December, 2008

The 2008 International Display Research Conference was held at the University of Central Florida in Orlando on November 3-6. The conference program is available in PDF format: Program [PDF]. To make it easier to find the LC related topics:

- Session 1 - Reflective and Transmissive Displays (hosted by John West from KSU)
- Session 2 - LC Materials
- Session 7 - Flexible Displays (hosted by Deng-ke Yang from KSU)
- Session 11 - Wide-View and Fast Response LCDs (hosted by Phil Bos)
- Session 13 - Novel LCD Components.

There was also a poster session with a number of liquid crystal related papers.

In the Materials session there was a paper (3.3 by Roman Dabrowski et al. of the Military University of Technology in Warsaw, Poland) on high birefringence materials. Molecular structures that allow high birefringence were reviewed, and mixtures with full sets of properties provided. For example, a mixture with a nematic range of -20 to 126 was listed with a delta epsilon of 18.6 and a birefringence of 0.427.

Also in this section was a paper on two frequency materials (3.4 by Haiqing Xianyu et al. from the University of Central Florida) that showed representative molecular structures and reported properties of a mixture where delta epsilon changed from about -4 to +6, with a cross-over frequency of about 2 kHz.

Two papers that I noticed in that session was one on Continuous Pretilt-Angle Control (P12) and Flow Orientation of LCs in thin film coating process (P10).

Please have a look at the list of papers and be sure to let us know if you would like more information on any of the papers or topics related to them.

One interesting event at the conference was the 70th birthday party for Martin Schadt, the inventor of the TN cell. I have a short talk about his early work, and below is a photo of him. It was interesting to hear him recall that when he invented the TN, that LCs were not viewed as reliable, with much emphasis at that time being placed on LED and EL solid state devices.
CLEANROOM NEWS

The Clean Air Systems Wet Bench rebuild is now complete, and the unit is now in service. The work surface was rebuilt with tanks to accommodate 7”x7” glass substrates for develop / etch / strip processes. The Air Control Wet Benches are still available for larger glass processing.

The MRC 603III Sputter Coater suffered failure of a solenoid valve and main mechanical pump last month. At this time, the unit is operating as usual with a backup pump and replacement solenoid. Permanent repairs will take place in the next several weeks.

Over the intersession, a number of pieces of equipment will undergo maintenance, and the room layout will be modified to enhance productivity.

Some of the equipment being repaired:

1. **Brewer GX100 Large Area Spincoater**: troubleshoot/repair electrical issues related to CPU card, basic operation.
2. **GenVac Aerospace SC1 ion assisted e beam coater**: troubleshoot/repair ion gun (e-beam only operation is working properly at this time); repair safety interlocks
3. **Technics Plasma Etcher**: troubleshoot/repair vacuum leaks. System currently will not pump far enough to effectively light plasma.

If there are particular pieces of equipment that are of interest to you, or if you would like to see particular capabilities added to the room, please contact Doug Bryant.

LCI News

Recent Seminars

November 19: **Prof. Nongjian Tao**, Department of Electrical Engineering & School of Materials Research, Arizona State University, "Molecular Electronics and Sensors"

December 3: **Prof. Michael Rubinstein**, John P. Barker Distinguished Professor, Department of Chemistry, University of North Carolina at Chapel Hill, "Physics of a Lung: A Simplified View of Airway Surface Layer of a Lung"
December 10: **Prof. Nader Engheta**, H. Nedwill Ramsey Professor of Electrical and Systems Engineering, and Professor of Bioengineering, University of Pennsylvania, "Circuits with Light at the Nanoscale: Metananocircuits and Metactronics"

**Seminar Videos**

In case you could not attend some of the Fall semester LCI Seminars, you can still watch them on your computer by going to this IPP web site link: [http://www.lci.kent.edu/ipp/07/lciconnection.htm](http://www.lci.kent.edu/ipp/07/lciconnection.htm) and typing in the username and password that was provided to you recently.

Recorded presentations include the following:

- **December 3, 2008** - **Prof. Michael Rubinstein**, John P. Barker Distinguished Professor, Department of Chemistry, University of North Carolina at Chapel Hill, "Physics of a Lung: A Simplified View of Airway Surface Layer of a Lung"

- **November 19, 2008** - **Prof. Nongjian Tao**, Department of Electrical Engineering & School of Materials Research, Arizona State University, "Molecular Electronics and Sensors"

- **November 17** - **Prof. Margaret Frey**, Department of Fiber Science & Apparel Design, Cornell University, Ithaca, NY, "Formation and functions of high surface area fabrics"

- **November 5** - **Prof. Peixuan Guo**, Dane and Mary Louise Miller Endowed Chair in Biomedical Engineering, University of Cincinnati, "Single molecule detection of six pRNAs and direct observation of phi29 DNA-packaging motor with customized single molecule dual-view system"

- **October 27** - **Dr. A. Schönle**, Department of NanoBiophotonics, Max Planck Institute, Germany, "Fluorescence Nanoscopy Through Optical Switching"

- **October 6** - **Dr. Ivan Dozov**, Vice President for Research and Development, Nemoptic, Magny les Hameaux, France, "Weak anchoring and anchoring breaking in liquid crystals: Basic Physics and Applications"

- **September 24** - **Prof. Igor Sokolov**, Department of Physics and Department of Chemical and Biomolecular Science, Clarkson University, "Liquid Crystal Template Self-Assembly of Nanoporous Particles: Shape Control and the Applications"

- **September 10, 2008** - **Dr. Hiroshi Yokoyama**, National Institute of Advanced Industrial Science and Technology (AIST), "Nano-Craft of Liquid Crystal Surface Alignment: Theory and Implementation"

**Palffy-Muhoray Elected as Fellow of National Physics Organization**

Dr. Peter Palffy-Muhoray, a Kent State University professor of Chemical Physics and associate director of the Liquid Crystal Institute (LCI), has been elected a Fellow of the American Physical Society (APS). He is being recognized for his outstanding contribution to physics, especially for his creative exploration and contributions to the understanding of light-matter interactions in liquid crystalline systems.

Election to Fellowship in the APS is limited to no more than one half of one percent of the membership.

Palffy-Muhoray’s work, which is both experimental and theoretical, addresses a broad range of topics in condensed matter physics related to special properties of liquid crystals, such as those demonstrated in liquid crystal elastomers, which are materials that can bend and stretch.
LCI Director Dr. Oleg D. Lavrentovich, who nominated Palffy-Muhoray for the honor, says, “For more than two decades, Peter has been at the forefront of liquid crystal research and education, bringing new developments made possible because of his unique combination of deep physics insights and broad knowledge of specific properties of liquid crystals.”

Palffy-Muhoray has been associate director of the LCI for the past 17 years. During that time, he has initiated programs in liquid crystal research at high schools, launched the on-line journal, “e-LC” and leads several grant-funded projects. He also leads a multi-university research initiative on a new generation of “soft” liquid crystal-based materials.

He demonstrated how physics knowledge can be translated into high-tech products by launching, with Dr. Bahman Taheri, AlphaMicron Inc. which develops liquid crystalline optical devices. One of AlphaMicron’s products, switchable liquid crystal eyeglasses, received the Popular Science “Best of What’s New” award in 2004 and is currently enjoying an expanding market. SkyMall magazine currently features the switchable skiing UVEX goggles with switchable films developed by Palffy-Muhoray and his colleagues.
Two CPIP graduate students awarded Samsung Scholarship

CPIP Graduate Students Bohdan Senyuk and Stefanie Taushanoff were recently awarded a one-year Samsung Scholarship increasing their stipends to $22,000 per year. This scholarship is awarded each year to two Kent State graduate students who will be supported by the annual stipend. Both students will write a technical report at the end of each semester for submission to Samsung.

Recent Faculty Publications:

CPIP Professor Antal Jákli:

Philip Bos:
Bin Wang, Yanli Zhang, Yong Kyu Jang, Philip Bos “ Stabilization of the Symmetric Splay State and “Warm-up” time reduction in pi-cell devices”, Conference presentation at the International Display Research Conference , Orlando Fl Nov 4-6 (2008)
Lu to receive Newport Spectra-Physics Research Excellence Award

CPIP Student Lu Lu will receive a Newport Spectra-Physics Research Excellence Award at the upcoming SPIE Photonics West. The event will be held on January 27 in San Jose, California. Lu is a second-year graduate student currently working in Prof. L.-C. Chien’s lab.

National Science Foundation Day to be held at Kent State

The National Science Foundation (NSF) and Kent State University in partnership with the NEOUCOM, Cleveland State University, University of Akron, Summa Health System, and Youngstown State University are sponsoring a one-day workshop on February 10, 2009. 7:30 a.m. to 4:00 p.m. The workshop will be held at the Kent State Student Center.

These directorates and program directors are currently scheduled:
- Biological Sciences - JoAnn Wise
- Computer & Information Science & Engineering - Almadene Chctchelkanova
- Education and Human Resource - James Hamos
- Engineering - Ted Conway
- Geosciences - Richard Lane
- Mathematical and Physical Sciences - Debra Lockhart
- Social, Behavioral, and Economic Sciences - Frederick Kronz
- Office of International Science Engineering - Cynthia Singleton

This workshop will provide an introduction to and overview of the National Science Foundation, its proposal and merit review process, its crosscutting programs, and its international programs. There will also be presentations on the programs of selected NSF directorates. More information about the selected NSF programs be listed on this site as the event approaches. Participants will also be able to chat informally with NSF program managers.

The National Science Foundation is charged with keeping our nation's science and engineering enterprise healthy, dynamic and relevant, and with advancing science, mathematics, engineering and technology education at all levels from pre-AK through postdoctoral.

There is a $25.00 registration fee payable to Kent State University. The registration fee includes: admittance into the NSF program, continental breakfast, box lunch and parking. Online registration<https://commerce.cashnet.com/nsfd> is required. Registration will be limited, so please register early! (The direct address for online registration is https://commerce.cashnet.com/nsfd) Visit http://www.kent.edu/rags/ for more information about NSF day.