Final Call for Papers

SID '06

International Symposium, Seminar & Exhibition

June 4–9, 2006
Moscone Center
San Francisco, California, U.S.A.

Since 1962, a professional worldwide interdisciplinary society committed to the advancement of information display.

Society for Information Display
Come to SID 2006 in beautiful San Francisco and see the world of electronic information displays come alive! Join the 7,500-plus display scientists, engineers, manufacturers, entrepreneurs, marketers and end-users at the premier international display conference of the year!

SID 2006 Highlights

Technical Sessions
From tutorials and seminars covering information-display fundamentals, to keynote addresses by top-level executives, to groundbreaking presentations advancing every segment of the display industry, SID 2006 covers the full spectrum of display technology. Among the topics covered will be:

- High-Definition Flat-Panel Displays
- LCDs, PDPs & OLEDs
- Flexible Displays & E-Paper
- Image- & Signal-Processing Techniques
- Test & Measurement Equipment & Techniques
- Electronic Cinema & DLP
- Convergent Portable Devices

Business Enterprise
Business Conference: The dynamic business of information displays, including technology tradeoffs, and market and business dynamics, will be explored in comprehensive discussions led by display-industry experts.

Investors Conference: Leading public and private display companies will offer detailed presentations to securities analysts, portfolio managers, investors, M&A specialists, venture capitalists, investment bankers and display-company executives.

Exhibition
With 250-plus exhibitors from around the world showcasing the most innovative information-display products and prototypes, SID 2006 is North America’s largest and most important exhibition exclusively devoted to electronic displays.

For General information and paper-submission guidelines, visit www.sid2006.org

For registration information, contact Ralph Nadell, +1-212-460-8090 x 203 Ralph@sid.org

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**Format of Submissions**

All authors are required to upload their submission to http://www.sheridanprinting.com/pcm/sid. Please follow the instructions on the URL site. Submissions should consist of a 35-50 word abstract and a technical summary that follow the instructions below.

**Page 1: Paper Title, Abstract, Oral/Poster Preference, Symposium Topic, and Keywords.** Include the names of all authors with their affiliations, addresses, telephone/fax numbers, and e-mail addresses, and underline the name of the presenter when there are two or more authors. Your submitted 35-50 word abstract, highlighting the key details of your paper, will be published in the Advance Program if your paper is accepted. The abstracts are usually edited to accommodate the program format.

(A) Indicate if you wish to have your paper considered for oral or poster presentation. If you do not do so, the committee will consider your paper for both venues.

(B) Indicate whether the paper is intended for the Applications Sessions.

(C) For Symposium presentation, indicate the closest matching Symposium Topic from the list provided and include a minimum of two keywords below the abstract for use in a future database.

(D) Indicate whether the main author or presenter is currently a student.

**Pages 2-5: Technical Summary.** Include the first author’s name and the title of the paper on each page. A technical summary (FOUR-PAGE MAXIMUM) covering the following aspects is required.

1. **Objective and Background:** Briefly describe the goals and intent of your project, and give background factors that led to the new results.

2. **Results:** Describe, in detail, the specific results that will be presented at the SID 2006 Symposium. Please provide a technical description of how the results were achieved. Quantitative and/or graphical data should be included so that the Program Committee can properly evaluate your submission.

3. **Impact:** Discuss the significance of your work and compare your findings with previously published work.

4. **References:** List a few main references covering projects in related areas.

5. **Prior Publications:** Symposium papers must be original contributions. If your organization has published or presented material on similar work in English, please explain how the present material differs. Applications papers need not be original.

**Timetable**

The deadline for receipt of abstract and technical summary is DECEMBER 1, 2005. Notification of acceptance will be e-mailed by JANUARY 20, 2006 (February 13 for Late-News Papers). Authors of accepted papers will receive an “Authors Kit” with instructions for the preparation of the paper to be published in the Symposium Digest/CD-ROM. The paper shall consist of four pages of camera-ready copy, including illustrations, and is due March 3, 2006 (March 10 for Late-News Papers).

**Abstract / Summary Submissions**

Please follow the instructions and post your abstract and technical summary at the following URL:

http://www.sheridanprinting.com/pcm/sid

For further information contact:

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**Poster Session**

Poster sessions present the opportunity for a more interactive dialog between authors and the audience. A successful poster paper should be a high-quality innovative paper where the poster presentation format would promote the exchange of detailed information between specialists. Papers where the demonstration of a new technology, concept, or phenomenon can complement the presentation are particularly suitable for the poster format and are encouraged.

Submission requirements and review criteria are the same for both oral presentation and poster formats, and these two formats receive equivalent publication in the SID Digest of Technical Papers. As indicated under “Format of Submissions,” authors may state their preference for a poster or an oral paper presentation; however, the final assignment of accepted papers will be at the discretion of the program committee. Poster presenters are requested not to distribute handouts other than business cards.
Format of Presentations
Oral presentations will conform to a 20-minute format (15 minutes for presentation and 5 minutes for questions and answers). This year’s Poster Session will be held on Tuesday, June 6, between 4:30 and 7:00 pm. Accepted papers will be assigned to either oral or poster presentation at the discretion of the program committee.

SID ’06 Features
Technical Symposium ... Applications Sessions ... Poster Session ... Keynote Speakers ... Invited Addresses ... Author Interviews ... Short Courses ... Applications Tutorials ... Technical Seminars ... Awards Banquet ... Special Social Event ... Annual SID Luncheon ... Business Conference ... Investors Conference ... Vendor Exhibitions ... Vender Theatre ... and more!

Late-News Papers
A portion of the Symposium schedule will be reserved for Late-News Papers. These papers should describe the results of late-breaking and significant developments that merit special consideration for attention at the Symposium.

The deadline for Late-News Papers is January 20, 2006. Late-News Papers must follow the format described for regular submissions to the Symposium (page 2). Additionally, authors should include a statement describing why their paper deserves late-news status. Only a limited number of late-news papers will be accepted. Authors of accepted presentations must also submit a paper for inclusion in the SID Digest. Papers accepted for oral presentation will have 10-minute slots (8 minutes for presentation, 2 minutes for discussion).

Deadlines and Key Dates
Abstract / Summary ................. Dec. 1, 2005
Late-News Papers .................. Jan. 20, 2006
Late-News Digest Paper Submission Mar. 10, 2006
Sunday Short Courses ............. June 6, 2006
Monday Seminars .................. June 5, 2006
Symposium .......................... June 6-9, 2006
Applications Sessions ............. June 6-9, 2006
Applications Tutorials ............. June 7-9, 2006
Exhibition .......................... June 6-8, 2006
Vendor Presentations .............. June 6-8, 2006

Symposium Topics
The Society for Information Display encourages the submission of original papers on all aspects of research, engineering, application, evaluation, and utilization of displays. SID 2006 will feature topical sessions which focus specifically on selected issues or key developments. Paper submissions are welcome for any of the general symposium topics or any of the specific topical sessions listed below.

Active-Matrix Devices: Advances in the innovative development and implementation of active-matrix electronics into displays.

Applications: Unique and innovative applications of display technologies including, but not limited to, design, materials, and components in the consumer, industrial, commercial, and military fields.

Applied Vision / Human Factors: All aspects of vision, perception, and human factors as they apply to the design, image quality, and usability of all types of visual display systems.

Display Electronics: Circuits (integrated or otherwise) for displays, circuits-related image-processing algorithms, and electronic components for displays.

Display Manufacturing: All aspects of display manufacturing.

Display Measurement: Characterization and measurements of displays and display components.

Display Systems: Novel integration of displays into specialized devices, as well as systems-level aspects of electronic displays.

Emissive Displays: New developments in emissive displays such as PDPs, inorganic EL, and advances in materials, phosphors, etc.

FEDs and CRTs: Design and design methods utilized in cathode-ray tubes and FEDs, their components, and materials.

Organic Light-Emitting Diodes (OLEDs): All aspects of organic light-emitting-diode displays for both small-molecule and polymer types.

Projection Displays: Projection-display systems, key components, and materials used in applications such as consumer television, game systems, electronic cinema, computer desktop monitors, business presentations and training, commercial and military simulation, and medical imaging.

Liquid-Crystal and Other Non-Emissive Displays: Advances in the development of liquid-crystal materials, electro-optical effects, and devices, including materials development in other non-emissive display technologies.

Student Travel Grants
A limited number of student travel grants, up to $1000 each, will be made available to student authors of accepted papers. The deadline for requests is January 13, 2006 for regular accepted papers and January 20, 2006 for late-news accepted papers. Any requests that are submitted after these deadlines will not be considered. Note that the student must be the presenter of the paper. All requests need to be in writing and should be e-mailed to Mark Goldfarb at mgoldfarb@pcm411.com.
Topical Sessions

As part of the technical symposium covering the broad range of information-display topics listed, SID '06 will feature topical sessions which focus specifically on selected issues or key developments. Paper submissions are welcome for any of the general symposium topics or for any of the specific topical sessions described below.

ACTIVE-MATRIX DEVICES

Novel Active-Matrix-Display Devices & Addressing
The growing emphasis on higher-quality displays has led to numerous development efforts for devices, driving circuits, and techniques. Papers are invited which address new device structures, active-matrix driving methods, and the resulting improvements in the following display characteristics, including image enhancement, gray scale, power consumption, response time, contrast ratio, lifetime, driver cost, etc. Papers addressing a novel pixel structure coupled with a required new driving scheme are specially encouraged.

Integrated Active-Matrix Displays & Sensors
Poly-Si TFTs have enabled the integration of row and column drivers on the display glass. Increasingly, other circuitry, such as controllers, D/A converters, and dc/dc converters, are also integrated. a-Si:H can be also used for some level of integration such as integrated gate drivers. Papers that advance the state of the art of integrated active-matrix displays are solicited. Flat-panel image sensors can be manufactured with processes similar to those for active-matrix-display arrays. They are used for medical x-ray imaging and other sensor systems, including embedded sensors (e.g., image sensors integrated inside an LCD panel and an ambient light sensor using some display pixels.) Papers that describe the process, design, pixel circuits, and readout electronics for achieving the required performance and wide dynamic range are solicited.

Active-Matrix Flexible Displays & Organic TFTs
Active-matrix displays produced with low-temperature processes on flexible substrates can provide increased durability, better shock resistance, decreased weight and thickness, and unique product shapes. Contributions are sought on low-temperature a-Si:H, poly-Si or organic TFT processes and performance, flexible-substrate material issues such as chemical attack inertness or dimensional tolerance control due to shrinkage, compaction and/or warping, substrate material, and processing cost. Papers on flexible displays resulting from these developments are especially encouraged.

High-Performance Active-Matrix Displays
Flat panels have taken over most of IT market, including the notebook and monitor markets. However, a great deal of continuous efforts are required to provide high-performance active-matrix displays. In addition to a manufacturing-cost reduction, many TFT makers are improving the following display performance: wide format, larger size, high brightness, improved video image, high resolution, and wider viewing angles. For notebook computers in particular, active-matrix displays need to be thin, light in weight, of low power, and robust. Papers that highlight new active-matrix technologies, which improve the overall display performance, are encouraged.

Ultra-Low-Power Active-Matrix Displays
An ultra-low power consumption is extremely important for any portable display, including handhelds and notebook PCs. Ultra-low-power technologies include, but not limited to, super-high-aperture TFT, high panel transmittance, highly efficient backlighting, dynamic backlighting, low-\(V_{th}\) LC material, charge sharing or recycling, step charging, new driving scheme, low digital voltage, avoiding double voltage conversion, pixel memory, partial updating, highly reflective displays, etc. Papers are particularly encouraged in this area.

LCD TV
Because of its rapid improvement in display performance and HDTV infrastructure readiness, LCD TV is merging as a mainstream technology in consumer electronics. To ensure the penetration in the TV market, the active-matrix LCD TV must have high brightness, high contrast, gamma and color consistency over viewing angles, fast response times, and high-quality image processing, and must be manufactured in large sizes at low cost. This session will focus on active-matrix technology advances directed towards TV and HDTV applications.

AMOLED and Its Backplane Technology
Organic LEDs have been a focal point in the display industry because of its superb image quality and slim form factor. However, AMOLEDs must overcome the following obstacles in order to achieve high-volume production: differential aging, image burning, power consumption, backplane consistency, manufacturability, and cost. Papers related to AMOLED technologies, such as pixel structure, circuitry, and driving scheme, with an emphasis on its backplane advances, are solicited.

Active-Matrix Mobile Displays
Active-matrix displays are enjoying rapid growth in cellular phones, MP3 players, and other handheld applications. Special requirements for small mobile displays include low power consumption, sunlight readability, slim form factor, image quality, and video performance. Papers on reflective, transflective, and transmissive AMLCDs or AMOLED displays that address these needs and advance the state of the art are solicited. Contributions are also sought on novel pixel designs, process, high integration, and addressing methods for handheld displays.

APPLICATIONS

Vehicular/Avionics
Demands for greater functionality in automotive and avionics displays is growing. Full color, wide-screen formats, higher resolution and increased brightness and contrast, as well as lower costs, are needed to meet these market demands. This session deals with new and enhanced display technologies to meet emerging vehicular market applications.

Medical
Displays are broadly used in the medical profession to enhance information transfer and access medical histories, to enable broader use of “telemedicine,” and to enhance diagnostics. The full range of emerging medical-display products and systems, from head-mounted systems to aid in surgery, to high-resolution displays for x-ray diagnosis, will be discussed in this session.

Entertainment, TV, and Cinema
The era of e-cinema is upon us, with the possibility for major cost reductions in production and distribution that may restructure the entire industry. For small-screen sizes (no longer so small), flat-panel and projection televisions are now available at affordable prices, and viewing area and performance are improving steadily. Which display technologies will share in these markets? Which will dominate? This session is a forum for reviewing display developments in these areas and discussing these issues.
Topical Sessions

Personal and Near-to-Eye Displays
The information-display capabilities of PDAs, HMDs, cell phones, and handheld games, to name a few personal display applications, are expanding rapidly. Full color, improved performance, and (always) reduced costs are key display parameters needed to support the growth of the personal electronics markets. Papers describing the implementation of displays for these new applications will be presented in these sessions.

3-D and Stereoscopic Displays
Three-dimensional display systems are currently in use in medical imaging, character-readout displays (VFDs), tiled modules for robots, and (always) reduced costs are key display parameters needed to support the growth of the personal electronics markets. Papers describing the implementation of displays for these new applications will be presented in these sessions.

Display and usability guidelines derived from research on desktop monitors are often inappropriate for mobile communications, portable computing, and e-book devices. This session will focus on the usability challenges and address the human-factors issues associated with small displays in mobile devices.

Visual Quality and Optometric Factors for Virtual Displays
Near-to-eye virtual-image displays enable mobile access to large amounts of information. Visual comfort and image quality determine the success of these products. Laboratory and field experiences that document the unique visual and optometric properties of head-mounted and handheld virtual displays are sought.

Enhancing Visual Performance with 3-D Display Technology
Stereo displays provide a unique viewing experience. Due to the technology challenges they present, they have been limited to occasional cinema presentations. Systems that provide a 3-D experience for one or two viewers often involve methods for auto-stereographic presentation, and coupled with head and eye tracking. This session will focus on the ergonomic challenges of 3-D display.

Visualization Issues for Spectral or Medical Image Data
There has been an increase in the need for improved visualization of geographic information systems (GIS) data, combining a wide variety of input data types, such as spectral image, topographic, demographic, and historic data. At the same time, improvements in the visualization of medical DICOM images and the use of life-sciences data are also needed. Paper submissions on the relationship between human factors, display, and user interface design for these kinds of visualization needs are encouraged.

Color Management, Color, and Luminance Control
Color and gray-scale optimization are becoming increasingly important for high-performance displays used for critical color management applications or demanding operational environments. Demands for color and gray-scale performance currently exceed the capabilities of many display technologies. Papers are sought concerning the issues of color, luminance, and gray-scale performance for displays, with special emphasis on AMLCDs or other emerging display technologies.

Spatio-Temporal Issues for Displays
Liquid-crystal, plasma, digital light projection, and MEMS-based displays suffer from various artifacts, such as those produced by moving objects on the scene. This can occur due to scaling of the input signal resolution to the native display resolution, with compressed or noisy image data. For television or video applications, these issues are particularly important. This session spotlights the underlying physics, techniques to remove, and perceptual measurement of these artifacts.

Pixel-Data-Processing Algorithms and Visual Factors
Recently, a number of new techniques and algorithms for scaling, subpixel subsampling, halftone patterning, gamma correction, compression, and others have been developed to improve the performance of display systems, particularly liquid-crystal displays. These techniques depend critically upon the characteristics of the human visual system. Papers are solicited in this area for all displays, particularly as they involve the relationship between the data-processing algorithm and visual factors.

Human Factors for Mobile Communications and Computing
Display and usability guidelines derived from research on desktop monitors are often inappropriate for mobile communications, portable computing, and e-book devices. This session will focus on the usability challenges and address the human-factors issues associated with small displays in mobile devices.

Emitters for Field-Emission Displays
Contributions on all forms of non-thermonic emitters applicable to a flat display are welcome. Improvements in the I-V characteristics, uniformity, potential manufacturing costs, or reliability of cold cathodes are also appropriate for this session.

Field-Emission-Display Design
Integrated FED designs including emitters, spacers, sealing and exhaust processing, as well as overall device operation will be included in this session. Advances in FED components such as spacer design and construction are also welcome. New concepts in FED design will also be included in this session.

Color-Picture-Tube Design
This session will cover design considerations and simulations on electron guns, electron emitters, deflection yokes, shadow masks, glass panels, and funnels. Furthermore, the session will include interactions among the gun, yoke, mask, and shields and advances in materials to meet the demanding needs of higher performance and lower cost. This session will also examine recent advancements in manufacturing processes and technology, such as mask forming, screen processing, tube pumping, and tube-yoke matching.

Other CRTs
This session will address issues critical to the design and manufacturing of projection and miniature CRTs and deflection components. Also included are CRTs for 3-D (stereo) displays, medical imaging, character-readout displays (VFDs), tiled modules for stadium-sized displays, and lamps using hot or cold electron sources.
Topical Sessions

**Cathodoluminescent Screens and Coatings**
This session will focus on advances in phosphor materials, screening, and deposition techniques together with anti-reflection coatings and other surface-treatment techniques that are designed to optimize the contrast and other ergonomic properties of CRTs and FEDs.

**Visual Aspects of CRTs and FEDs**
This topic includes perception, various optical aspects and their measurement, as well as the ergonomic aspects of a cathodoluminescent display in its workplace.

**Data-Driven ICs, Intra-Panel Interconnects, and New Drive Schemes**
The presentation of high-quality video and graphics on large flat-panel displays requires a broad color gamut, large dynamic range, and crisp rendition of moving images. Papers should cover the advancements in intra-panel interconnects, new drive schemes for data and lighting, and new types of data-driven ICs required to deliver these improvements. This includes circuit and system design issues, power and EMI reduction techniques, and new packaging techniques including chip-on-glass (COG).

**Poly-Si Circuits**
The integration of driver circuits on the same substrate as a flat-panel display offers many advantages, but continues to present major challenges in system and circuit design as well as technology development. Papers should address the design and performance of integrated scan and data drive circuits for flat-panel displays, including poly-Si and a-Si TFT-AMLCDs and reflective light valves (LC or micro-mechanical) based on single-crystal-silicon substrates. Papers dealing with architectural and system-partitioning issues, yield and cost impact, and performance limitations as well as detailed circuit design approaches are encouraged.

**ICs for Mobile Electronics**
The need for lower-power displays for portable equipment has been the major driving force behind the development of many FPD technologies, and portable systems remain the dominant market area. At the same time, display performance requirements are becoming more and more demanding, and maintaining low power dissipation continues to push development and innovation. Papers are solicited that deal with system architecture, interface design, and circuits concepts that will reduce system and/or support higher performance, highly integrated displays, and display electronics in portable systems. Micro-power circuits for systems with super-low-power reflective displays are of particular interest.

**Video Interfaces and Digital-Content Protection**
The RGB analog interface has long dominated the display of digital information from computers. However, most flat-panel modules have digital interfaces. This has driven the establishment of data-transmission methods such as TMDS, LVDS, GVIF, etc. This session discusses the encoding methods, the physical layer design, the performance of interfaces, and the design of receiver and transmitter circuits. It also covers higher level protocols for the transmission of digital data to displays which can contain compression, selective refresh, delta transmission, etc. An integral part of any external digital interface is digital content protection. Papers discussing issues involved in implementing robust content protection are solicited for this session.

**Integrating Emissive-Display Electronics**
The emissive display, such as LEDs, PDPs, OLEDs, and FEDs, has some major advantages over non-emissive displays, such as LCDs and LCoS. However, these displays require different driver performance and driving schemes than non-emissive displays. This session solicits papers describing novel features, architectures, or circuits for various types of emissive displays.

**Video and Motion Electronics**
High-quality presentation of video requires different types of processing, depending on the nature of the content and the characteristics of the display used. The type of processing includes NTSC/PAL or MPEG decoding, noise reduction, deinterlacing, scaling, detail enhancement, color-space transformations, spatial-temporal dithering, and frame-rate conversion. This session will focus on innovative video-processing algorithms and circuits.

**Algorithm for Image-Quality Improvements**
As AMLCD prepares to displace the CRT as the mainstream video display, it has some ground to cover to provide image quality that is on par with the excellent performance of the CRT. Areas requiring continuing improvement include response time, contrast, gamma, color, and black level. In the case of response-time compensation, new areas for development are to produce sub-10-msec response times and to continue to find ways to reduce memory storage and bandwidth requirements. In addition to improving liquid-crystal response time, new approaches are being developed to compensate for the sample-and-hold characteristic of LCDs that leads to perceptual blurring of moving objects. In addition, new innovative algorithms are being developed to provide automatic contrast enhancement, improved black level, gamut remapping, and color enhancement. Papers on work on any such image-quality improvement for LCDs or other display types are solicited for this session.

**Display System Integration**
As semiconductor technology advances and cost pressures on all types of displays systems continue to grow, there is an increasing push towards integrating as much of the display system as possible, using deep submicron processes, stacked dies, and multichip modules. Papers are solicited on novel packaging schemes and new types of integration that lead to higher display system integration.

**Manufacturing of Non-Emissive Displays**
AMLCDs continue as the dominant display technology in a wide range of markets; in addition to the notebook computer and monitor markets, television applications are a clear target for this technology. The continued success of AMLCDs, particularly for large display applications, depends to a large extent on further optimization of manufacturing technologies while migrating to ever-larger motherglass. Areas of current optimization efforts include mask/complexity reduction, TACT time or yield improvements, and reduction in the consumption of manufacturing materials. In addition, as the motherglass moves into Gen 6 and Gen 7 sizes, the logistics of substrate handling and processing,
and overall factory layout, present significant manufacturing challenges. Papers discussing any of these topics are appropriate for these sessions. In addition to the above topics, papers describing advances in the manufacture of other non-emissive displays are solicited. These may include papers describing advances in the manufacture of poly-Si based AMLCDs such as advanced crystallization and activation methods and equipment; novel manufacturing methods for the production of STN-LCDs; or innovations in the manufacture of liquid-crystal on silicon (LCOs).

Manufacture of Emissive Displays
These sessions will cover advances in the manufacture of emissive displays. While the venerable CRT continues to find its market position under threat from a range of emissive and non-emissive display technologies, CRT manufacturers continue to refine their processes to improve performance and add new features at ever lower cost. Papers describing these advances are solicited for these sessions. Among the other emissive displays competing for a share of the CRT market are PDPs, offering a range of products with increasing size and resolution for large-diagonal display market. It is believed that PDP technology can offer significant competition in the large TV/HDTV market, with a continued reduction of manufacturing costs being a key to that success. Papers describing advances in this area are encouraged. Other emissive technologies, such as TFEL, FED, and OLED, are also continuing to receive development efforts and funding, leading towards full-scale manufacturing. Of particular interest are manufacturing techniques for FEDs utilizing carbon nanotubes. The future success of the new emissive technologies requires the development of robust, cost-effective manufacturing processes to yield defect-free displays at competitive prices. Papers describing advances in these areas are appropriate for these sessions.

Display Materials
Material developments to support the efforts of the display manufacturer are appropriate topics for these sessions. These topics include new substrate materials, properties, and handling methods; improvements in consumable materials such as photoresist and sputter targets; and performance-enhancing materials such as sealing frits, polarizers (including film and coated polymer type), and optical enhancement films.

Manufacturing Equipment
The advent of new display types, sizes, and features all mandate the development of new processing equipment and techniques. These sessions will focus on the development and application of new designs or unique adaptations of equipment for the manufacture of displays and/or production testing. Possible topics include equipment advances in the areas of robotic handling, thin-film deposition and patterning, spacer construction and/or application, final assembly, test, and repair. Papers are requested covering technology advancements for the manufacturing and handling of very large AMLCD motherglass and very large PDP glass, and in how this relates to both equipment and factory design. Also of particular interest are developments in the areas of automated optical inspection (AOI) and array repair.

Manufacturing Systems and Productivity
Market demands continuously drive display requirements towards greater optical performance at reduced cost. As new display manufacturers make the transition from development to production, a systems approach to manufacturing will yield the biggest reduction in cost. Papers dealing with this approach will be the focus of these sessions. Possible topics include cost reduction and systems integration, quality management and resource planning techniques, manufacturing economics, cost-of-ownership issues, environmental awareness, and the human factor in display manufacturing.

Additionally, alternate manufacturing techniques such as roll-to-roll processing are solicited for these sessions.

DISPLAY MEASUREMENT

Advances in Display Measurements, Equipment, Methods and Technology
All areas of physical display metrology continue to benefit from improvements in detectors, optics, computer controls, data reduction methods, etc. Authors are encouraged to submit papers which demonstrate how these improvements are being applied and the benefits they provide.

Perceptual Significance of Measured Display Artifacts
Defect detection and characterization are important considerations for display image quality. However, not everything that can be measured is perceptually significant. Papers are solicited that address the relationship between measurable and perceptible artifacts in displays and display components. Topics can include spatial, temporal, color, luminance, and other artifacts.

Optical Modeling of Flat-Panel Displays
Each new type of flat-panel display requires optical measurements to demonstrate its performance. Usually, numerical models are produced to aid the design process. Papers are solicited which explore the theory of these optical models and then correlate the models against measured results. Authors should carefully describe the physical measurement methods as well as the model details.

Performance of Display-Measurement Standards
Papers are requested which explore the issues of applying display measurement standards to real-world display characterization applications. Correlations between measured data and expected results and/or suitability of measured data to end-user application is preferred along with an exploration of other issues that arise.

Comparing Image-Quality Across Display Technologies
The vastly different physical properties of the various display technologies make it very difficult to design equivalent characterization methods. Papers are solicited which propose and evaluate measurement methods for comparing the image quality between display technologies in similar applications in repeatable and understandable ways.

Calibration and Verification of Instrumentation
The field of display metrology continues to benefit from the growing number of instrument developers, along with the ever increasing range of instrumentation designs. Along with this opportunity comes the challenge of verifying the accuracy and traceability of new instruments, as well as their suitability for a given task. Authors are encouraged to submit papers which describe their recent work in calibrating, testing, and validating new instrumentation for display measurement applications.

DISPLAY SYSTEMS

Avionics Displays and Systems
Avionics display systems are evolving with every new generation of aircraft to provide better human interfaces and new functions. Modern commercial airplanes such as the A380 and 787, commuter planes and business jets, transport airplanes, helicopters, and fighters have introduced new cockpit concepts and systems. On-board entertainment systems are also of increasing importance for commercial aircraft. Papers are solicited which describe cockpit display systems, multimodal interfaces, head-down dis-
Topical Sessions

plays, HUDs, enhanced vision systems, synthetic vision systems, and improvements to conventional avionic display systems.

**Backlighting Components and Systems**

Backlights for LCDs are becoming more important with the rapid growth of the LCD market. This session will cover the components and system technology of backlights. Areas of interest include new prism sheet structures, new light-guide plate technology (sheetless backlights), long-life hot-cathode fluorescent lamps for backlight applications, flat lamps for use as backlight light sources, new driving schemes for multi-lamp inverters, integrated backlight systems, and other topics related to backlighting components and systems.

**Backlight Optics and Technology**

Reducing power consumption is one of the main challenges for making LCDs competitive. Power-efficient design of the LCD’s illumination system, i.e., the backlight unit, directly affects overall luminous efficiency. In turn, efficiency and luminance uniformity are critical to total performance of the LCD system. The increased capability of LCDs depends on the improved performance of backlights and/or frontlights, therefore, evolution of the illumination system will have a direct bearing on the future direction of LCDs. Employment of micro-optics in the lighting design is an exciting subject. Papers that describe novel or improved technologies to advance the illumination system, including theory, simulation, and design using micro-optics, are solicited.

**Display Systems**

All papers covering the novel integration of displays into specialized devices, as well as system-level aspects of electronic displays, are solicited.

**Handset and Mobile Display Systems**

Display systems for highly portable applications, such as cellular phones and handhelds, present unique challenges and complex design trade-offs. Recent progress has resulted in significant improvements to mobile display products. System integration challenges are numerous and include achievement of long battery life, small form factors, light weight, higher resolution, deeper color depth, and wider gamut for natural image rendition, high readability in bright outdoor conditions, as well as very low light conditions, video capability, difficult environmental conditions, and ever-lower cost. This topical session will focus on recent innovations and mobile-system designs that contribute to reaching these goals, including mobile display devices and components, drivers and controllers, lighting systems, packaging solutions, touch screens, system electronics and software. Papers that describe original and innovative work in these areas of mobile display systems are solicited.

**LCD Contrast-Enhancement Systems**

Next to motion blur, the contrast of LCD panels is the limiting factor toward acceptance of LCDs for TV use. In particular, when viewing the screen in dark-room conditions, considering the display has to be dimmed for comfortable viewing, the contrast can be troublesome. Papers that deal with this problem, either via improvements in the panel, improvements via additional films, or via improved dimming of the backlight, are solicited.

**LCD Motion-Blur Reduction**

Recently, LCD systems have made great strides toward improved image quality. One of the final challenges for full acceptance of LCD TV is to achieve blur-free motion images. Possible solutions include improved driving methods, advanced image processing techniques, backlight modulation, or combinations of these technologies. Papers which address improved LCD motion image performance are solicited.

**LCD-TV Backlighting Systems**

LCD TV is a young but rapidly growing industry segment. Because of wide-viewing-angle and high-color-purity requirements, the resulting transmittance of the LC cell is lower than in other applications. In addition, LCD TVs need to be very bright and very uniform. The result is an extra-high-luminance and luminance-uniformity requirement for LCD-TV backlighting units. Many breakthroughs in design and efficiency are needed. Cost reduction of the LCD backlight is also required. Papers for LCD-TV backlighting that deal with novel solutions and innovative breakthroughs in the area of light-source technology, optical film technology, thermal-treatment technology, low-cost multi-lamp CCFL inverters, and related improvements are solicited.

**LED Backlights**

To achieve an LCD TV or LCD monitor with extended gamut, the key technical challenge is to develop and produce a backlight which employs and mixes red, green, and blue light from LEDs into uniform white light. Potential advancements in the LED backlighting arena include real-time dynamic color and brightness control, self-adjustment to maintain color and brightness levels over time, efficiency improvements, thermal management, a reduction in the blurring effect created by fast-moving images, improvements in color mixing and environmentally friendly mercury-free low-voltage operation. New or improved technologies that delineate the LED-backlight-based display, including theory, simulation, and design in each of the areas of optical, electrical, and mechanical design are solicited.

**Novel Displays**

New and even unconventional display systems of today are sowing the seeds for the new products of tomorrow. From micro-displays to handhelds to wall displays to projection systems, all sizes and approaches are of interest. Papers which create new concept display systems and may include novel devices, integration, or image processing are solicited.

**3-D/Stereoscopic Display Systems**

Three-dimensional display systems are continuing to evolve in the quest to increase the perception of reality for observers of 3-D scenes. Although the world is inherently 3-D, the vast majority of today’s displays are limited to 2-D views. Papers to help clarify the limitations of 3-D displays and to describe strategies employed to improve realism, usability, and 3-D content are solicited. Of particular interest are papers describing 3-D system hardware, software, user interface, content generation, and applications where the benefits attained by the users are measured.

**EMISSIVE DISPLAYS**

**Plasma-Display Panels**

The plasma-display-TV market is doubling every year, thanks to strong competition between Japan and Korea. By using new designs, the efficiency continues to improve, but further reduction of power consumption is needed. In addition to these features, advanced fabrication processes are required in order to lower the cost. New materials are needed to replace lead-containing frits and dielectric layers. For high efficiency operation at high xenon levels, the MgO layer has to be optimized or replaced. Papers concerning subjects related to the science and technology of innovative cell designs, materials, processes, image quality, and driving methods are solicited.

**Inorganic EL Materials and Displays**

There has been progress in the development of materials for efficient full-color inorganic EL displays. New panel structures using highly saturated phosphor or color-conversion materials
that realize full-color EL displays have been reported. Papers on EL phosphor materials and processing, EL device structures and modeling, color EL display design, fabrication techniques, performance characterization, and drive electronics are solicited.

**Light-Emitting Diodes**
Full-color super-large-area displays consisting of LEDs were brought into the marketplace due to the successful development of blue-emitting LEDs for wall and information displays. Papers which describe the science and technology of LED materials, phosphors for LEDs, and characteristics for display applications are solicited.

**Phosphors and Photonic Materials**
Plasma displays, field-emission displays, and CRTs are all light-emitting devices that use phosphors. The development of new phosphor materials and nanocrystal phosphors for these devices are expected to improve their reliability and luminous efficiency. Papers which describe the science and technology of phosphors for these devices and photonic materials for display application are solicited.

**Light-Emitting Diodes**

**Phosphors and Photonic Materials**

**Topical Sessions**

**SID Symposium**

**LCD Materials and Components**

**LC Modeling and Optimization**

**LC Alignment**

**Nanotechnology for Displays**

**Polymer Composites**

**Electronic Paper**

**LC-Based Optical Components**

**OLED Materials**

**Organic Light-Emitting-Diode (OLED) Displays**

**Liquid-Crystal and Other Non-Emissive Displays**

**LCDs for Advanced Monitor and TV Applications**
Large-area high-resolution LCDs are expanding their application area in the monitor and TV segments and are rapidly replacing conventional CRT TVs and becoming the mainstream. This session will focus on all topics related to LCDs for advanced monitors and TV applications with emphasis on the displays or key components for viewing angle, fast response, moving-image blur, and high video quality.

**Reflective/Transflective Displays**
With the trend to ever-more-portable and low-power electronic devices such as mobile phones, DSC, DVC, PDAs, e-books, games, laptops, small TVs, and DVD players, there is a growing need for reflective and transflective displays with improved visual performance. Many of these applications are demanding full-color video performance. Papers that cover this important field from basic electro-optical effects to the creation of display systems in which all aspects of the visual requirements are addressed are solicited.

**Flexible Displays**
Displays that can be curved, rolled, bent, or folded offer a variety of benefits to the consumer: lighter weight, damage resistance, and exciting new product designs. At the same time, manufacturers of flexible displays face new challenges in materials handling, electronics interconnection, and packaging. Papers addressing any aspect of flexible-display design or manufacturing, including cell design, mechanical modeling, processing of flexible substrates, and advances in flexible drive electronics, are welcome.

**LCs for Mobile Applications**
The performance under high ambient lighting and the power used by displays are critical factors for the success of mobile product applications. In this session, the latest improvements for both of these factors, as well as new concepts that may lead to future advances, will be covered.

**Low-Power and Bistable Displays**
Bistable displays offer many advantages such as no crosstalk and low-power operation. Bistable displays are ideal for portable and remote devices, as well as for applications such as smart cards. Absence of crosstalk also means bistable displays are capable of high resolution. Papers focused on the development and applications of BTN, FLC, BCD, and other technologies are solicited.
Topical Sessions

essence are of great interest. This includes injection, charge transporting, and emissive materials.

OLED Devices
Papers in the area of OLED device architecture with requisite color chromaticity, high power efficiency, and long operational lifetime at display level luminance requirements are sought. This includes analyses of the physics of OLED devices relating to these performance requirements. Of particular interest are deep-blue and white devices with high efficiency and long lifetime. In addition, novel architectures such as stacked, top-emitting, and OLEDs on flexible substrates are solicited.

Passive-Matrix OLED Displays
Contributions are welcome in the status and future promise of passive-matrix OLED displays. Novel display design and manufacturing technologies for the production of competitive monochrome and full-color passive-matrix flat-panel products are sought.

Active-Matrix OLED Displays
In the area of AMOLED displays, papers are sought for display design and performance for small- to large-area panels. Here, OLED displays utilizing polysilicon, amorphous-silicon, CMOS crystalline silicon, and emerging areas of organic thin-film transistors (OTFTs) are sought. Papers that discuss the progress and challenges for AMOLED display performance and manufacturing issues as compared to LCDs and plasma displays are of particular interest. Furthermore, papers on novel displays designs and technology such as flexible active-matrix displays are encouraged.

Large-Area OLED-Display Manufacturing
Papers on advanced fabrication technologies to manufacture both passive- and active-matrix OLED displays are welcome. Of particular interest are breakthroughs in the area of deposition and patterning equipment and processes that enable low-cost manufacturing (high yield and low tact time). More specific areas include high productivity vacuum, vapor, and solution-based technologies for depositing organics and electrodes. Furthermore, packaging and encapsulation advancements for novel designs such as top-emitting and flexible displays are solicited.

Light Sources and Illumination Systems
Projection systems using lamps as the source of light deliver only a small fraction of the available light to the screen. This session focuses on methods for improving this utilization, including improved condensing/integrating systems and polarization-recovery schemes. Lamps for light-valve projectors with improved arc size/shape, brightness, efficiency, lifetime, and spectral output are of great interest. Also, laser and other alternative light sources and their respective systems are included.

Color-Management Systems
Essentially all color video projection systems create complete images by combining red, green, and blue images or subpixels. As system architectures evolve from three-device to two- or single-device projectors, the requirements and challenges in this area evolve as well. Developments in color-management schemes, their unique technologies, key components, and modeling are included in this topical area.

Projection Screens
Increase in resolution and coherence of projected light/images have increased the demands on projection screens, both front- and rear-screen systems. This session seeks both technology surveys/comparisons as well as papers on advances in image-enhancing screen technology.

Electronics for Projection Displays
Drive and higher-level electronics/processors are key to light-valve-projector image quality and video performance. Large-area tiled displays are highly dependent on image processing for scaling as well as image performance. Developments in electronic system design, ASICs, and electronics/component integration are vital projection-display topics.

Opto-Mechanical Design and Thermal Aspects
Continuous efforts on total system miniaturization aimed at reducing form factor and weight in both front- and rear-projection systems amplifies the opto-mechanical and thermal-management challenges of the overall system. Novel approaches and component developments that provide solutions are of interest.

Simulation and Analysis of Projection-Display System Performance
This session is interested in papers which address the possibilities/capabilities of modeling and simulation to enhance system design and optimization in complex projection displays. Such modeling might include advancement in classical ray-trace (imaging) and lighting (illumination) design, visual science, polarization effects, thermal control, and component reliability, to name a few.

/projection displays

High-Resolution Projectors — HDTV, ATV, Electronic Cinema, Simulation
There are many applications for large displays with high information content, including advanced television systems (DTV and HDTV), electronic cinema, and simulators for training systems. This session will stress both new methods for producing high-information-content projected images and improvements in existing components, devices, and systems.

Image Generation from CRTs and Light Valves
Projectors using light valves are finding increasing application in portable projectors, as well as in higher lumen output fixed installations. This session will focus on new and improved light valves, their associated components, and system design for light-valve projectors. It will also address developments in projection-CRT image generation and processing which continue to "raise the bar" in performance.
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