>
<tr>
<td>Linli Su</td>
<td>Chemistry; LCI (West)</td>
</tr>
<tr>
<td>Dmitry Voloschenko (12/01)</td>
<td>CPIP (Lavrentovich)</td>
</tr>
<tr>
<td>Bin (Charles) Wang (5/02)</td>
<td>CPIP, Intel, ALCOM (Bos)</td>
</tr>
<tr>
<td>Chenhui Wang</td>
<td>CPIP, Displaytech (Bos)</td>
</tr>
<tr>
<td>Dong Wang</td>
<td>CPIP (Yang)</td>
</tr>
<tr>
<td>Xinghua Wang</td>
<td>CPIP, NASA (Bos)</td>
</tr>
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<td>Fang Zhang (12/01)</td>
<td>CPIP; ALCOM (Yang)</td>
</tr>
<tr>
<td>Guoqiang Zhang</td>
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</tr>
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<td>Hailiang Zhang</td>
<td>CPIP (Kelly and Gartland)</td>
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<tr>
<td>Yanli Zhang</td>
<td>CPIP; Intel (Bos)</td>
</tr>
<tr>
<td>Ke Zhang</td>
<td>Chemistry (West)</td>
</tr>
<tr>
<td>Zhou, Fushan</td>
<td>CPIP, Matsushita, Chromalux (Yang, Kelly)</td>
</tr>
<tr>
<td>Student</td>
<td>Dissertation/Thesis Title</td>
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<tr>
<td>---------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
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<tr>
<td><strong>Doctor of Philosophy</strong></td>
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<tr>
<td>Bharat Raj Acharya</td>
<td>Correlation Between the Surface Properties and Liquid Crystal Anchoring on Polymer Films</td>
</tr>
<tr>
<td>Letemeskel Asfaw</td>
<td>Coherent Backscattering from Complex Liquids</td>
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<tr>
<td>David Heineman</td>
<td>Kinetics of Patterned Electric Field Induced Polymer Segregation in Liquid Crystal Solutions</td>
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<tr>
<td>Dmitry Voloshchenko</td>
<td>Photoinduced Aggregation in Cholesteric Liquid Crystals</td>
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<tr>
<td>Fang Zhang</td>
<td>Physical Properties of Cholesteric Liquid Crystal Displays</td>
</tr>
<tr>
<td>Bin Wang</td>
<td>Two Dimensional Liquid Crystal Devices and their Computer Simulations</td>
</tr>
<tr>
<td>Salman Saeed</td>
<td>Electro-optical Polarization Interference Filters</td>
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<tr>
<td><strong>Master of Science</strong></td>
<td></td>
</tr>
<tr>
<td>Nate Hall</td>
<td>Nature of the Phase Transition Between Biaxial and Uniaxial Nematic Phases in a Lyotropic Crystal</td>
</tr>
</tbody>
</table>
Table 4: Placement of Personnel

<table>
<thead>
<tr>
<th>Graduates</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bharat Acharya</td>
<td>Bell Lab/Lucent Technologies, Inc.</td>
</tr>
<tr>
<td>Letemeskel Asfaw</td>
<td>Alcorn State University, Mississippi</td>
</tr>
<tr>
<td>Dave Heineman</td>
<td>CoAdna Photonics, Inc.</td>
</tr>
<tr>
<td>Salman Saeed</td>
<td>Three Five Systems, Inc.</td>
</tr>
<tr>
<td>Dmitry Voloshchenko</td>
<td>Motorola, Inc.</td>
</tr>
<tr>
<td>Bin Wang</td>
<td>Agilent Technologies, Inc.</td>
</tr>
<tr>
<td>Fang Zhang</td>
<td>Dimensional Media, Inc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Postdoctoral Fellows, Research Associates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miguel Camacho-Lopez</td>
</tr>
<tr>
<td>Charles Titus</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Staff/Technicians</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tricia Franklin</td>
<td>KSU, Music Department</td>
</tr>
<tr>
<td>Hugh Wonderly</td>
<td>Viztec, Inc.</td>
</tr>
</tbody>
</table>
Table 5: Grants and Contracts, 2001-2002

<table>
<thead>
<tr>
<th>Title</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Center for Advanced Liquid Crystalline Optical Materials (ALCOM) Consortium of Kent, Case Western Reserve and Akron universities National Science Foundation NSF DMR 89-20147-15 and 18 02/1991 – 01/2002 (Years 10/11)</td>
<td>$2.075 million (1,660,000 Year 10/11) (54% Kent, 34% CWRU, 12% UA)</td>
</tr>
<tr>
<td>Kent State University PIs:</td>
<td>University of Akron PIs:</td>
</tr>
<tr>
<td>Case Western Reserve University PIs:</td>
<td>Research Associates/Postdocs</td>
</tr>
<tr>
<td></td>
<td>Students</td>
</tr>
<tr>
<td></td>
<td>K. Artyushkova, R. Ennis, N. Hall,</td>
</tr>
<tr>
<td></td>
<td>442129</td>
</tr>
<tr>
<td>2. ALCOM Support</td>
<td>$349,200</td>
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<tr>
<td>Ohio Dept. of Development 05/2001 – 07/2002</td>
<td>Same as 1</td>
</tr>
<tr>
<td></td>
<td>444239</td>
</tr>
<tr>
<td>3. ALCOM Support</td>
<td>$282,000</td>
</tr>
<tr>
<td>Ohio Dept. of Development 05/2002 – 07/2003</td>
<td>Same as 1</td>
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<td></td>
<td>444249</td>
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<td>4. ALCOM Support</td>
<td>$750,000</td>
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<tr>
<td>Ohio Board of Regents 02/1998 – 01/2000</td>
<td>Same as 1</td>
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<tr>
<td></td>
<td>(Equipment)</td>
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5. **Polymer Stabilized Cholesteric Liquid Crystal Diffraction Gratings**  
   N00014-00-1-0899-01  
   Office of Naval Research  
   07/1999 – 06/2001  
   Project through 06/2002  
   $265,000  
   S. Sprunt and L.-C. Chien  
   S.-W. Kang  
   440602

6. **Numerical and Experimental Studies on Isotropic-Liquid Crystalline Binary Mixtures**  
   P.O. S1214  
   Anteon Corp (AFRL Subcontract)  
   05/2002 – 06/2003  
   $22,000  
   P. Palffy-Muhoray  
   R. Ennis  
   440636

7. **Basic Clean Room Techniques**  
   Ohio Board of Regents  
   07/2000 – 09/2002  
   $197,600  
   B. Hanniford, CCS; J.L. West  
   M.R. Fisch  
   440810

8. **School Based Remote Experiments on the Web**  
   NSF DMR89029147-12  
   NSF **EHR**  
   08/1998 – 01/2002  
   $160,058  
   P. Palffy-Muhoray  
   R. Ennis  
   442117

9. **Remote Experiments in the Science Curriculum**  
   NSF DMR89-20147-17  
   NSF **EHR**  
   10/2000 – 01/2002  
   $51,228  
   P. Palffy-Muhoray  
   R. Ennis  
   442150

10. **Liquid Crystal Based Beam Steering Device and Optical Telescopes**  
    NAG 3-2359  
    NASA  
    01/2001 – 01/2004  
    $654,066  
    P.J. Bos and O.D. Lavrentovich  
    A. Golovin, T. Ishikawa, L. Kreminska,  
    S. Shiyanovskii, C. Titus  
    X. Wang  
    444102

11. **Active/Passive Optical Sensor Research**  
    SN-AFIT-99-03  
    AFOSR/DAGSI  
    08/1999 – 12/2001  
    $126,340  
    J.L. West, P.J. Bos, O.D. Lavrentovich  
    L. Su  
    444209
12. Visiting Scientist
AFOSR
05/2000 – 11/2001

$262,564
J.L. West
D.R. Wiff (salary; no KSUS)
444214

13. Wire Grid Polarizers for LCD
Moxtex (NSF Subcontract)
08/1999 – 07/2001

$34,804
J.R. Kelly
T. Sergan
444216

14. Coalescence of Liquid Crystal Lenses
PRF 35306-AC7
ACS Petroleum Research Fund
01/2000 – 08/2002

$60,000
O.D. Lavrentovich
T. Ishikawa
T. Schneider, I. Smalyukh
444218

15. Optical Properties of Holographic Elements in Display Applications
Dupont
01/2000 – 01/2003

$120,000
P.J. Bos
E. Bramley
444220

16. Chromonic Liquid Crystals
Ohio Board of Regents
Research Challenge
01/2000 – 08/2001

$100,000
O.D. Lavrentovich, D. Finotello, J. Kelly
P. Westerman
T. Jin
444221

17. Liquid Crystal Ultrasonic Transducer
Santec Systems
12/1999 – 11/2001

$33,500 (award reduced from $60,000)
P.J. Bos, D.K. Yang
444223

18. Liquid Crystal Based Optical Phase Array for Steering Lasers
F33615-00-1-1681
DARPA
06/2000 – 06/2003

$2,423,208 (increased from $757,731)
P.J. Bos, O.D. Lavrentovich, J.L. West
M. Fisch, A. Glushchenko, A. Golovin,
L. Kreminska, V. Sergan
G. Zhang
444226

19. C1 SSFLC Bistable Device Optimization Project
Displaytech
09/2000 – 08/2003

$99,000
P.J. Bos
C. Wang
444228
20. Digital Beam Deflector
   BOU 431588
   Rockwell (DARPA subcontract)
   09/2000 – 06/2003
   $446,499
   P.J. Bos, O.D. Lavrentovich
   G. Barrick, A. Golovin, L. Kreminska,
   S. Shiyanovskii,
   C. Titus
   O. Pishnyak, J. Shi
   444230

21. Steered Agile Beams
   Boulder Nonlinear Systems
   08/2000 – 01/2002
   $112,500
   M.E. Neubert
   X. Dai, A. Norton
   444231

22. High Twisting Power Chiral Materials
   Kent Displays (NSF subcontract)
   01/2001 – 06/2002
   $60,000
   J.W. Doane
   M. Groom
   444232

23. Electro-optical Devices from Banana-Shaped Liquid Crystals
   Ohio Board of Regents
   Research Challenge
   03/2001 – 12/2002
   $70,000
   A. Jakli, L.-C. Chien
   O. Catanescu
   Y. Huang
   444233

24. Trans-reflective LCD
    Matsushita Electric Industrial Co.
    04/2001 – 03/2003
    $50,000 (award reduced from $100,000)
    D.K. Yang
    F. Zhou
    444234

25. Development of Polymer and Chiral Materials for FE-LCD
    Boulder Nonlinear Systems
    03/2001 – 02/2003
    $156,370
    L.-C. Chien
    S. Lee
    444235

26. Carbon Nanotube-Reinforced Liquid Crystal Structural Composites by Electron Beam Curing
    ML-UD-01-13
    DAGSI (AFRL subcontract)
    07/2001 – 06/2003
    $47,628 (reduced from $99,999)
    L.-C. Chien
    S.H. Kim
    444238
27. Novel Liquid Crystal Materials with High Birefringence and Low Rotational Viscosity for the Field Sequential Color Reflective LCDs
   Samsung SDI, Ltd.
   04/2001 – 01/2002
   $89,940
   L.-C. Chien, J.R. Kelly
   O. Catanescu, T. Sergan
   444240

28. Modeling and Improvements to PI-Cell Type Devices for AMLCD Applications
   Samsung Electronics Co. Ltd.
   03/2001 – 05/2003
   $143,641
   P.J. Bos
   G.-D. Lee, D. Berreman
   444241

29. Research Proposal for Intel Corporation
   Intel Corporation
   06/2001 – 05/2002
   $49,917 (reduced from $142,151)
   P.J. Bos
   B. Wang, Y. Zhang
   444242

30. Resolution of Electron Beam Addressed Liquid Crystal Displays
   Chromalux, Inc.
   07/2001 – 09/2001
   $6,248
   D.K. Yang
   X. Wang, F. Zhou
   444243

31. Polymer Walls for Ruggedized LCDs Using Plastic Substrates
   Nitto Denko Corporation
   09/2001 – 08/2002
   $62,054
   J.L. West
   444244

32. Turnable Filters for Telecommunications Applications
   CoAdna Photonics, Inc.
   10/2001 – 09/2002
   $96,189
   A. Jakli
   A. Olivares
   444245

33. Development of High Birefringence Liquid Crystals for Optical Beam Steering
   Univ. Central Florida/ Raytheon Systems; (US Airforce subcontract)
   01/2002 – 12/2003
   $90,000
   L.-C. Chien
   O. Catanescu
   444247

$20,000  
M.E. Neubert  
X. Dai  
444248


$28,500  
D.K. Yang  
D. Wang  
444251


$423,756  
P. Palffy-Muhoray  
A. Munoz  
W. Cao  
444328


$80,000 ($53,160 for O.D. Lavrentovich)  
C. Woolverton, O.D. Lavrentovich  
444521


$226,712  
J.L. West  
J. Francl  
444694

39. 2nd Sponsored Research Agreement Viztec 4/00 - 12/02

$233,107  
S. Kumar  
440622

40. Research Experiences for Undergraduates in Chemistry at KSU NSF 4/01 – 3/04

$120,000  
R. Twieg, A. Gericke  
442155

41. Acquisition of Organic Semiconductor Processing and Characterization Facility for Research and Student Training NSF 8/01 – 7/04

$200,000  
R. Twieg, B. Ellman, S. Huang  
442172
42. **EBEAM Sensitive Polyimides**
   NASA
   6/99 – 9/03
   $348,263
   R. Twieg, R. Uribe, C. Vargas-Aburto
   444125

43. **Dynamic Light Scattering Study of Commensurate and Incommensurate Structure in Ferroelectric and Twist Grain Boundary LCs**
   NSF
   8/99 – 7/03
   $284,685
   S. Sprunt
   442132

44. **Chromophores, Sensitizers and Transport Agents for Polymeric Photorefractive Systems**
   Stanford Univ./US Air Force
   11/00 – 10/02
   $173,814
   R. Twieg
   444714

45. **Self-Organizing Molecular Semiconductors: Synthesis, Properties and Applications**
   Tokyo Institute of Technology
   7/01 – 3/02
   $46,596
   R. Twieg
   444730

46. **Real World Research Experience in Undergraduate Materials Chemistry Education**
   Camille & Henry Dreyfus Fndn.
   2/02 – 1/04
   $46,000
   R. Twieg
   444735

47. **Electromagnetic Structure of the Neutron**
   NSF
   1/00 – 6/02
   $242,796
   D. Allender, R. Madey
   442123

48. **Optical Polymers and Manufacturing Processes for Low-Cost WDM Devices and Systems**
   Goodrich (subcontract)
   10/98-1/02
   $270,000
   R. Twieg
   444708
INTERNATIONAL PROGRAMS

49. Photoalignment of Liquid Crystals
DMR89-20147-13
NSF Internation Programs (Hungary)
02/1999 – 01/2002
$28,440
P. Palffy-Muhoray, T. Kosa, A. Jakli
442124

50. Nonlinear Optics of Lyotropic Liquid Crystals
DMR89-20147-13
NSF International Programs (Brazil)
02/1999 – 01/2002
$28,600
P. Palffy-Muhoray, A. Saupe, T. Kosa
442125

51. Photoalignment of Low-Weight Photo-Crosslinking Materials
DMR89-20147-14
NSF International Supplement
10/1999 – 01/2002
$14,600
L.-C. Chien
442135

52. Cholesteric LC Laser Sensors in Optical Fibers
DMR89-20147-16
NSF International Supplement
09/2000 – 01/2002
$28,200
P. Palffy-Muhoray
442147

53. LCD Optical Shutter for Eye Protection Devices
NATO Science for Peace Program
$270,000 (8 million Begian Francs)
$29,300 (KSU share)
P.J. Bos, J. Pirs (Univ. Ljubljana)
444210

54. US-Slovenia Materials Research on Orientational Phenomena in Homeotropic LC Films
NSF-Slovenia
1/99-12/02
$63,995 ($24,747 DF share)
D. Finotello, G. Crawford, S. Zumer
442100
### Table 6: Proposals for Extramural Support

<table>
<thead>
<tr>
<th>Title</th>
<th>e. Project Director; Principal Investigators</th>
<th>f. Faculty Assoc./Vis. Sci.</th>
<th>g. Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Materials Research Science and Engineering Center</td>
<td>c. Initial</td>
<td>d. $12,000,000</td>
<td>e. West</td>
</tr>
<tr>
<td>a. NSF</td>
<td></td>
<td></td>
<td>g. Not Awarded</td>
</tr>
<tr>
<td>b. 9/1/02 – 8/31/08</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2. Prism Rotator Beam-steering Component and Two-Dimensional Optical Phased Array Wavefront Corrector</td>
<td>c. Initial</td>
<td>d. $565,695</td>
<td>e. Bos</td>
</tr>
<tr>
<td>a. DARPA</td>
<td></td>
<td></td>
<td>g. Pending</td>
</tr>
<tr>
<td>b. 4/1/02 – 5/31/03</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Electrically Tunable Cholesteric Color Display</td>
<td>c. Initial</td>
<td>d. $27,500</td>
<td>e. Yang</td>
</tr>
<tr>
<td>a. Motorola</td>
<td></td>
<td></td>
<td>g. Not Awarded</td>
</tr>
<tr>
<td>b. 9/1/02 – 8/31/05</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Nano-FE Particles in LC Suspensions</td>
<td>c. Initial</td>
<td>d. $8,630</td>
<td>e. West</td>
</tr>
<tr>
<td>a. National Research Council COBASE</td>
<td></td>
<td></td>
<td>g. Not Awarded</td>
</tr>
<tr>
<td>b. 4/1/02 – 9/30/02</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>5. A Consortium to Use Magnetic Levitation Techniques to Process and Study New Materials</td>
<td>c. Initial</td>
<td>d. $42,500</td>
<td>e. Chien, Fisch</td>
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<tr>
<td>a. OBR Hayes Investment Fund</td>
<td></td>
<td></td>
<td>g. Not Awarded</td>
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<tr>
<td>b. 7/1/02 – 6/30/05</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. KSU Sub-contract/Univ. Akron proposal</td>
<td>c. Initial</td>
<td>d. $107,320</td>
<td>e. West</td>
</tr>
<tr>
<td>a. NASA/URETI (CAN 01 OAT-01)</td>
<td></td>
<td></td>
<td>g. Pending</td>
</tr>
<tr>
<td>b. 4/01/02 – 3/31/07</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. NIRT: Nanomanufacturing Processes for the Production of Environmentally Resistant Protective Coatings</td>
<td>c. Initial</td>
<td>d. $159,988 (KSU)</td>
<td>e. West</td>
</tr>
<tr>
<td>a. NSF (submitted by Case Western Reserve Univ.)</td>
<td></td>
<td></td>
<td>g. Not Awarded</td>
</tr>
<tr>
<td>b. 04/01/02 – 03/31/05</td>
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<td></td>
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8. Center for Liquid Crystal Science
   a. Federal Funding (legislative) - admin. by WPAFB
   c. Initial
   d. $3,000,000/yr.
   e. West
   g. Pending

9. Carbon Nanotube-Reinforced Liquid Crystal Structural Composites by Electron Beam Curing
   a. DAGSI
   b. 7/1/01 – 6/30/03
   c. Initial
   d. $47,628
   e. Chien
   g. Awarded

10. Resolution of Electron Beam Addressed Liquid Crystal Displays
    a. Chromalux, Inc.
    b. 7/21/01 – 9/15/01
    c. Initial
    d. $6,248
    e. Yang
    g. Awarded

11. Polymer Walls for Ruggedized LCDs Using Plastic Substrates
    a. Nitto Denko Corporation
    b. 9/1/01 – 8/31/02
    c. Initial
    d. $62,054
    e. West
    g. Awarded

12. Tunable Filters for Telecommunications Applications
    a. CoAdna Photonics, Inc.
    b. 10/1/01 – 9/30/02
    c. Initial
    d. $96,189
    e. Jakli
    g. Awarded

13. Development of High Birefringence Liquid Crystals for Optical Beam Steering
    a. US Air Force (Univ. Central Fla./Ratheon Systems)
    b. 1/28/02 – 12/30/03
    c. Initial
    d. $90,000
    e. Chien
    g. Awarded

14. Development of High Birefringence Liquid Crystals for Optical Beam Steering
    a. US Air Force (Univ. Central Fla./Ratheon Systems)
    b. 1/28/02 – 12/30/03
    c. Initial
    d. $20,000
    e. Neubert
    g. Awarded

15. Black and White Cholesteric Displays
    a. Kent Displays, Inc.
    b. 6/10/02 – 5/31/03
    c. Initial
    d. $28,500
    e. Yang
    g. Awarded

16. Pathogen Detection by Lyotropic Liquid Crystals
    a. OBR Research Challenge
    b. 2/1/02 – 12/31/03
    c. Initial
    d. $80,000
    e. Lavrentovich
    g. Awarded
17. Travel Grants for Outstanding Young Scientists
   a. NSF
   b. 5/1/02 – 4/30/03

18. Acquisition of an Imaging Fourier Transform Infrared (FTIR) Spectrometer
   a. NSF
   b. 4/15/02 – 7/31/05

   a. NSF
   b. 9/1/02 – 8/31/05

20. IMI on Orientationally Ordered Materials
    a. NSF
    b. 10/1/02 – 9/30/07

21. Numerical and Experimental Studies on Isotropic-Liquid Crystalline Binary Mixtures
    a. Anteon Corporation/AFRL (subcontract)
    b. 5/1/02 – 6/30/03

22. Tunable Mirrorless Lasing in Cholesteric Liquid Crystalline Elastomers
    a. NSF-EC
    b. 6/1/02 – 5/31/03

23. Liquid Crystal Eyewear
    a. AlphaMicron, Inc./ODOD (subcontract)
    b. 6/1/02 – 5/31/04

24. Liquid Crystal Based Wavefront Corrector for Space Deployable Optical Elements
    a. NASA
    b. 7/1/02 – 6/30/05

25. Computer Optimization of Omnidirectional Dielectric Reflectors
    a. AF STTR (subcontract from 3D Optics)
    b. 2 years (submitted April 2002)
26. Acquisition of Imaging FTIR Spectrometer
   a. NSF (equipment grant)
   b. 2 years (submitted Feb. 2001, not originally funded; funded in 2002)
   c. Initial
   d. $205,359
   e. Gericke, Cabaniss, West Fulghum, Lavrentovich
   g. Funded
Table 7: Publications

David W. Allender


Philip J. Bos


Liang-Chy Chien


Daniele Finotello


Antal Jákli


Jack R. Kelly


Satyendra Kumar


**Oleg D. Lavrentovich**


**Mary E. Neubert**


**Peter Palfy-Muhoray**


**Samuel N. Sprunt**


**Robert J. Twieg**


**John L. West**


**Deng-Ke Yang**


**Adjunct/Temporary Faculty**

**Michael R. Fisch**


**Tamas Kosa**


**Sergij Shyianovskii**


S.V. Shyianovskii, I.I. Smalyukh, O.D. Lavrentovich, "Computer Simulations and Fluorescence Confocal Polarizing Microscopy of Structures in Cholesteric Liquid Crystals," in *Defects in


Bahman Taheri


<table>
<thead>
<tr>
<th>KSU Discl. #</th>
<th>Patent Number</th>
<th>Title</th>
<th>Date</th>
<th>Inventors</th>
</tr>
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<tr>
<td>142/143</td>
<td>6,141,074</td>
<td>Four Domain Pixel for Liquid Crystalline Light Modulating Device</td>
<td>Oct. 31, 2000 (not previously reported)</td>
<td>P. Bos, H. Vithana, D. Johnson, J. Chen</td>
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<tr>
<td>151/155/170/171</td>
<td>6,154,190</td>
<td>Dynamic Drive Methods and Apparatus for a Bistable Liquid Crystal Display</td>
<td>Nov. 28, 2000 (not previously reported)</td>
<td>D. Yang, Y. Zhu, X. Huang</td>
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<tr>
<td>182</td>
<td>6,204,835</td>
<td>Cumulative Two Phase Drive Scheme for Bistable Cholesteric Reflective Displays</td>
<td>March 20, 2001 (not previously reported)</td>
<td>D.K. Yang, Y.M. Zhu</td>
</tr>
<tr>
<td>187</td>
<td>6,268,839</td>
<td>Drive Schemes for Gray Scale Bistable Cholesteric Reflective Displays</td>
<td>July 31, 2001</td>
<td>D.K. Yang, X.Y. Huang, N.M. Miller</td>
</tr>
<tr>
<td>184</td>
<td>6,278,429</td>
<td>Bistable Reflective Cholesteric Liquid Crystal Displays Utilizing Super Twisted Nematic Driver Chips</td>
<td>Aug. 21, 2001</td>
<td>J. Ruth, R. Hewitt, P.J. Bos</td>
</tr>
<tr>
<td>215</td>
<td>6,312,618</td>
<td>Polar Diphenyldiacetylene Liquid Crystals</td>
<td>Nov. 6, 2001</td>
<td>S.T. Wu, M.E. Neubert</td>
</tr>
<tr>
<td>183</td>
<td>6,320,563</td>
<td>Dual Frequency Cholesteric Display and Drive Scheme</td>
<td>Nov. 20, 2001</td>
<td>D.K. Yang, M. Xu</td>
</tr>
</tbody>
</table>
Table 9: Presentations at Professional Meetings

David W. Allender

Philip J. Bos

Liang-Chy Chien

Daniele Finotello
"Deuteron NMR Investigation of 5CB Confined to CPG with Nanosized Pore Geometry," 16th EENC, PA57, Prague, Czech Republic, June 2002.


"2H NMR Measurements of Molecular Self-Diffusion in Nanoscale-Modulated Liquid Crystal Structures," Book of Abstracts p. 169, ICAM2001, Cancun, Mexico,

**Antal Jákli**


"Dynamics of the Nematic Phase of a Bent-Core Liquid Crystal," S. Stojadinovic, A. Adorjan, A. Jákli, H. Sawade, S. Sprunt, APS Meeting, Indianapolis, IN, March 2002.


**Satyendra Kumar**


Oleg D. Lavrentovich


Peter Palffy-Muhoray

"Light Driven Molecular Motors in Orientationally Ordered Fluids," Brazilian Physical Society, Caxambu, Brazil, May 8, 2002.


"Mirrorless Lasing in Cholesteric Liquid Crystals," Photonics West (Organic Photonic Materials and Devices IV), San Jose, CA, January 20-25, 2002.


John L. West


**Deng-Ke Yang**


Table 10: Academic Presentations and Other Activities

Philip J. Bos

L.C. Chien
"Polymer-Stabilized Liquid Crystal Displays," Tosoh Corporation, Yokkaichi-Shi, Mie, Japan, January 31, 2002 (invited).

"Polymer-Stabilized Liquid Crystal Displays," Nitto-Denko Corporation, Onomichi, Hiroshima, Japan, Feb 1, 2002 (invited).

Antal Jákli


Satyendra Kumar
"Use of Phase Separated Composite Films Method to Build Any Type of LC Device," S. Kumar, LG Philips, S. Korea, August 28, 2001.

"The Elusive Biaxial Nematic Phase and Bent-Core Liquid Crystals," S. Kumar, University of Korea, August 27, 2001.

Oleg D. Lavrentovich

"Chromonic Lyotropic Liquid Crystals and Biological Detection," Seoul, South Korea, to group of venture investors, February 2002.


Mary E. Neubert
International Conference on Ferroelectric Liquid Crystals, Washington D.C., August 2001 (Session Chair)
Peter Palfy-Muhoray

"Liquid Crystals as Photonic Bandgap Materials," Department of Physics, University of Sao Paulo, Brazil, May 17, 2002.

"Dynamics of a Light Driven Molecular Motor," Institute of Physics, University of Sao Paulo, Brazil, May 16, 2002.


"Dynamics of a Light Driven Molecular Motor," Virginia Polytechnic Institute and State University, Blacksburg, VA, April 12, 2002.


"Dynamics of a Light-Driven Molecular Motor," Department of Physics, Wayne State University, Detroit, MI, February 7, 2002.


"Mirrorless Lasing in Cholesteric Liquid Crystals," Department of Physics, Simon Fraser University, Burnaby, BC, Canada, November 21, 2001.

John L. West


"Liquid Crystal Research and Applications," Leadership Akron, Polymer Institute, University of Akron, May 15, 2002

"Update on Liquid Crystal Institute Research," Nitto Denko, April 16, 2002

"Liquid Crystal Dispersions for Beam Steering," Wright Patterson AFB, March 20, 2002

"Liquid Crystal Research and Applications," Ergom, Italy scientists at LCI, Jan. 3, 2002

"Liquid Crystal Research and Applications," Goodyear, October 16, 2001


Deng-Ke Yang


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<tr>
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| Sept. 5 | Prof. V.A.Belyakov  
Landau Institute for Theoretical Physics, Moscow, Russia | Surface Anchoring and Pitch Hysteresis in Planar Layers of Chiral LC Caused by Temperature and Electric Field Variations |
| Sept. 12 | Prof. Ru-Pin Chao Pan  
Dept. of Electrophysics  
National Chiao Tung University, Taiwan | Tunable Wavelength Semiconductor Lasers with a Liquid Crystal Pixel Mirror |
| Oct. 31 | Leo Holmberg  
Senior LAN Administrator  
Kent State University | Coping with Computer Hackers |
| Nov. 7 | Prof. Rolfe G. Petschek  
Department of Physics  
Case Western Reserve University | Hydrogen Bonded Polymeric Liquid Crystals: Potential New Phases and Microemulsions |
| Nov. 28 | Dr. Michael Wand  
VP, Materials Research  
Displaytech, Inc., Longmont, CO | Commercial FLC Devices and Applications: An Overview |
| Dec. 5 | Dr. Paul Keyes  
Department of Physics & Astronomy  
Wayne State Univ., Detroit, MI | A New Model for the Nematic - Smectic A Transition |
| Dec. 12 | Drs. Deborah Barnbaum and Michael Byron  
Asst. Professors of Philosophy  
Kent State University | Research Ethics |
| 2002  |                                                                        |                                                                      |
| Feb. 6 | Professor Isabel Carvalho  
Dept. of Physics  
PUC-Rio, Rio de Janeiro, Brazil | Optical Fibers: Properties and Applications |
| Feb. 20 | Dr. Antal Jakli  
Liquid Crystal Institute  
Kent State University | Electroactive Liquid Crystals: Reality and Potentials |
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<td>Acoustic Properties of Liquid Crystals and Underwater Imaging</td>
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<td>Development of a Liquid Crystal Biosensor for Pathogen Detection</td>
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<td>Professor Gregory Crawford</td>
<td>Division of Engineering Brown University</td>
<td>Holographically Formed Polymer Dispersed Liquid Crystals For Telecommunications Applications</td>
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Table 14: Education and Public Service

ALCOM Education Program Personnel
Professor Peter Palffy-Muhoray, ALCOM Education Program Director
Dr. Maxwell Godfrey, ALCOM Education Project Coordinator

Other Participants
Drs. John West, Tamas Kosa and Jon Ruth
Doug Bryant, Brenda Buck, Merrill Groom, Lynn Fagan

NSF REU Program
California college students participated in KSU Research Education for Undergraduates (REU) program during Summer, 2002: Ryan Grams, Jason Morgan, Carol Moya, Ryan Nosler, Jacob Fontana. Students worked on projects with LCI scientists Antal Jakli, Deng-Ke Yang, and Peter Palffy-Muhoray, and Adjunct CPiP Asst. Professor Bahman Taheri.

Remote Experiments on the Web: A University/School/Industry Collaboration

Experiment at a Distance
Web site: http://olbers.kent.edu/alcomed/Experiment/eo.html

Activities and Presentations
Display at the Kent State University’s Geauga Campus lobby with information on liquid crystals and items such as a LC visor welding helmet, bistable cholesteric LC display, laser written LC images and polymer liquid crystal tutorial CD.

ALCOM Education Outreach Kits

Short Course and Workshops
Liquid Crystals: Materials and Display Devices, September 25-28, 2001 (31 participants from universities and industries)
Cleanroom Training: Developing Cleanroom Skills for the 21st Century; 120 participants.
## Presentations and Tours
### July 2001-June 2002

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**Total: 212**
APPENDICES

I. OUTREACH ACTIVITIES

II. PH.D. DEGREES AWARDED
Facility

Established in 1965, the Liquid Crystal Institute (LCI) is the oldest, largest, and most comprehensive liquid crystal research program in the country. It also maintains the largest university-based liquid crystal flat panel display research and development program in the world.

Institute achievements include the discovery and characterization of new liquid crystalline phases and invention of new types of liquid crystal devices such as polymer dispersed and polymer stabilized liquid crystals.

The Liquid Crystal Institute is also headquarters for the National Science Foundation Science and Technology Center for Advanced Liquid Crystalline Optical Materials (ALCOM), a consortium of three Northeast Ohio universities: Kent State University, Case Western Reserve University, and The University of Akron.

The new 65,000-square-foot Liquid Crystal/Material Science building also houses associated research centers and the graduate Chemical Physics program. The facility consists of 22,000 square feet of research laboratories, a 2,500-square-foot cleanroom, three teaching labs, two classrooms, and a 150-seat auditorium.

Web Sites
LCI: http://www.lci.kent.edu
ALCOM: http://alcom.kent.edu/ALCOM/ALCOM.html
Short Course: http://alcom.kent.edu/ALCOM/shortcourse.html

LIQUID CRYSTALS
MATERIALS AND DISPLAY DEVICES
A Lecture/Laboratory Course

Electronic Newspaper Tablet using bistable reflective cholesteric technology invented at the Liquid Crystal Institute

Liquid Crystal Institute
Kent State University, Kent, OH

Sponsored by
ALCOM
National Science Foundation
Science and Technology Center
for Advanced Liquid Crystalline Optical Materials
http://alcom.kent.edu/ALCOM/ALCOM.html
Liquid Crystals: Materials and Display Devices

A hands-on lecture/laboratory course that provides a working understanding of liquid crystal materials and display applications. Laboratories provide participants with the basic skills required to use these materials effectively and fabricate TN, STN, ECB, and PDLC devices. Lectures and laboratory sessions will be held at the Liquid Crystal Institute, Kent State University, Kent, Ohio. Bus transportation will be provided between the Sheraton Suites and the institute each day.

Lectures

Fundamentals
- Introduction to liquid crystal phases
- Basic theory of liquid crystals
- Physical properties
- Relationship of chemical structure and physical properties

Liquid Crystal Device Physics
- Alignment layers and electric field effects
- Device configuration of TN, PDLC, ECB, STN, SmC*, and bistable devices
- Electro-optical properties
- Viewing angle limitations
- Modeling methods

Display Applications
- RMS addressed passive matrix displays
- PDLC devices
- Bistable matrix displays
- Ferroelectric displays
- Active matrix displays

Laboratories

Tour of ALCOM Laboratories
- Characterization facility
- PDLC development lab
- Polymer stabilized device development lab
- Prototyping facility
- Basic research labs

Principles of Device Fabrication
Hands-on construction of small liquid crystal cells demonstrating principles of:
- Polymer dispersed liquid crystal (PDLC)
- Twisted nematic (TN)
- Supertwisted nematic (STN)
- Electrically controllable birefringent (ECB)

Device Analysis
- Principles of operation
- Device characterization

Previous Participants
Past participants from the United States and Canada include 156 from a wide variety of industries, 12 from universities, the U.S. Army, Navy, Air Force, National Bureau of Standards, and Patent Office.

At the conclusion of the short course, participants evaluate all aspects of the course. Their comments and suggestions are incorporated in the planning of future courses. Comments from past participants include the following:

"Great balance between lecture and lab. Pure research and industry application."

"I thought the course was well-prepared, well-presented, and very informative."

"Great course. I will definitely recommend it."

"Keeping up on current research is important. PDLC's were all new to me. The course was very informative and well run. Accommodations and personnel were great."

Faculty

The course is taught by University faculty with active research and a minimum of ten years experience in the areas covered by their lectures. Previous faculty include:

David W. Allender
Chair, Department of Physics. Dr. Allender has given numerous invited lectures on fundamental properties of liquid crystals. His interests include modulation and instabilities, surfaces, and linear and nonlinear optical properties.

Philip J. Bos
Associate Professor, Chemical Physics Interdisciplinary Program. Dr. Bos is the inventor of the pi cell and an alignment method for SmC* devices. His research interests include novel liquid crystal devices and applications.

J. William Doane
Director Emeritus of the Liquid Crystal Institute. Dr. Doane is the co-inventor of the polymer dispersed liquid crystal (PDLC) and bistable reflective cholesteric texture technologies. He is a co-founder of Kent Displays, Inc.

Jack R. Kelly
Associate Professor, Chemical Physics Interdisciplinary Program. Dr. Kelly is the creator of the software package, "Twist Cell Optics." His research interests focus on modeling of display devices and physical properties of liquid crystals.

John L. West
Director, Liquid Crystal Institute. Dr. West is the co-inventor of PDLC devices. He concentrates research on the development of PDLC and cholesteric materials for use in electro-optic devices.

Deng-Ke Yang
Assistant Professor, Chemical Physics Interdisciplinary Program. Dr. Yang is co-inventor of bistable cholesteric display (BCD) technology, currently the world's most promising technology for electronic paper.
Liquid Crystals: Materials and Display Devices
A lecture/laboratory course

Date: September 25-28, 2001

Registration

Registration fee: $1,250
Fee includes:
- Registration
- Instruction and reference materials
- Breakfasts, lunches and refreshments, banquet
- Tour of LCI facilities
- Transportation between the LCI and the hotel

To register, complete the registration form and mail with full payment to LCI Workshop, College of Continuing Studies, Kent State University, PO Box 5190, Kent OH 44242-0001 or register via our Web site (see address below). To register by phone call (330) 672-3100, or toll-free in Ohio (800) 672-KSU2, or fax your completed enrollment form to (330) 672-2079. Please make check or money order payable to Kent State University or pay by VISA, MasterCard or Discover. Cash cannot be accepted at the College of Continuing Studies office.

Withdrawal/Cancellation Policy

The deadline for registration and payment is September 21, 2001. Cancellations received in writing prior to 48 hours before the workshop will receive a full refund. Cancellations received in writing within 48 hours of the workshop will receive a full refund minus a $20 processing fee. No refunds will be given after the workshop begins. If a program is canceled due to insufficient enrollment, all fees will be refunded. If you are unable to attend you may arrange to have a substitute attend in your place.

Location

Lectures and labs will be held at the Liquid Crystal Institute (LCI) at Kent State University. Transportation will be provided between the Holiday Inn, Kent and LCI each day. Parking permits are available for those wishing to drive to the LCI each day.

The City of Kent is located approximately 15 miles east of Akron, Ohio, and can be easily reached from the Cleveland Hopkins or Akron-Canton airports. The Holiday Inn is located at I-76 and Route 43 in Kent. Maps and directions to Kent and the campus are available from the Liquid Crystal Institute Web site (see below).

Hotel Accommodations

A block of rooms is being held for short course participants at the Holiday Inn, 4363 State Route 43, Kent, Ohio. Directions to the Holiday Inn may be found on the LCI Web site (see below). Room reservations must be made with the Holiday Inn (330) 678-0101 or 1-800-240-1881. You may register via the web at www.basshotels.com/holiday-inn?_franchise=AKRTT. Please identify yourself as a participant in the LCI liquid crystals short course to receive the discounted room rate of $69 per night. To ensure available space, reservations should be made on or before August 24, 2001.

Web sites

LCI: http://www.lci.kent.edu
ALCOM: http://www.lci.kent.edu/ALCOM/alcom.html
REGISTRATION: http://www.kent.edu/Continuing_Studies

LCI WORKSHOP
COLLEGE OF CONTINUING STUDIES
KENT STATE UNIVERSITY
PO BOX 5190
KENT OH 44242-0001
WHY CLEANROOM TRAINING?

Many industries use cleanrooms as part of their manufacturing process. In the 21st century, the need for personnel trained to work in such environments is becoming increasingly critical. The economic future of both Northeastern Ohio, and the former “rust belt,” in general, depends in part on emerging industries and small companies that use these controlled environments to minimize contamination during manufacturing. This is especially true of the biotechnology, medical device, pharmaceutical, circuit board and display industries. Not surprisingly, there is a shortage of trained workers.

Until now, a source of cleanroom training did not exist in Northeast Ohio and its proximity. Having learned from extensive work with the display industry, Kent State now provides cleanroom training and workforce development for a wide range of high technology companies. Since basic cleanroom protocols and procedures in sterile and non-sterile environments are similar, we have expanded our program to encompass both.

The training facility is housed in the Liquid Crystal Institute. The program in customized cleanroom training is a collaboration between the Liquid Crystal Institute and the College of Continuing Studies.

INSTRUCTOR

Michael R. Fisch received his Ph.D. in applied physics from Harvard University in 1981. After nearly 15 years in undergraduate education, he joined the Liquid Crystal Institute in 1999. He has more than 40 publications in soft condensed matter science and three patents in liquid crystal displays. His current professional interests include critical cleaning, cleanrooms, polymers and liquid crystals.

ABOUT LCI

Kent State University leads the nation and the world in academic liquid crystal research. The university's Glenn H. Brown Liquid Crystal Institute (LCI), founded in 1965, is the nation’s first and largest academic center devoted to basic and applied liquid crystal research. The LCI is unique in concentrating on both basic research and technological development. Technologies that use liquid crystals include low-power reflective displays, portable head-mounted computers, wireless communications, erasable optical recording media, and electronic books and signs. For additional information on Kent State’s Liquid Crystal Institute, visit www.liquidcrystal.org.

ABOUT CONTINUING STUDIES

The College of Continuing Studies extends the educational resources of Kent State University to learners of all ages by providing a broad range of programs designed for professional development, career enhancement and academic enrichment. To learn more about the College of Continuing Studies, visit our Web site at continuing.ksu.edu.

CONTACT INFORMATION

If your company is interested in a training program or additional information, contact Dr. Michael Fisch at (330) 672-9319 or mfsch@uci.kent.edu, or contact Marilyn Bokrass at (330) 672-8658 or marilyn@ccs.kent.edu.
## Appendix II

**DOCTORAL DISSERTATIONS ON LIQUID CRYSTALS**

<table>
<thead>
<tr>
<th>Date</th>
<th>Name, Title of Dissertation</th>
<th>Advisor/Department</th>
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<tr>
<td>1967</td>
<td><strong>GULRICH, LESLIE</strong>&lt;br&gt;X-Ray Diffraction Studies of the Nematic Structure of p-methoxybenzylidene p'-cyanoaniline&lt;br&gt;*DuPont</td>
<td>Brown Chemistry</td>
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<td>1970</td>
<td><strong>WILLEY, DAVID</strong>&lt;br&gt;The Thermodynamics of Dilute Solutions using Selected Liquid Crystalline Solvents&lt;br&gt;*Industry, Akron</td>
<td>Brown Chemistry</td>
</tr>
<tr>
<td>1972</td>
<td><strong>LEE, Y.S.</strong>&lt;br&gt;An Ultrasonic Shear Wave Study of the Mechanical Properties of a Nematic Liquid Crystal&lt;br&gt;*Industry, Taiwan</td>
<td>Brown Chemistry</td>
</tr>
<tr>
<td>1972</td>
<td><strong>LESSER, DAVID</strong>&lt;br&gt;Crystal Structure Analysis of X-Ray of 2,2'-Dibromo-4,4'-bis-(p-methoxybenzylideneamino) Biphenyl</td>
<td>Brown Chemistry</td>
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<td>August 1972</td>
<td><strong>HSU, Y.Y.</strong>&lt;br&gt;Studies of Liquid Crystals: Part I - Synthesis and Characterization of Selectively Deuterated Compounds with Mesomorphic Properties; Part II - Synthesis of Novel Schiff's Bore Compounds and the Investigation of Binary Systems with Nematic Properties&lt;br&gt;*Consultant, California</td>
<td>Fishel Chemistry</td>
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<td>Dec. 1972</td>
<td><strong>WILSON, JACK</strong>&lt;br&gt;Mossbauer Effect in a Smectic Liquid Crystal&lt;br&gt;*Retired</td>
<td>Uhrich Physics</td>
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<td>March 1973</td>
<td><strong>VISINTAINER, JAMES</strong>&lt;br&gt;Spin-Lattice Relaxation in the Nematic Liquid Crystalline Phase&lt;br&gt;*Research Scientist, Goodyear Tire and Rubber Co., Akron, Ohio</td>
<td>Doane Physics</td>
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<td>March 1973</td>
<td><strong>WISE, RAYMOND</strong>&lt;br&gt;A Nuclear Magnetic Resonance Study of Smectic C Liquid Crystals&lt;br&gt;*Retired</td>
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| June 1973 | **FELLNER, HANS G.** Light Scattering from Liquid Crystals  
*Professor, Slippery Rock University, PA | Franklin/Christensen  
Physics |
| August 1973 | **DETJEN, ROBERT E.** A Mossbauer Investigation of the Lattice Dynamics of the Smectic Liquid Crystalline State | Uhrich  
Physics |
| August 1973 | **KESS, SHARON** The Photostatistics of Brillouin Scattering by a Liquid Crystal  
*IBM Corp., R&D, Vermont | Franklin  
Physics |
| August 1973 | **MURPHY, JOHN A.** NMR Pulsed Gradient Studies of Diffusion in Liquid Crystals  
*Keithley Instruments, Solon, Ohio | Doane  
Physics |
| Dec. 1973 | **NANDY, PAPIYA SENGUPTA** Theoretical Studies of the Electrohydrodynamic Instabilities in Nematic Liquid Crystals  
*Instructor of Physics, Jadavpur University | Sauer  
Physics |
| March 1974 | **SCHENZ, ANNE FILLER** Optical and Faraday Studies of Liquid Crystals  
*General Foods, White Plains, NY | Neff  
Chemistry |
| June 1974 | **CHU, KWOSUN** Theories of Intermolecular Potential and Molecular Diffusion in the Mesophases of Liquid Crystalline Systems  
*Retired (NY) | Moroi  
Physics |
| June 1974 | **CHUNG, DAVID BUU-VINH** An X-Ray Study of the Crystal Structure and the Smectic E Structure of a Smectogenic Liquid Crystal -- Di-n-Propyl-p-terphenyl-4,4’-carboxylate  
*Research Scientist, Intel Corp., Santa Clara, CA | Brown  
Chemistry |
Chemistry |
| June 1975 | **PHOTINOS, PANAGIOTIS J.** Mean Field Study of the Formation of Uniaxial Smectic Liquid Crystals with Polarized Layers  
*Professor/Chair, Dept. Physics, Southern Oregon State Univ, Ashland | Saupe  
Physics |
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<td>June 1976</td>
<td><strong>AIMIWWU, VICTOR Q.</strong> Fe-57 Mossbauer Study of Four Ferrocene Derivatives in a Smectic B Liquid Crystalline Glass</td>
<td>Uhrich Physics</td>
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<td>August 1976</td>
<td><strong>MORITZ, ELAN</strong> A Class of Nonlinear Electrohydrodynamic Effects in a Nematic Liquid Crystal *Research Scientist, US Naval Coastal Systems, Panama City FL</td>
<td>Franklin Physics</td>
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<td>Dec. 1976</td>
<td><strong>UKLEJA, PAUL</strong> Spin-Lattice Relaxation and Director Fluctuations in Nematic Liquid Crystals *Professor, University of Massachusetts at Dartmouth</td>
<td>Doane Physics</td>
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<tr>
<td>June 1978</td>
<td><strong>BOS, PHILIP J.</strong> NMR Studies of Orientational Order in the Smectic C Liquid Crystalline Phase *Associate Professor, Chemical Physics, Kent State University</td>
<td>Doane Physics</td>
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<td>Dec. 1978</td>
<td><strong>BRISBIN, DOUGLAS J.</strong> Divergence of the Bend Curvature Coefficient above the Nematic-Smectic A Phase Transition: Freedericksz Transition *Research Scientist, General Dynamics Corp., Los Angeles, CA</td>
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<td>MAJOROS, STEPHEN J. A Test of Curvature Elasticity Above the Nematic-Smectic A Phase Transition</td>
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<td>*Lorrain Co. Community College, Elyria OH</td>
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<td>June</td>
<td>GRADDICK, WILLIAM The Effect of Calcium on the Thermotropic Phase Behavior of Dipalmitol</td>
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<td>Phosphatidylcholine (DPPC) Multilayers</td>
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<td>NAIKSATAM, PRAKASH Structure-Property Relationships of Thermotropic Liquid Crystals</td>
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<td>BAGINSKI, GERARD H. Proton Magnetic Resonance Study on Iron bis(cyclopentadienyl) in Nematic</td>
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<td>Solutions</td>
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<td>EKACHAI, ARUN X-Ray and Optical Studies of Several Smectic Phases</td>
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<td>*Lecturer, Prince of Songkla University, Thailand</td>
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<td>August</td>
<td>SETHNA, VIJAY N. X-Ray Diffraction Studies of the Skewed Cybotactic Nematic Phases</td>
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<td>*Industrial Scientist, Kaiser Electronics, San Jose, CA</td>
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<td>VAZ, NUNO A. Nuclear Magnetic Resonance Studies of Orientational Order in Lyotropic</td>
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<td>DEHOFF, RICHARD J. Specific Heat in the Vicinity of a Nematic-Smectic A-Smectic C Multicritical</td>
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<td>HAVEN, THOMAS J. Elastic and Viscous Properties of Nematic Systems in Aqueous Decylammonium</td>
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<td>Dec.</td>
<td>RICHARDS, BERNARD L. Rotational Diffusion in Nematic Liquid Crystals</td>
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<td>*Assistant Professor, Stark Campus, Kent State University</td>
<td>Moroi Physics</td>
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| May 1981 | LOCKHART, THOMAS E.  
Indices of Refraction at Smectic A-Smectic C Phase Transitions  
*Associate Professor, University of Wisconsin, Eau Claire | Gelerinter, Physics |
| August 1981 | KTORIDES, PETROS  
Mossbauer Study of the Smectic Liquid Crystalline Glass Phase Using Sn-bearing Molecules  
*Teaching, Cyprus | Uhrich, Physics |
| Dec. 1981 | KUZMA, MICHAEL R.  
Mean Field Study of Molecular Tilt in Uniaxial Liquid Crystalline Phases  
*Real Estate, Philadelphia | Allender/Johnson, Physics |
| Dec. 1981 | VAZ, MARIA J.  
Orientational Order in Phospholipid, Cholesterol-Phospholipid, and Protein-Phospholipid Bilayer Membranes: A DMR Study  
*Professor, Lawrence Technical University, Detroit MI | Doane, Physics |
| June 1982 | SHARMA, BRIJ B.  
Proton Magnetic Resonance in Nematic Solvents: Orientation and Structure of Anthraquinone Derivatives and a Linewidth Analysis of Benzene Spectrum  
*Research Scientist, Bell Communications, Piscataway, NJ | Saupe, Physics |
| June 1982 | SHETTY, ANIL N.  
Molecular and Segmental Orientational Order in Thermotropic Liquid Crystals: An NMR Study  
*Scientist, Imaging Center, William Beaumont Hospital, Royal Oak, MI | Doane, Physics |
| June 1982 | SHIH, LIH-BIN  
Laser Light Scattering of Surface Fluctuations of Liquid Crystals  
*Research Scientist, S.C. Johnson, Racine, WI | Brown, Chemistry |
| Dec. 1982 | YANIV, ZVI  
A Deuterium Magnetic Resonance Study of Biaxial Ordering and Self-Diffusion in Chiral Nematic and Smectic Phases  
*President, SL Diamond Technology, Austin TX | Doane, Physics |
| May 1983 | TODOROFF, DOUGLAS G.  
Sn-119 Mossbauer Investigation of Different Sn-Bearing Molecules in Nematic and Smectic Glasses  
*Research Scientist, US Naval Coastal Systems, Panama City FL | Uhrich, Physics |
## Doctoral Dissertations, 1967-2002

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<tr>
<td>August</td>
<td><strong>BENIGNI, SAMUEL P.</strong> An X-Ray Study on the Thermal Behavior of Potassium-Palmitate-Water Mixtures</td>
<td>Spielberg, Physics</td>
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<td><em>Staff Scientist, RCA, Inc., Lancaster PA</em></td>
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<td><strong>BIGGERS, RAND R.</strong> Thermal Properties Near the Nematic-Smectic A Tricritical Point</td>
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<td><em>Research Scientist, Wright Patterson AFB, Ohio</em></td>
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<td><strong>BOONBRAHM, POONPONG</strong> Optical Studies on Micellar Nematics and on Phase Transitions Between Nematic States</td>
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<td><em>Lecturer, Prince of Songkla University, Thailand</em></td>
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<td><strong>GOODEN, CLARENCE E.</strong> Light Scattering and Magnetic Deformation Study of the Nematic-Smectic A Transition</td>
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<td><strong>MAHAMOOD, RIZWAN</strong> Director Elasticity Above the Nematic-Smectic A Transition</td>
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<td><em>Associate Professor, Slippery Rock University, PA</em></td>
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<td><strong>ROTH, ROBERT A.</strong> Theoretical Studies on the Dielectric Permittivity of Liquid Crystals with Application to Alkylazoxybenzene Derivatives</td>
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<td><em>Research Scientist, US Air Force, Dayton, Ohio</em></td>
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<td>Dec.</td>
<td><strong>STEFANOV, MICHAEL E.</strong> Physical Properties of Nematic Decylammonium Chloride/Ammonium Chloride/Water Systems</td>
<td>Saupe, Physics</td>
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<td>May</td>
<td><strong>STRENK, LAWRENCE M.</strong> A Deuterium NMR Study of Orientational Order and Spatial Modulation in Phosphatidyl Choline Bilayers Including Those Containing Cholesterol and Protein</td>
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<td><em>Pres/CEO, Stenk Scientific Consultants, Middleburg Heights, Ohio</em></td>
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<td>August</td>
<td><strong>MARANDE, ROBERT P.</strong> Iron-57 Mossbauer Temperature Study of Smectic A., Smectic B and Smectic C Liquid Crystalline Glasses</td>
<td>Uhrich, Physics</td>
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<td><em>Assistant Professor, Behrend College, Erie, PA</em></td>
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| Dec. 1984 | **HAFIZ, NAJMA**  
Nematic Phases in Liquid Crystals: Theory of Uniaxiality and Biaxiality and an
NMR Study of Reectants | Allender/Doane  
Physics |
| May 1985  | **RAHMAN, JOLLY A.**  
The Development of Some Molecular Models for Smectic A Phases  
*Research Scientist, Tektronix, Inc., Beaverton, OR | deVries/Spielberg  
Physics |
| May 1985  | **SPIELBERG, JOHANAN**  
An EPR Study of Glass-Forming Liquids and Liquid Crystals | Gelerinter  
Physics |
| August 1985  | **HENDERSON, GIRARDEAU L.**  
Phenomena at the Isotropic - Nematic Transition Induced by Surface Order  
*Research Scientist, US Naval Coastal Systems, Panama City, FL | Allender  
Physics |
| August 1985  | **LIU, HSING-CHUNG**  
Analysis of the X-Ray Diffraction Pattern of the Skewed Cybotactic Nematic
Phase of p-n-Octyloxybenzoic Acid | deVries/Spielberg  
Physics |
| August 1985  | **VLACHOPOULOS, PETROS**  
Theoretical Studies of Local Orientational Order in Cholesterics and Cholesteric
Liquid Crystal Mixtures | Lee  
Physics |
| Dec. 1985  | **MOTTAKABBIR, KAZI A.**  
Quantum Simulations of the Ground State of the One-Dimensional Hubbard
Model  
*Postdoctoral Fellow, University of Texas, Austin | Lee  
Physics |
| May 1986  | **WU, BAO-GANG**  
Deuterium NMR of Asymmetric Motion and Molecular Ordering in Liquid
Crystals and Microdroplet Controlled Scattering in Display Applications  
*R&D Scientist, Advanced Display Systems, Amarillo, TX | Doane  
Physics |
| August 1986  | **LEE, YOUNG-HEE**  
Classical and Quantum Computer Simulation Studies: Molecular Dynamics of
the Kerr Effect in Carbon di-sulfide in Green's Function Monte Carlo
Calculations of the Electronic Correlation Energy in Atoms  
*Assistant Professor, Physics, Jeonbug National University, Korea | Lee  
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| Dec. 1986  | **CUNNINGHAM, BETH A.**  
The Influence of Monovalent Ions on Dipalmitoylphosphatidyl-choline Bilayer
Structure and Packing  
*Assistant Professor of Physics, Bucknell University, Lewisburg, PA | Lis/Doane  
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<td><strong>FIGUEIRINHAS, JOAO</strong>&lt;br&gt;A Deuterium Nuclear Magnetic Resonance Study of the SF Phase&lt;br&gt;*Scientist, Centro de Fisica da Materia Condensada, Lisbon, Portugal</td>
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<td><strong>LEWIS, MICHAEL E.</strong>&lt;br&gt;A Mode I Light Scattering Study of the Smectic-A Phase Near the NA Transition: Critical Behavior of the Layer Dilation Elastic Coefficient&lt;br&gt;*Lewis Consulting, Akron, Ohio</td>
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<td><strong>ZHOU, E</strong>&lt;br&gt;Curvature Elasticity of the Micellar Nematics&lt;br&gt;*Lecturer, Beijing University, China</td>
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<td><strong>GOLEMME, ATILIO</strong>&lt;br&gt;Nuclear Magnetic Resonance of Polymer Dispersed Liquid Crystals&lt;br&gt;*Research Scientist, Dept. Chemistry, University of Calabria, Rende, Italy</td>
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<td><strong>KLEMM, STEFAN</strong>&lt;br&gt;Quantum Simulation of Polyene Ground States&lt;br&gt;*Postdoctoral Fellow, University of Notre Dame, Notre Dame, IN</td>
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<td>August</td>
<td><strong>PHONPHOK, NASON</strong>&lt;br&gt;Effects of Anesthetic Membrane Solutes on Orientational Order in Lecithin Bilayer Membranes: An NMR Study&lt;br&gt;*Lecturer, Chulalongkorn University, Bangkok, Thailand</td>
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<td><strong>FRISKEN, BARBARA J.</strong>&lt;br&gt;Nematic Liquid Crystals in Electric and Nematic Fields&lt;br&gt;*Assistant Professor, Physics, Simon Fraser Univ., Vancouver, BC, Canada</td>
<td>Palffy-Muhoray, Physics/UBC</td>
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<td>May</td>
<td><strong>RISSER, STEVEN</strong>&lt;br&gt;Model Hamiltonian Calculations of the Nonlinear Polarizabilities of Conjugated Molecules&lt;br&gt;*Texas A&amp;M, Commerce, TX</td>
<td>Lee, Physics</td>
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<td>Date</td>
<td>Name, Title of Dissertation</td>
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<tr>
<td>August  1989</td>
<td><strong>WHITEHEAD JR., JOE B.</strong> Light Scattering from Polymer Dispersed Liquid Crystals</td>
<td>Doane, Physics</td>
</tr>
<tr>
<td></td>
<td>*Associate Professor, Physics, University of So. Mississippi, Hattiesburg</td>
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<tr>
<td>Dec. 1989</td>
<td><strong>VITHANA, HEMASIRI</strong> Light Scattering and Magnetic Field Deformation Study Near the Nematic-Smectic A Phase Transition: Critical Behavior of Twist and Bend Elastic Coefficients</td>
<td>Johnson, Physics</td>
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<td></td>
<td>*Research Scientist, Reveo, Hawthorne, NY</td>
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<tr>
<td>May 1990</td>
<td><strong>ERDMANN, JOHN H.</strong> Electro-Optic Response of Polymer-Dispersed Liquid Crystals</td>
<td>Doane, Physics</td>
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<tr>
<td></td>
<td>*Hana Microdisplay Technologies, Inc., Twinsburg, OH</td>
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</tr>
<tr>
<td>May 1990</td>
<td><strong>LEE, JONG-CHEON</strong> Theoretical and Experimental Study of the Homeotropic Surface Effect on the Cholesteric-Nematic Phase Transition of a Compensated Mixture</td>
<td>Allender/Neff, Physics</td>
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<td>*Research Scientist, Samsung Corporation, Seoul, Korea</td>
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<tr>
<td>May 1990</td>
<td><strong>PLUMLEY, SULAKSHANA</strong> Elasticity and Dynamic Properties of Ionic Micellar Mixtures</td>
<td>Saupe, Physics</td>
</tr>
<tr>
<td>Dec. 1990</td>
<td><strong>SUBRAMANIAM, RAVI</strong> Quantum Simulations of the Ground State Electronic Structure of Diatomic Molecules</td>
<td>Lee, Physics</td>
</tr>
<tr>
<td></td>
<td>*Research Fellow, University of Pittsburgh</td>
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<tr>
<td>Dec. 1990</td>
<td><strong>SUBRAMANYAM, SUNDAR</strong> Liquid Crystals Containing the Dibenzopyran Nucleus: Synthesis and Mesomorphic Properties of 3-(4-n-Alkoxybenzylidene-amino) Dibenzo[b,d]Pyran</td>
<td>Fishel, Chemistry</td>
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<tr>
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<td>*Research Fellow, University of Lowell</td>
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<tr>
<td>May 1991</td>
<td><strong>BOYD, DARWIN</strong> Mossbauer Studies of Some 1. Iron(III) Spin Crossover Systems and 2. A Cold Cholesteric Liquid Crystal</td>
<td>Uhrich, Physics</td>
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<tr>
<td></td>
<td>*Assistant Professor of Technology, Kent State University, Kent, OH</td>
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<tr>
<td>May 1991</td>
<td><strong>GLEESON, JAMES L.</strong> Instabilities During Directional Solidification of a Transparent Material</td>
<td>Palffy-Muhoray, Physics</td>
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<tr>
<td></td>
<td>*Associate Professor, Dept. of Physics, Kent State University, Kent, Ohio</td>
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<tr>
<td>August 1991</td>
<td><strong>SARKAR, MOINUDDIN</strong> X-Ray Study of Some Columnar Thermotropic Mesophases</td>
<td>Spielberg, Physics</td>
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<td></td>
<td>*Assistant Profesor of Physics, Tennessee State University, Nashville, TN</td>
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<tr>
<td>Date</td>
<td>Name, Title of Dissertation</td>
<td>Advisor/Department</td>
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</tr>
</tbody>
</table>
| August 1991 | SU, WEN-CHEN  
Part 1. Novel Syntheses of Substituted 6H-D(b,d) Pyrans by Pschorr  
Cyclization; Part 2. Synthesis and Studies of Mesomorphic Compounds Derived  
from 3-Amino and 3-Hydroxy-6H-D(b,d) Pyrans  
*Avery Dennison, Pasadena, CA | Fishel Chemistry |
| Dec. 1991 | CHEN, LI  
High-Resolution X-Ray Diffraction Studies of the Nematic to Smectic-A Phase  
Transition and the Frustrated Smectic A Phase | Kumar Physics |
| Dec. 1991 | CRAWFORD, GREGORY P.  
Nematic Liquid Crystals Confined to Cylindrical Cavities: A 2H-NMR Study  
*Assistant Professor of Engineering, Brown University | Doane Chemical Physics |
| Dec. 1991 | LIU, JIMING  
Line Defects in Biaxial Nematics and Critical Properties of Nematic-Isotropic  
Transitions Near the Landau Point  
*Computer Scientist, Pittsburgh, PA | Sauge Physics |
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Nonlinear Optical Properties of Liquid Crystals  
*CoAdna Photonics, Inc., San Jose, CA | Palffy-Muhoray Physics |
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Phase Separation Kinetics of Binary Liquid Crystal Polymer Mixtures  
*Research Scientist, Samsung Corp., Seoul, Korea | Palffy-Muhoray Physics |
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Dielectric Response of Polymer Dispersed Liquid Crystalline Films  
*SpectraSwitch, Inc., Santa Rosa, CA | Kelly Physics |
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Optical Fibers with Liquid Crystalline Cores  
*Philips Flat Displays, San Jose, CA | Palffy-Muhoray Physics |
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Novel Mesomorphic Systems Based on Heteromethylene Bridged Biphenyls  
*Postdoctoral Fellow, Virginia Tech., Blacksburg, VA | Fishel Chemistry |
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Effects of Polymers in the Rotational Viscosity of Nematic Liquid Crystals and  
Dynamics of Field Alignment  
*Instructor, Kangwon National University, Korea | Sauge Physics |
<table>
<thead>
<tr>
<th>Date</th>
<th>Name, Title of Dissertation</th>
<th>Advisor/Department</th>
</tr>
</thead>
</table>
| May 1993 | **PATEL, PREM L.**  
High-Resolution X-Ray Diffraction Study of Frustrated Smectics  
*Private Enterprise, Philadelphia, PA | Kumar Physics |
| August 1993 | **AMARASINGHE, NANDANA**  
Iterative Solutions to Nonlinear Wave Equation in a X(2) Medium and Permittivity Gradient Induced Polaration and Second Harmonic Generation in Inhomogeneous Media  
*Staff Scientist, SpectraSwitch, Santa Rosa CA | Moroi Physics |
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The Effect of Molecular Anchoring and Curvature on Confined Nematic Liquid Crystals  
*University of Massachusetts at Dartmouth | Doane Physics |
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Phase Behavior and Electro-Optics of Dispersions of Polymers and Low Molecular Weight Liquid Crystals  
*Research Scientist, Motorola, Ft. Lauderdale, FL | West Chemical-Physics |
| Dec. 1993 | **IANNACCHIONE, GERMANO S.**  
AC Calorimetric Study of Liquid Crystal Phase Transitions and Restrictive Geometries  
*Asst. Professor, Brandeis University, Waltham, MA | Finotello Physics |
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Calorimetric and X-Ray Diffraction Studies of Phase Transitions in Lyotropic Liquid Crystals  
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Dielectric Properties of Liquid Crystals: Polymer Dispersions and Chiral Smectic Phases  
*Dept. of Chemistry, University of Akron | Saupe Physics |
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High Resolution X-Ray Reflectivity Studies of Ordering in Liquid Crystal and Polymer Thin Films  
*Research Scientist, 3M Corporation, Minneapolis, MN | Kumar Physics |
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Polymer Stabilized Cholesteric Textures for Scattering Mode Projection Light Valves  
*Applications Engineer, Varitronics Corp., Hong Kong | Doane Physics |
<table>
<thead>
<tr>
<th>Date</th>
<th>Name, Title of Dissertation</th>
<th>Advisor/Department</th>
</tr>
</thead>
</table>
| Dec. 1994 | **LEE, SEUNGHEE**  
Paramagnetic Resonance (epr) Studies of Glass-Forming Polymers and Liquid Crystal Polymers  
*Chonbuk National University, Korea | Gelerinter Physics |
| Dec. 1994 | **LEE, SUNG HEE**  
Molecular Dynamics of Glass-Forming Polymer, Plasticized Polymers and Liquid Crystal Polymers: An Electron Paramagnetic Study  
*Applications Engineer, Hyundai Corp., Korea | Gelerinter Physics |
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Determination of Surface Anchoring of Nematic Liquid Crystals from Optical Response Measurements  
*Polytronix, Inc., Richardson, TX | Palffy-Muhoray Physics |
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The Effects of Polyethylene Oxide on Curvature, Elasticity and Viscosity of Micellar Nematic Cesium Perfluoro-Octanotate Water Mixtures | Saupe Physics |
| May 1995 | **KOTHEKAR, NATASHA**  
Modeling and Numerical Analysis of Surface Effects and Critical Phenomena in Nematic Liquid Crystals | Allender Physics |
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High Resolution X-Ray and Small Angle Neutron Scattering Studies of Liquid Crystal Structure  
*Postdoctoral Fellow, Los Alamos National Lab, NM | Kumar Physics |
| August 1995 | **DAI, SONG**  
X-ray Studies of Phase Transitions and Structures of Some Columnar Liquid Crystals  
*Research Specialist, Alltristar Corp., Mogadore OH | Spielberg Physics |
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Reflection from Imperfect Cholesteric Liquid Crystals: Basic Properties and Applications  
*Gelcore, Cleveland OH | Doane Physics |
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Critical Behavior of Heat Capacity Near a Nematic-Smectic A Tricritical Point  
*Computer Specialist, Cray Computer, NJ | Johnson Physics |
<table>
<thead>
<tr>
<th>Date</th>
<th>Name, Title of Dissertation</th>
<th>Advisor/Department</th>
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<tr>
<td>August 1995</td>
<td><strong>JI, YIMIN</strong></td>
<td>Kelly, Physics</td>
</tr>
<tr>
<td></td>
<td>Surface Anchoring at a Polymer/Liquid Crystal Interface in the Neighborhood of the Glass Transition</td>
<td>*Research Scientist, Corning, Inc., NY</td>
</tr>
<tr>
<td>Dec. 1995</td>
<td><strong>CHEN, JIANMIN</strong></td>
<td>Johnson, Physics</td>
</tr>
<tr>
<td></td>
<td>Nonrubbing Techniques for Alignment of Nematic Liquid Crystals: Fundamentals and Applications</td>
<td>*Colorlink, Inc., Boulder, CO</td>
</tr>
<tr>
<td>Dec. 1995</td>
<td><strong>FOLKS, RAYMOND</strong></td>
<td>Lavrentovich, Physics</td>
</tr>
<tr>
<td></td>
<td>Light Induced Instabilities in Smectics</td>
<td>*American Lighting, Inc., Michigan</td>
</tr>
<tr>
<td>Dec. 1995</td>
<td><strong>LU, ZHIJIAN</strong></td>
<td>Doane, Physics</td>
</tr>
<tr>
<td></td>
<td>Reflective Cholesteric Liquid Crystal Displays</td>
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<tr>
<td>May 1996</td>
<td><strong>HUANG, XIAO-YANG</strong></td>
<td>Doane, Physics</td>
</tr>
<tr>
<td></td>
<td>Field-Induced Transitions in Cholesteric Liquid Crystals: Dynamics and Applications in Displays</td>
<td>*Senior Scientist, Kent Displays, Inc.</td>
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<tr>
<td>May 1996</td>
<td><strong>JAMAL, SYED H.</strong></td>
<td>Kelly, Physics</td>
</tr>
<tr>
<td></td>
<td>Characterization and Optimization of Twisted Nematic Liquid Crystals: Dynamics and Applications in Displays</td>
<td>*Senior Project Engineer, Honeywell, Phoenix, AZ</td>
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<tr>
<td>August 1996</td>
<td><strong>DING, HONG</strong></td>
<td>Kelly, Physics</td>
</tr>
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<td></td>
<td>The Study of Dielectric and Electro-Optic Response of Liquid Crystals in Confined Systems</td>
<td>*Staff Scientist, Meadowlark Optics, Longmont, CO</td>
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<tr>
<td>Dec 1996</td>
<td><strong>QIAN, SIHAI</strong></td>
<td>Finotello, Physics</td>
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<tr>
<td></td>
<td>Liquid Crystal Phase Transitions in Porous Media</td>
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<tr>
<td>May 1997</td>
<td><strong>HU, GONGJIAN</strong></td>
<td>Palffy-Muhoray, Physics</td>
</tr>
<tr>
<td></td>
<td>Laser Induced Configurational Transition in Liquid Crystals</td>
<td>*Staff Scientist, dpiX, A Xerox Co., Palo Alto, CA</td>
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<tr>
<td>May 1998</td>
<td><strong>GALABOVA, HRISTINA</strong></td>
<td>Allender, Physics</td>
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<tr>
<td></td>
<td>A Theoretical Study of Surface Induced Phenomena in nematic Liquid Crystals</td>
<td>*Staff Scientist, Reveo Corp., Hawthorne, NY</td>
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<tr>
<td>Date</td>
<td>Name, Title of Dissertation</td>
<td>Advisor/Department</td>
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<td>May 1998</td>
<td><strong>WANG, XIAO-DING</strong></td>
<td>West/Allender Physics</td>
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<td></td>
<td>Polarized Ultraviolet Light Induced Alignment for Liquid Crystal Displays on well-Defined Polyimide Films</td>
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<td></td>
<td>*Staff Scientist, Micro Display Corp., San Pablo, CA</td>
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<tr>
<td>August 1998</td>
<td><strong>LIU, HONG</strong></td>
<td>Allender Physics</td>
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<td></td>
<td>Theory of Liquid Crystal Static Distortions in Uniaxial and Biaxial Nematics</td>
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<td>*Lecturer, Nanjing University, China</td>
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<td>May 1999</td>
<td><strong>HOKE, CHARLES D.</strong></td>
<td>Bos Chemical Physics</td>
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<td></td>
<td>Multi-Dimensional Alignment of Liquid Crystals and its Application to the Bistable Twist Cell</td>
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<td>*Staff Scientist, Hewlett Packard, Palo Alto, CA</td>
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<td>August 1999</td>
<td><strong>MORI, HIROYUKI</strong></td>
<td>Bos Chemical Physics</td>
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<td>Fabrication and Optical Effects of a Discotic Negative Birefringence Film for Liquid Crystal Displays</td>
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<td></td>
<td>*Staff Scientist, Fuji Photo Film Company, Japan</td>
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<td>August 1999</td>
<td><strong>WU, WEI</strong></td>
<td>Kelly Physics</td>
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<td></td>
<td>Single and Multiple Light Scattering Studies of PDLC Films in the presence of Electric Field</td>
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<td>*Research Scientist, Monsanto Corp., St. Louis, MO</td>
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<tr>
<td>Dec. 1999</td>
<td><strong>ZENG, HUAIREN</strong></td>
<td>Finotello Physics</td>
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<td></td>
<td>Liquid Crystal Orientational Order in Confined Geometries: An NMR Perspective</td>
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<tr>
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<td>*Postdoctoral Fellow, Yale University</td>
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<tr>
<td>May 2000</td>
<td><strong>ISHIKAWA, TOMOHIRO</strong></td>
<td>Lavrentovich Chem. Physics</td>
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<tr>
<td></td>
<td>Elasticity of Defects and Structures in Uniaxial Liquid Crystals</td>
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<td></td>
<td>*Postdoctoral Fellow, Kent State University, Liquid Crystal Institute</td>
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<td>May 2000</td>
<td><strong>MA, RUI-QING</strong></td>
<td>Yang Chem. Physics</td>
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<tr>
<td></td>
<td>Polymer Networks Formed in Liquid Crystals and Their Applications</td>
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<td>*Research Scientist, Corning, Inc., NY</td>
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<td>May 2000</td>
<td><strong>WATSON, PHILIP E.</strong></td>
<td>Bos Chemical Physics</td>
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<td></td>
<td>The Homeotropic to Planar Transition in Cholesteric Liquid Crystals</td>
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<td>*Research Scientist, 3M Company, Minneapolis MN</td>
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<tr>
<td>May 2000</td>
<td><strong>XU, MING</strong></td>
<td>Yang Chemical Physics</td>
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<td>Electro-Optical Properties of Cholesteric Liquid Crystal Devices and Applications of Dual Frequency Cholesterics</td>
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<td>*Research Scientist, Chorum Technologies, Richardson TX</td>
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<td>Date</td>
<td>Name, Title of Dissertation</td>
<td>Advisor/Department</td>
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</tbody>
</table>
| August 2000 | **COLEGROVE, JENNIFER**  
Optimization of Holographic Polymer Dispersed Liquid Crystal Device Performance  
*Kaiser Electronics, San Jose CA | Kelly  
Chemical Physics |
| August 2000 | **CUI, MINGJI**  
Temperature Dependency of Viscoelastic Properties of Nematic Liquid Crystals  
*CoAdna Photonics | Kelly  
Physics |
| Dec. 2000 | **ANDERSON, JAMES E.**  
Transitions from the Homeotropic in Cholesteric Liquid Crystals  
*Hana Microdisplay Technologies | Bos  
Chemical Physics |
| Dec. 2000 | **KONOVALOV, DMITRI A.**  
A Dynamic Light Scattering Study of Ferroelectric Phases of Chiral Smectic Liquid Crystals  
*Postdoctoral Fellow, Brandeis University | Sprunt  
Physics |
| Dec. 2000 | **MI, XIANG-DONG**  
Dynamics of the Transitions Among Cholesteric Liquid Crystal Textures  
*Research Scientist, Eastman Kodak | Yang  
Chemical Physics |
| Dec. 2000 | **TANG, ANLUN**  
Dynamics of Chiral Smectic-A and Twist Grain Boundary Phases of Liquid Crystals  
*KLA-Tencor, California | Sprunt  
Physics |
| Dec. 2000 | **TITUS, CHARLES M.**  
Diffractive and Refractive Liquid Crystal Beam Steering Devices  
*Postdoctoral Fellow, Liquid Crystal Institute | Bos  
Chemical Physics |
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Light Propagation in Complex Liquid Crystal Structure  
*Mgr., LC Technologies, LambdaFlex, Inc. | Palfy-Muhoray  
Chemical Physics |
| May 2001 | **LIU, WEIMIN**  
Characterization of Some Wide Viewing Angle Liquid Crystal Displays  
*Kaiser | Yang  
Chemical Physics |
| August 2001 | **ACHARYA, BHARAT RAJ**  
Correlation Between the Surface Properties and Liquid Crystal Anchoring on Polymer Films  
*Bell Lab/Lucent Technologies, Inc. | Kumar  
Physics |
<table>
<thead>
<tr>
<th>Date</th>
<th>Name, Title of Dissertation</th>
<th>Advisor/Department</th>
</tr>
</thead>
</table>
| August 2001 | **ASFAW, LETEMESKEL**  
Coherent Backscattering from Complex Liquids  
*Alcorn State University, Mississippi | Sprunt  
**Physics** |
| Dec 2001 | **HEINEMAN, DAVID**  
Kinetics of Patterned Electric Field Induced Polymer Segregation in Liquid Crystal Solutions  
*CoAdna Photonics, Inc. | West  
**Chemical Physics** |
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Photoinduced Aggregation in Cholesteric Liquid Crystals  
*Motorola | Laventovich  
**Chemical Physics** |
| Dec. 2001 | **ZHANG, FANG**  
Physical Properties of Cholesteric Liquid Crystal Displays  
*Dimensional Media, Inc. | Yang  
**Chemical Physics** |
| May 2002 | **WANG, BIN**  
Two Dimensional Liquid Crystal Devices and their Computer Simulations  
*Agilent Technologies | Bos  
**Chemical Physics** |