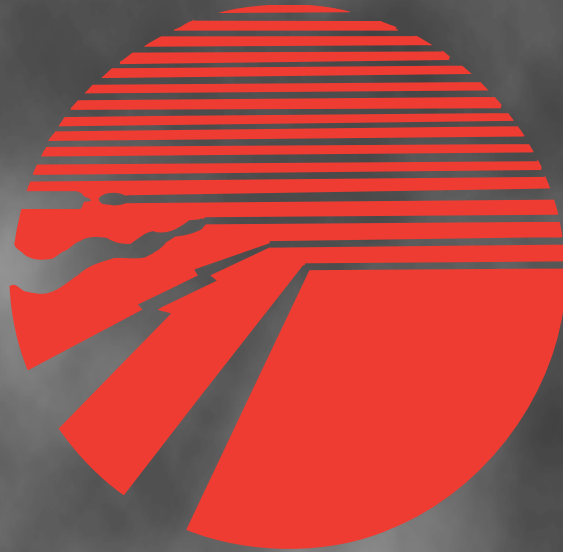


NIP19 Conference
Preliminary Program

NIP19

International Conference on
Digital Printing Technologies



Sept. 28 to
Oct. 3, 2003

Hyatt Regency Hotel
New Orleans, Louisiana

Sponsored by:



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Science and Technology

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Introduction

Join your colleagues in New Orleans, Louisiana for IS&T's NIP19: International Conference on Digital Printing Technologies. This conference continues the tradition of providing a forum for the discussion of all aspects of digital printing and related technologies.

- The **Tutorial Program**, from Sunday through Thursday, offers 33 tutorials on a wide variety of subjects. Detailed descriptions of the tutorials can be found in this program.
- Monday through Thursday will begin with **Keynote Addresses** by industry leaders from Hewlett Packard, Fuji Xerox, NexPress Solutions L.L.C. and dotrix nv.
- The three-track **Technical Program** will feature over 220 papers in twenty sessions, including three Special Topic sessions.
- Three **Special Topics Sessions** will offer invited presentations by experts in these areas, "*Digital Photofinishing*," "*Electronic Applications Based on Printing Materials and Processes*," and "*Pre-press and Post-press Systems*."
- The **Textile Forum and Exhibit**, held on Monday afternoon, will provide a chance to learn about the state-of-the-art textile and fabric printing technologies and to take a close-up look at digitally printed textiles.
- The **Print Gallery** will begin on Monday afternoon and the gallery will be on display until the end of the day on Wednesday.
- The **IS&T Awards Ceremony** will be held on Tuesday Morning after the keynote address.
- **Interactive Sessions**, from Monday through Thursday, the short oral previews portion of the interactive papers will be presented right after the regular oral technical sessions of similar subjects. On Tuesday and Thursday afternoons, the poster portion (all tracks) of the interactive papers will be presented. These sessions present an opportunity for one-on-one interactions with the authors. Light refreshments will be available during the poster presentations.
- The **Exhibition**, on Tuesday and Wednesday, will showcase a wide range of products, applications, and services related to printing and imaging.
- On Wednesday afternoon, there will be a **Panel Discussion on "Security Imaging"**.
- The **Social Program**, an "**Ice-Breaker**" on Sunday evening and the "**Conference Reception**" on Wednesday evening, offer great networking opportunities. If you work in the field of digital printing or related technologies, the NIP19 is the conference to attend!

New Orleans, Louisiana

NIP loves New Orleans's unique Old World charm and architecture. It's blend of Caribbean and Mediterranean style and soul, unique music, and many diverse and vibrant neighborhoods keep us coming back! There's so much to see and do: adventure tours on the bayous and alligator swamps, Mississippi riverboat rides, beautiful garden district homes, voodoo tales in haunted houses and grand plantation tours, fine art museums, the aquarium and zoo, cooking classes, one of a kind shopping ... and, of course, evenings out on the town for great jazz, blues and zydeco music and wonderful restaurants featuring the distinct Creole and Cajun dishes! Plan to bring your family and join us to make great memories at NIP19.

www.neworleanscvb.com

Special Topics Sessions

Digital Photofinishing

Digital photofinishing is an important application of non-impact printing processes, with workflow and systems implications as well as unique requirements for process, materials, and image quality.

Electronic Applications Based on Printing Materials and Processes

Materials and processes used in non-impact printing and conventional printing are being applied to electronics, at both the device level and for developing new manufacturing techniques.

Pre-press and Post-press Systems

Integrated software and hardware systems allow increased automation and more effective management of the printing workflow process. These advances enable the adoption of digital printing in graphic arts print production environments.

NIP19 Exhibitors

The Exhibit Hall will be open on Tuesday, September 30 from 9:30 am to 5:00 pm and Wednesday, October 1, 2003 from 9:00 am to 4:00 pm. Please join us.

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|--|--|--|

PANEL DISCUSSION: SECURITY IMAGING

Wednesday, October 1, 4:15 - 5:15 pm

Chair: Annette Jaffe, Consultant

This panel will discuss security imaging issues relating to currencies, packaging, CD labels, forensic issues, watermarking, digital embedding for traceability and authentication as well as related legal implications. Interested parties should contact the organizer, Dr. Annette Jaffe at annette_jaffe@earthlink.net or 408-298-8688.

Textile Forum and Exhibit

Monday, September 29, 5:00 - 7:00 pm

Chairs: Vince Cahill, VCE Solutions; and Chuck Woerner, DuPont

The Textile Forum will begin earlier in the evening this year than at previous NIP conferences. The Forum and Digital Textile Exhibit starts at 5:00 pm on Monday 9/29/03. The panel will focus on emerging technologies for textile printing and technical factors affecting user adoption. Chuck Woerner of DuPont will chair the discussion panel. Contact Vince Cahill at vince@vcesolutions.com or 717-977-7779 for information about displaying at the Textile Exhibit.

Print Gallery

You are invited to submit print samples to showcase your products or technologies. Authors of the Print Gallery will be able to exchange prints and take home a collection of the latest samples. On Monday at 5:00 to 6:00 pm, presenters will be available at the gallery for discussions. The state-of-the-art print samples will be displayed Monday through Wednesday. Contact Mamie Kam-Ng for more information, the standard print file, and to reserve your space for your display at mamie.kam-ng@kodak.com or 585-722-9117.

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Keynote Papers

Monday, September 29, 8:20 to 9:10 am

THE PRINTING INDUSTRY IS ENTERING THE DIGITAL ERA - FACT OR FANTASY?

Benny Landa, HP Indigo

Commercial printing is the last vestige of the analog era: a \$400 billion industry that has barely been touched by the digital revolution. Is this industry finally ready to yield? Or will the digital transformation of the printing industry continue to elude its pursuers? Is there a "killer app" that will blow this market open? If so, what are its key enablers? Will inkjet, xerography and liquid electrophotography all compete in this space? Does the Internet complement - or compete with - commercial digital printing? Lastly, what's the big deal - who needs it anyhow?

Benny Landa is the founder of Indigo, now a division of Hewlett-Packard. He serves as strategic advisor to HP CEO Carly Fiorina, has been granted over 140 U.S. patents and hundreds more worldwide, including Digital Offset Color patents and patents for Electroink that are at the core of the Indigo technology. In October 2002, Mr. Landa was awarded the Edwin H. Land Medal by the Optical Society of America and the Society for Imaging Science and Technology for his pioneering work in imaging and his entrepreneurial creativity. For his outstanding contributions to the industry, particularly the Indigo Digital Offset Color printing process. Mr. Landa was awarded the Institute of Printing's Gold Medal in 2000. In the words of the Institute, the Indigo Digital Offset Color printing process is "one of the most significant technological innovations in our industry since the development of offset printing more than 100 years ago."

Tuesday, September 30, 8:20 to 9:10 am

CHEMICAL TONER TECHNOLOGY AND THE FUTURE

Takayoshi Aoki, Fuji Xerox Co., Ltd.

This talk is about "The Chemical Toner Technology and The Future" and brief history, difficulty, breakthrough technology and potentials. Although chemical process toner seemed to be more suitable than melt-mix and crush method, chemical process toners such as suspension polymerized toner was not launched for some time yet. The first reason is its difficulty for charge control and the second, is poor blade cleaning applicability. Huge investment is also a barrier for hardware companies. But at the end of 90's, several powerful industries began to produce various types of chemical toners because of the technology breakthroughs such as: charge control improvement,

micro encapsulation method establishment, shape control process, smaller particle toner manufacturing process-improvement, color oilless capability realization, and so on. One of the dominant chemical processes is suspension polymerization toner from Nippon Zeon and Canon. The second dominant process is emulsion aggregation method toner from Konica and Fuji Xerox. Chemical toners are still low compared with conventional methods, but considering the much higher potentials of super high print quality for graphic arts, ultimate transfer efficiency, relative environmental advantage for CO2 reduction and other superior properties of their future possibilities, the amounts of production will increase explosively soon.

Takayoshi Aoki graduated from Kyoto University in 1974 (Faculty of engineering, Organic synthesis) and joined Fuji Xerox in 1982. For 15 years, his main activity was in toner and developer material design. After that, he has been the manager of toner and developer, photoreceptor and other chemical materials for xerography such as fuser. He holds 98 Japanese patents, 31 U.S. patents, and is the co-author of three books. His latest position is General manager of Chemicals Creation Center in Fuji Xerox. He is a member of the Imaging Society of Japan.

Wednesday, October 1, 8:20 to 9:10 am

EVOLUTION OF PRODUCTION COLOR PRINTING

Arun Chowdry, NexPress Solutions L.L.C.

In the last ten years, Digital Production Color Printing has evolved from an emerging segment of color printing to one that is ready for "prime time". We will review how technology developments have resulted in product attributes to satisfy customer needs for this segment. We will also discuss our view of the next frontier of customer needs, and predict how the industry will be able to satisfy these needs for the next phase of growth for this segment.

Arun Chowdry has been with NexPress since its formation in 1997, and is currently Chief Technical Officer and Vice President. He was part of the team that architected the NexPress platform and selected the technology sets for the first product and for future products. His career started at the Eastman Kodak Company, where he worked on novel imaging processes, development of high-quality color electrophotographic systems and new business opportunities for color electrophotography. At Kodak, he held positions of Laboratory Head (1981-92), Manager, New Business Opportunities (1993-95), and General Manager, Color EP Technology & Programs (1995-97). Dr. Chowdry is the author of 16 patents.

Keynote Papers

Dr. Chowdry received a bachelors' degree in electronics and electrical communication engineering from the Indian Institute of Technology, Kharagpur, India and a doctorate in electrical engineering from The Johns Hopkins University.

Thursday, October 2, 8:20 to 9:10 am

RELATING SECURITY PRINTING TO EMERGING DIGITAL PRINTING SOLUTIONS

Jan Van Laethem, dotrix nv

Today all documents that carry intrinsic value contain one or more security design features. Applications of security printing range from banknotes, passports and ID documents, to checks, lottery tickets and gift vouchers. Dramatic growth in product counterfeiting has also lead to more attention to the packaging of fraud-sensitive goods. It is clear that these markets have different demands, yet they share a common goal: to make life difficult for the counterfeiter through design complexity and authenticity verification features.

Today, we also notice an ever-increasing interest from the security printing industry in the developing technologies for digital printing. This

interest includes both opportunity as well as risk-assessment. An overview of existing and emerging technologies will be placed in comparison with the current practices for the production of security documents and brand protection. The various parameters (ink, substrate, and design) of digital printing and their relationship to the specific needs and concerns of the security printing industry will be discussed.

Jan van Laethem is Manager, Security Systems for dotrix nv. He began his career at Barco in 1989, where he started in software application development for CAD systems for the packaging design market. This work included the development of a CAD system specifically for the ceramics design market. Since 1993, he has been with the Security Systems Group, and was responsible for the design and implementation of the Fortuna digital design and assembly system. At the end of 2001, dotrix was created from the Industrial Printing Group of Barco. In his current position at dotrix, he is managing the Security Systems group, that develops and markets the Fortuna, SecuSeal, and SecuPass/Insider products. Mr. van Laethem holds an engineering degree in electronics.

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Tutorial Program

Note: We reserve the right to cancel tutorial classes in the event of insufficient advance registration. Indicate your interest early. Preequisites are noted in the descriptions for advanced courses.

T01 - 4 hour tutorial Sunday, September 28
8:00 am to 12:00 noon

DIGITAL HALFTONING IMAGE QUALITY AND THE HUMAN VISUAL SYSTEM

Instructor: Stephen Herron, Isis Imaging Corp.

This tutorial describes how halftone technology and the HVS interacts to provide the illusion of color images when little color actually exists. Attendees will learn how the various types of halftone screens communicate visual information and how each fail and succeed.

Topics include color gamut, dot shape retention, moiré avoidance, spatial frequency maintenance, the five laws of screen degradation, metadata use to control quality, types of quantification errors, print quality metrics, Human Visual System filtering, Human Contrast Sensitivity function, etc. Mathematical concepts are described with illustrations. The tutorial focuses on how dithering affects the quality of image reproduction. Mechanical artifacts are described only in relation to digital reproduction properties.

Benefits: This course will enable you to:

- Understand the complexities of the halftone process from metadata through bit-depth reduction and halftone pattern, shape, amplitude and frequency
- Understand how halftoning reproduces an image
- Understand how the Human Visual System decodes halftone code into color images
- Know how to select the appropriate halftone from the various technologies available
- Identify key criteria for judging halftone quality

Intended Audience: This tutorial is intended for engineers, scientists, and technicians who are interested in prepress and are concerned about color reproduction issues. The attendees should have a basic understanding of the halftone reproduction process.

Stephen Herron is with Isis Imaging Corporation. He is currently focusing on remote image-quality analysis, halftone screening, and non-primary ink-specific color space transformations. Previously he was Principal Engineer, color strategy, at Xerox Corporation. He holds patents in halftoning and color management. He is a frequent contributor to imaging conferences and has published over 25 technical papers on color and digital imaging. He has taught several electronic publishing courses. Mr. Herron received his master's degree in printmaking from Cranbrook Academy of Art in Michigan.

T01 - \$190/\$240

T02 - 4 hour tutorial Sunday, September 28
8:00 am to 12:00 noon

INTRODUCTION TO ELECTROPHOTOGRAPHY

*Instructor: Lawrence B. Schein,
Consultant*

Electrophotography is the primary technology used in copiers and laser printers. In this introduction the fundamentals of the technology will be discussed, from the basic six steps to the underlying physics of the process. Discussions will include the physics of development and transfer, our current understanding of toner charging, and the challenges of color electrophotography. The architecture of some commercial applications of color electrophotography will be examined.

Benefits: This course will enable you to:

- Understand the basic principles of the electrophotographic process
- Explain the more important advances that have occurred in electrophotography historically
- Compare the architecture of several mid-range copy machines
- Explain how a copier is converted into a printer
- Understand the physics of toner development, toner charging, and the transfer process
- Appreciate the technical challenges in making a color copier or printer
- Summarize commercially available color copier and printer architectures

Intended Audience: This course should be of interest to anyone working in the field of digital printing technologies.

Lawrence B. Schein received his Ph.D. in solid state experimental physics from the University of Illinois in 1970. He worked at the Xerox Corporation from 1970 to 1983 and at the IBM Corporation from 1983 to 1994. He is now an independent consultant. He has helped implement development systems in IBM laser printers, has proposed theories of most of the known electrophotographic development systems, and has contributed to our understanding of toner charging and charge transport mechanisms in photoreceptors. He is the author of "Electrophotography and Development Physics," a Fellow of the Society for Imaging Science and Technology, recipient of the Carlson Memorial Award in 1993, a Senior Member of the IEEE, and a member of the American Physical Society and the Electrostatics Society of America.

T02 - \$190/\$240

Tutorial Program

T03 - 4 hour tutorial Sunday, September 28
8:00 am to 12:00 noon

AN OVERVIEW OF INK JET PRINTING FROM AN INK PERSPECTIVE

Instructor: Alan Hudd, Xennia Technology

This class provides a detailed description of the complexities of developing new chemistries for the major ink jet printing technologies and an overview of the different printhead technologies from an ink chemist's perspective. The course will concentrate on describing the key design criteria for successful ink development and highlight the importance of good scientific understanding to ensure reliability, critical for any ink jet product. State-of-the-art characterization measurements will be presented to gain a better insight into the factors influencing reliability for different applications. A review of ink technology patents will be presented based on Pivotal Resources patents service, "Directions". Examples will be used to illustrate recent major technical breakthrough advances in new chemistry for ink jet. The status of a range of new industrial applications will be highlighted.

Benefits: This course will enable you to:

- Understand the key elements and design criteria for successful ink development
- Describe the processes influencing the development of new chemistries for ink jet printing
- Compare the ink properties required for the range of printhead technologies
- Predict reliability of ink jet products using state-of-the-art characterization measurements
- Summarize the status of the ink jet ink patent literature
- Identify recent technical breakthroughs in new chemistries

Intended Audience: This class assumes basic scientific knowledge. The class provides a useful background to anyone entering the ink jet industry and those seeking an efficient update in developments of ink jet technologies.

Alan L. Hudd founded Xennia Technology in April 1996, an independent contract ink jet technology house dedicated to developing new ink jet inks for industrial and office ink jet industries. In 1987, he joined Domino Printing Sciences and spent eight years as the Fluids Technology Manager, developing a wide range of ink jet inks for diverse applications. He is credited with a number of patents and significant innovations. He spent almost eight years with the Ministry of Defense and Royal Ordnance in the U.K., developing new solid polymer rockets for air to air missiles. Dr. Hudd graduated with a B.Sc. Honours degree in Chemistry and Physics, M.Sc. and Ph.D. research degrees in Polymer Chemistry from Manchester University.

T03 - \$190/\$240

T04 - 4 hour tutorial Sunday, September 28
8:00 am to 12:00 noon

COLOR QUALITY FACTORS IN DESKTOP PRINTING

Instructor: Gabriel Marcu, Apple Computer

This tutorial discusses and illustrates the most important quality factors of color reproduction for desktop printing. Elements such as reproduction technology, colorant/media interaction, geometric resolution, halftoning, color separation (including UCR/GCR), TRC corrections, gamut mapping will be examined for their influence on print quality. The importance of color management (including characterization and calibration) for high quality color reproduction is discussed. The influence of chromatic adaptation and the viewing conditions on evaluation of the print quality is highlighted. The role of measurement and interpretation of data (including gamut comparison) for color quality evaluation will be demonstrated. The importance of test and reference images is illustrated with examples.

Benefits: This course will enable you to:

- Identify the key elements in achieving a high color quality in printing
- Understand the technology limitations in achieving the high quality color reproduction
- Understand the concept of resolution, MTF and CTF and their contribution in deriving quality metrics
- Compare the color gamut on different media and understand the role of ink/media interaction
- Understand the role of tone reproduction, halftoning, color separation, gamut mapping on color quality
- Understand the difference between Gray Component Replacement and Under Color Removal techniques and their contributions in the high quality color reproduction
- Understand the influence of halftoning in achieving a high quality color reproduction and the practical limitations due to dot gain
- Identify the advantages and limitations of CMM in achieving high quality color reproduction in desktop printing
- Recognize the role of characterization and calibration for accurate color reproduction
- Understand the role of adaptation in judgment of color quality
- Understand the importance of the viewing conditions for color quality evaluation
- Select the test and reference images and use them effectively to evaluate the quality of color reproduction

Intended Audience: The tutorial is intended for engineers, scientists and managers confronting color quality issues in color reproduction. Participants should have familiarity with color imaging and computer systems.

Tutorial Program

Gabriel Marcu is Senior Scientist in ColorSync group, at Apple Computer. His achievements are in color reproduction (device characterization and calibration, halftoning, gamut mapping, ICC profiling). Dr. Marcu has taught seminars and short courses on color topics for Shizuoka University, Japan ('92, '93), UC at Berkeley (April, '97), Electronic Imaging Symposium '98-99, IS&T/SID's CIC '98-2000, IS&T's PICS '99-2000. Since 1998 he is Co-Chair of the IS&T/SPIE EI Conference on Color Hard Copy and Applications, San Jose, CA and in 2003 he is the General Co-Chair of the IS&T Color Imaging Conference, Scottsdale, AZ.

T04 - \$190/\$240

T05 - 4 hour tutorial Sunday, September 28
8:00 am to 12:00 noon

DIGITAL PHOTOGRAPHIC PRINT PERMANENCE:

**An Update on an Increasingly
Competitive Market, Applicable Accelerated
Test Methods, and A Review of Current and
Future ISO Standards**

*Instructor: Henry Wilhelm,
Wilhelm Imaging Research, Inc.*

As inkjet, dye-sub, and other types of digital photo printers continue their expansion into mainstream markets, many questions are being asked about how the permanence of various types of digital prints compares with that of traditional silver halide color prints (which, with the rapid proliferation of the Océ LightJet, Durst Lambda, Fuji Frontier, and other silver halide digital photo printers, comprise an increasingly important component of the total digital print market). This tutorial will give an overview of the many factors affecting color print permanence. Looking at a print will tell you nothing about how long it will last. Attempting to answer the complex question, "How long will it last?" requires a full range of accelerated aging tests. In this course, the similarities and differences between inkjet prints made with dye-based inks, inkjet prints made with pigmented inks, dye-sub prints, and traditional silver-halide color prints in the context of image stability are discussed, and applicable ISO and other test methods are described.

Benefits: This course will enable you to:

- Understand the important role of image permanence in the development and successful marketing of new printers, inks, and media
- Differentiate between dye-based and pigmented inks from an image permanence perspective
- Discuss the substantial influence of media and ink receiving layer formulation on the permanence of both dye-based and pigmented inkjet prints – swellable-polymer, microporous, and other types of inkjet media

- Apply accelerated light stability tests and reciprocity failure evaluations
- Explore existing ANSI and ISO image permanence test methods standards – including status of work on forthcoming ISO standards for evaluation of the permanence of digital photographic print materials
- Understand the role of visible light and UV radiation in fading and color balance changes of various types of prints – how much benefit are UV absorbing framing and lamination materials
- Understand the "window test" for display of photographs and graphics in commercial store windows
- Understand dark stability (thermal aging), including yellowing of the substrate, fading, and color shift of image colorants
- Explore potential humidity-fastness issues with dye-based inkjet inks, the substantial influence of media, and applicable test methods
- Understand water-fastness tests with inkjet prints
- Define gas-fading and how it can affect dye-based images on microporous paper as well as other ink/media combinations
- Describe physical degradation – embrittlement, delamination, surface scuffing, and other forms of physical deterioration

Intended Audience: Administrators and marketing personnel, along with scientists and engineers involved in printer, ink, and media development and evaluation, will benefit from this course. This is an entry-level course intended to give attendees a good understanding of the subject from the perspective of both the consumer and printing systems suppliers in what has become a highly competitive field.

Henry Wilhelm is the president of Wilhelm Imaging Research, Inc. www.wilhelm-research.com. The company conducts research on the stability and preservation of traditional and digital color photographs and motion pictures. Wilhelm Imaging Research specializes in the image permanence evaluation of inkjet prints and counts among its clients many of the world's leading inkjet printer and media. In 1978 he was a founding member of American National Standards Institute Subcommittee IT9-3 (now ISO Working Group 5/Task Group 3) that is responsible for developing standardized accelerated test methods for the stability of color photographs and digital print materials; for the past nineteen years he has served as Secretary of the group. Mr. Wilhelm is also an active member of the ISO Task Groups responsible for storage standards for black-and-white films and prints. He was a founding member of the Photographic Materials Group of the American Institute for Conservation of Historic and Artistic Works. Mr. Wilhelm and contributing author Carol Brower are the authors of the 744-page book, *The Permanence and Care of Color Photographs: Tra-*

Tutorial Program

ditional and Digital Color Prints, Color Negatives, Slides, and Motion Pictures. Wilhelm Imaging Research is also a consultant to museums, archives, and commercial collections on sub-zero cold storage for the very long-term preservation of still photographs and motion pictures. Mr. Wilhelm has been a consultant to the Museum of Modern Art in New York and other institutions on issues related to the display and preservation of both traditional photographic prints and digital print media. Since 1995 he has been an advisor to Corbis on the long-term, sub-zero preservation ($-20^{\circ}\text{C}/-4^{\circ}\text{F}$ at 35% RH) of the Corbis/Bettmann photography collection. Mr. Wilhelm is a frequent speaker on inkjet printing technologies and print permanence at industry conferences, trade shows, and museum conservation meetings.

T05 - \$190/\$240

T06 - 4 hour tutorial Sunday, September 28
1:00 to 5:00 pm

PHOTOGRAPHIC QUALITY DIGITAL IMAGING: REQUIREMENTS, TECHNOLOGIES, CHALLENGES

*Instructor: James C. Owens,
Torrey Pines Research*

The technologies of photography, printing, and display have developed dramatically in the last two decades, leading to new applications and to startling changes in both workflow and overall business structures. The challenge for technologists is to match or exceed the visual quality of traditional photography while maintaining comparable system robustness. We will review the most important aspects of image quality and image appearance preference, the characteristics of digital cameras and scanners, the pitfalls of color management and file format conversion, the several technologies for creating or depositing colorants on substrates, and the problems of media design. Finally, we will examine particularly important image artifacts as well as insights into their causes and elimination.

Benefits: This course will enable you to:

- Identify the major business applications of photographic-quality color printing
- Explain the importance of workflow simplification for the photofinishing wholesaler, retailer, and customer, and develop analogous procedures for other businesses
- Describe the most important attributes of image quality and customer preference
- Select appropriate image capture devices and be aware of file format and color management issues
- Explain and compare the principles, advantages, and disadvantages of the major color printing technologies
- Recognize the appearance and causes of the

most common image artifacts produced by digital systems and develop designs that avoid them

- Select and apply the most appropriate technology for a given application

Intended Audience: Engineers, scientists, product planners, and end users needing a broad understanding of imaging technologies in order to choose the appropriate process and tailor it for a given application will benefit from this class.

James C. Owens is a physicist with 30 years' experience in the development of many types of imaging systems at the Research Laboratories of Eastman Kodak Company, where he received the C. E. K. Mees Award for his work on infrared laser printing. He is currently the Senior Fellow of Torrey Pines Research. He is a Fellow, past President, and past Visiting Lecturer of the IS&T; the Vice-Chair of the New York State Section of the APS; the past President of the Rochester Section of the OSA; and a member of the IEEE.

T06 - \$190/\$240

T07 - 4 hour tutorial Sunday, September 28
1:00 to 5:00 pm

INTRODUCTION TO TONER TECHNOLOGY

*Instructor: George P. Marshall,
Lexmark International, Inc.*

This course will include an introduction to electronic printing technologies and define the place of electrophotography in its various embodiments. One common element - toner - will be discussed in terms of architecture, formulation and implementation in each of these embodiments. Various toner design criteria and performance requirements will be discussed. Analytical and measurement techniques will be surveyed, including size, charge and rheological attributes. Recent product introductions will be reviewed and present and future trends in toner technology will be discussed. A glossary and bibliography for future reference will also be provided.

Benefits: This course will enable you to:

- Understand the various implementations of electrophotographic printing and the role that toner plays in each
- Recognize the design criteria and performance requirements of toner in an EP printing subsystem
- Comprehend toner manufacturing alternatives for commercial devices
- Compare the market implementation of the various toner technologies and the potential for future market domination

Intended Audience: This class is directed toward anyone seeking an introduction to electrophotography, electrophotographic printing, supplies technology or related development activities. An

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interest in toners or carriers is helpful. No working knowledge of electrophotography will be presumed nor is required.

George P. Marshall is a Senior Technical Staff Scientist in the Imaging Solutions Division of Lexmark International, Inc. He has been involved in multiple aspects of copier and printer development. He has developed toner formulations for IBM and Lexmark printers and is a recognized figure in the area of electrophotography and related supplies disciplines. His interests include toner charge control, rheology/fusing, print quality evaluation and toner processing. He received his Ph.D. in Organic Chemistry from the University of Arizona in 1978 and worked for IBM Corp. Office Products Division from 1978 until 1991, at which time a divisional sale created Lexmark International, Inc. He has worked in the Toner Development Group since 1978. He served on the Board of Directors of IS&T, edited IS&T's Recent Progress in Toner Technology (December, 1997), and is a member of the Editorial Review Board for Particulate Science and Technology: An International Journal. He received Lexmark's highest employee honor 'Customer for Life Award', in 1996.

T07 - \$190/\$240

T08 - 4 hour tutorial Sunday, September 28
1:00 to 5:00 pm

DIGITAL PRODUCTION PRINTING (Technologies, Methods and Systems)

*Instructor: Helmut Kipphan,
Heidelberger Druckmaschinen AG*

This course offers an overview of high quality digital production printing. Digital production printing demands equipment that produces high quality prints, exhibits high productivity, and is highly reliable; such systems are in use in commercial printing establishments, at in-house print shops, at data centers as well as offices and print shops of large organizations. The course describes several versions of systems for digital printing, all based on the fully digital defined print products, including conventional techniques, non-impact-printing technologies as well as hybrid printing technologies for sheetfed and web printing systems. We will also discuss computer-to-plate, computer-to-press/direct imaging and computer-to-print. We will also pay special attention to system architecture including single pass and multipass design. The course will also cover print quality specification, pressroom networking, and digital workflow. Print production strategies like centralized and distributed printing, versioning, customization, personalization, print on demand and book on demand will be a section of this course. The course will offer descriptions

and comparisons of state-of-the-art equipment of many manufacturers worldwide. We will also discuss electronic media and future requirements, demand, and technological trends.

Benefits: This course will enable you to:

- Understand the several printing technologies for print media production
- Differentiate/understand the various workflow steps premedia, prepress, print, postpress/finishing, distribution for producing print media based on digital described print products
- Understand the basic principles of conventional, NIP-based and hybrid printing production systems
- Select production tools/solutions for your special application and customers demands
- Identify and discuss technologies of digital printing solutions to use within the different areas for print media production
- Analyze and evaluate available equipment and production systems with their architecture and system design
- Rank the various systems and technologies from the perspective of market demand and customer/user requirements
- Recognize and differentiate the principles in system architecture, design and imaging and printing methods
- Demonstrate enhanced basic knowledge about networking, workflow and color management
- Compare different print production strategies and possibilities
- Categorize technologies and production systems according to the print quality that can be achieved and productivity measurements
- Understand and summarize state-of-the-art technologies and systems for digital printing including imaging systems and all the Computer to... technologies
- Recognize trends, opportunities, challenges and demand within the graphic arts industry
- Position and compare print media with electronic media

Intended Audience: Engineers, researchers and scientists working in the area of product/system research and development, technical marketing people, managers in print shops and publishing houses, trainers and lecturers for graphic arts and print media production will benefit from this class, as well as anyone who is interested in state-of-the-art and future trends in the imaging, printing and publication, media and communication industry. Participants only need a basic technical understanding; the concept of the course is to lead to deep knowledge step-by-step using detailed handouts and course materials.

Helmut Kipphan is Senior Vice President Advanced and Future Technology and Chief Scientist/Technology Advisor at Heidelberger Druckmaschinen AG. He studied mechanical engineering at

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the University of Applied Sciences in Mannheim and at the University of Karlsruhe. In 1971, he served as a scientific assistant at the Institute for Measurement and Automation Control Engineering at the University of Karlsruhe. Following his doctoral thesis (1975) and post-doctoral thesis (1979), he assumed a professorship in Measurement Technology and Systems and has been teaching as a lecturer at the University of Karlsruhe. In 1978 he joined Heidelberg as a research engineer. Professor Dr.-Ing. habil. Helmut Kipphan has held several management and executive positions in R&D and technology/product development in the fields of sheet-fed and web offset printing, technology transfer, patenting and education. Since 1992 he has been a senior vice president for technology and innovation research, dealing especially with advanced and future technologies for digital printing with conventional and NIP technologies. He holds leading positions in international committees within the graphic arts industry and associations for industrial joint research. He is a member of TAGA and IS&T; served on several IS&T and IS&T/SPIE conferences and as a member of the TAGA board of directors. He is the inventor of over 40 patents, a speaker at various international technical conferences, author of numerous publications as well as the main author and editor of "Handbook of Print Media - Technologies and Production Methods." In 2001 he received the TAGA Honors Award for his research activities and contributions. Since 2002 he has been a full member of the "Heidelberg Academy of Sciences and Humanities". In April 2003 Helmut was honored by receiving the laureateship of an Honorary Doctor, the academic title "Dr.h.c." (Doctor honoris causa) from the Moscow State University of Printing Arts.

T08 - \$190/\$240

T09 - 4 hour tutorial Sunday, September 28
1:00 to 5:00 pm

COLOR MANAGEMENT BASICS AND USE FOR OPTIMIZING CMYK-OUTPUT DEVICES

Instructor: Eggert Jung, NexPress GmbH

Fundamentals of color science (visual perception, physical definition, color measurements, standards) will be described for understanding digital color management principles. The advantages of color management systems in imaging applications in order to maintain best color reproduction will be explained for typical color-workflows: from an original scene by image capturing (via photographic/electronic imaging and scanners), then digital processing including creation of pages and finally output on color monitors and digital printers. In particular the generation, structure and use of ICC profiles and related parameters like

color rendering intents will be demonstrated on sample prints as well as on monitor simulations.

Benefits: This course will enable you to:

- Understand the basics of color and color management systems
- Explain color and tone reproduction principles
- Understand additive and subtractive color mixing including screening necessities for multi-color print processes
- Understand definition and generation of ICC profiles and corresponding parameters
- Use ICC profiles, rendering intents within custom color workflows
- Optimize color-quality of your CMYK-printer including proof-simulation of other print conditions
- Evaluate color accuracy of printers or print processes

Intended Audience: This is an introductory level tutorial for all people interested in better understanding and practical optimization of color imaging output quality, especially for CMYK print applications. A basic knowledge of widely used applications like Photoshop, Acrobat, would be beneficial.

Eggert J. Jung studied Physics at the University of Kiel/Germany, where he earned his Master and Ph.D. in Engineering Physics. In 1974 he joined the company, Dr.-Ing.Rudolf Hell GmbH, working on new and improved pre-press products for the graphic arts industry at different positions within R&D (esp. drum-scanner). The main focus of his work has been on colorimetry and color management; image scanning, processing and reproduction with high fidelity including screening for optimized output quality of multi-color-images. Related products have been e.g. DC3000-Chromagraph high end drum scanners and film recorders as well as the PIXON technology for 3D-color transformations using LUTs on CMYK/RGB data – a "pre-runner" of today's color management and in close cooperation with single inventors the HiFi color reproduction. Within "Linotype-Hell" (after merging with Linotype) he was responsible for digital color correction and later for proofer integration including technology assessment and improvement of existing ink-jet solutions in respect to workflow and color quality by using ICC profiles for simulation of color prints. After the integration of Linotype-Hell into "Heidelberger Druckmaschinen" he joined the team for developing a new digital color printer based on electrophotographic technology. With the founding of the NexPress JV by Eastman Kodak and Heidelberg in 1999 he became a Senior Scientist at NexPress GmbH, responsible for Image Quality and Color Workflow.

Dr. Eggert Jung holds several patents and has given papers at graphic arts conferences in Europe and the U.S. He is member of TAGA, IS&T, and in also

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serves on the technical advisory group of FOGRA in Munich. He also supports some national standardization groups related to color, printing and image quality.

T09 - \$190/\$240

T10 - 4 hour tutorial Sunday, September 28
1:00 to 5:00 pm

INTRODUCTION TO ORGANIC ELECTRONIC MATERIALS AND DEVICES

*Instructors: Zoran D. Popovic and Tim Bender
Xerox Research Centre of Canada*

The research, development and technological applications of organic electronic materials development is an area of intense current interest, which entails applications in many fields including displays, sensors, transistors, emissive devices and electronic circuitry. This tutorial will begin with a survey of these current areas of application, showing where organic materials may offer advantages over traditional inorganic materials. The key classes of organic materials involved: photoconductors, semiconductors, transport molecules (hole and electron), and conductors will then be discussed from the standpoint of molecular design, synthesis, purification and characterization. Finally an overview of the characterization methods of important electronic material parameters and evaluation methods of currently used device will be given together with some device design principles. The main emphasis will be placed on small molecule systems although, where relevant, polymeric systems will also be discussed.

Benefits: This course will enable you to:

- Understand technological applications where organic electronic materials are, or may become, important
- Develop criteria for the design, synthesis, purification and broad-scale characterization of organic electronic materials
- Be introduced to some of the specialized techniques used to characterize these materials both as pure molecules and in devices
- Learn about basic device design concepts

Intended Audience: Although based primarily on chemistry and physics, this course will be of interest to a wide audience of scientists, engineers, project managers and others interested in the design, synthesis and applications of organic electronic materials. Being an introductory course, the subject matter will not be dealt with in great detail. Rather the audience will be introduced to the key areas of scientific expertise required to become knowledgeable in this area. Reference to more detailed information will be provided.

Zoran Popovic has a Bachelors Degree in Electrical Engineering from University of Belgrade and

a Ph.D. in Materials Science from McMaster University (Hamilton, Canada). Dr. Popovic has worked at the Xerox Research Centre of Canada for over 28 years. His major interest has been in organic photoreceptors and, more recently, in organic electroluminescence. Dr. Popovic is internationally renowned in both fields and he is a frequently invited speaker at major conferences. He has published over 100 papers and holds 30 U.S. Patents.

T10 - \$190/\$240

T11 - 2 hour tutorial Monday, September 29
9:15 to 11:15 am

PRODUCTION DIGITAL PRINTING: DIGITAL WORKFLOW

Instructor: Peter A. Crean, Xerox Corporation

This course will survey all of the elements that a job moves through from the creative workstation to the digital press. Special emphasis will be given to the newer elements that enable short run and personalized printing, applications of particular importance to digital printing. The course will take the document from the creation tools, Quark, Photoshop and InDesign, through trapping, imposition, soft proof, pre-flight, color management, RIP and the actual printing. Examples of the newer workflow elements for efficiently generating and printing personalized documents and web-based systems for creating and controlling customized documents will be discussed. Relevant standards such as PDF, PODI, and C4P will be explained and positioned in the workflow.

Benefits: This course will enable you to:

- List the workflow steps from creation through printing of a digital document
- Understand the workflows and various technologies used in digital printing
- Identify recent enhancements in workflow elements that positively impact the creation of personalized documents
- Describe workflow elements that improve efficiency in document generation from web-based systems
- Define relevant standards related to workflows management
- Evaluate and recommend workflow elements to improve digital print product delivery

Intended Audience: This course will be of benefit to both digital printing systems and component developers, especially those looking for a quick update on new elements to improve digital workflow management. A basic knowledge of digital printing technologies is assumed.

Peter Crean is a Xerox Senior Fellow working in the Imaging and Services Technology Center. He manages the Color Studio, a color research and applications facility at the Webster, NY, Xerox campus. His recent activities include the develop-

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ment of the technologies for high quality, high performance color imaging and printing systems, color management, color document creation and high-speed networking. Dr. Crean joined Xerox in 1970 after completing his B.S. at the University of Toronto and his Ph.D. in Physics at Princeton University. He was a member of the first laser-printing group in Rochester and a founding member of the team that developed the first prototype electronic copier, an activity that led to the development of DocuTech and subsequent digital document systems. He holds 24 U.S. patents dealing with digital image processing, ink jet printing, xerographic printing, and color systems. He has been associated with the 4890 high light color printer, the 5775 and 4900 color printer families, document preservation and management systems, and the present fleet of Xerox digital color copier printers. His current activities include the Xerox iGen3 printing system and the development of high performance compute platforms for RIP and image processing. He is a member of IEEE, SHE, IS&T and ACM. As a Senior Fellow, he works with researchers, product development teams, strategy setting teams, and customers to understand and shape Xerox technologies and products. Dr. Crean chairs the corporate wide Digital Imaging Patent Management Committee and is involved in the development of Xerox intellectual property.

T11 - \$140/\$185

T12 - 2 hour tutorial Monday, September 29
9:15 to 11:15 am

DESKTOP INKJET PRODUCTS PERFORMANCE STUDY

*Instructor: Rob Beeson,
Hewlett Packard*

This tutorial will examine products from HP, Canon, Epson, Lexmark, and Brother. Printhead performance parameters and ink/media interactions will be discussed with appropriate reverse engineering data from the HP labs. A few examples of how inkjet compares with competing technology such as dye diffusion thermal transfer and Polaroid's Opal will also be discussed.

Benefits: This course will enable you to:

- Understand printhead firing frequency, drop volume, velocity and drop shape tradeoffs from the principal desktop inkjet printer manufacturers
- Examine key differences in piezo and thermal inkjet printhead performance characteristics.
- Look at some patents for future direction

Intended Audience: This course is intended for those somewhat familiar with inkjet printing technology that want a better understanding on the differences in printhead output parameters from the popular manufacturers.

Rob Beeson is a senior member of the technical

staff in the Inkjet Technology Platforms Unit of Hewlett Packard. He has held several management and engineering positions in thermal inkjet technology since 1985, and is currently the R&D Competitive Intelligence Team Leader. He holds 12 inkjet patents. He has a B.S. and M.S. in Mechanical Engineering from Colorado State University and has worked with several divisions in HP since 1966.

T12 - \$140/\$185

T13 - 2 hour tutorial Monday, September 29
9:15 to 11:15 am

COLORANT CHEMISTRY I

Instructor: C. Wayne Jaeger, Xerox Corporation

This tutorial will start with a brief historical review of synthetic dyes. Examples of typical chromogens (compounds that produce color) will be discussed as well as the traditional way dyes are classified in the Colour Index. The difference between dyes and pigments will be illustrated with examples of textiles colored by the heat transfer printing process and how this process relates to the generation of color hard copy today. The discussion will lead to questions you need to ask in order to choose colorants for your particular printing technology.

Benefits: This course will enable you to:

- Understand the historical classification of organic colorants
- Recognize the chemistry of the more common chromogens
- Locate commercially available colorants
- Understand what is meant by a process shade colorant
- Understand hue, chroma, and lightness of color
- Understand the difference between dyes and pigments

Intended Audience: Beginning scientists, engineers, technicians, technical marketing people, or anyone interested in color printing will benefit from this class. Knowledge of chemistry and color hardcopy technologies would be helpful but is not necessary. There are no prerequisites. This course is intended for novices of colorant chemistry.

Wayne Jaeger is a Xerox Research Fellow in the Xerox Office Group. He was part of the Tektronix Color Printing and Imaging Division which was bought by Xerox in January 2000. He is a co-inventor and developer of the phase change inks and colorants used in the award winning Tektronix color phase change ink jet printers. He holds patents related to color hardcopy applications, particularly those related to ink jet printing and inks. He was the project leader for the development of inks and media for the earlier Tektronix aqueous ink jet printers. He was recognized by Tektronix for his contributions by bestowing on him in Febru-

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ary 1995 the Howard Vollum, Tektronix founder, Excellence in Engineering Award. In May 1997 he was honored as a Fellow of the Society for Imaging Science and Technology. In May of 1998 he was awarded the Johann Gutenberg Printing Innovation Award by the Society for Information Display. Dr. Jaegaer is the current President of IS&T. Before joining Tektronix in 1980, he was a dye research chemist for seven years at Crompton and Knowles Corp. He received his B. S. degree in chemistry from Florida State University in 1966, his Ph.D. degree in Organic Chemistry from Purdue University in 1971, and was a Post-Doctoral Research Associate at the Georgia Institute of Technology with Professor H. O. House.

T13 - \$140/\$185

T14 - 4 hour tutorial Monday, September 29
1:00 to 5:00 pm

ACCURATE, DIGITAL COLOR REPRODUCTION OF ARTWORKS

*Instructor: Nitin Sampat,
Rochester Institute of Technology*

This comprehensive seminar will offer the attendee an overview of the issues involved in accurate color reproduction of fine art paintings. Details of the entire imaging system necessary from capture to print will be presented.

Reproduction of fine art imposes a significant demand on an imaging system; from colorimetric image capture to accurate reproduction on archival media. The large sizes of the originals demand very high resolution capture devices. As such, much of archiving and reproduction of museum images continues to be implemented using a film-based workflow. Digital capture, however, offers unique advantages over film (and its own challenges!). Very high resolution digital capture devices and archival, high quality printers and media are now available. Accurately controlling the various components of the imaging system and *managing color* in this environment offers a unique insight into the general problem of accurate color reproduction. This seminar will offer the attendee an opportunity to understand the issues surrounding the issue of achieving accurate color reproduction *using commercially available tools*.

Benefits: This course will enable you to:

- Understand the principal components making up a *color reproduction system*
- Understand issues, components and technology involved in *accurate digital image reproduction* using commercially available tools
- Gain an appreciation for past and present work being done in accurate reproduction of fine art
- Explain fundamental terminology used in *practical color management*
- Compare commercially available cameras and

printers for high quality color reproduction

- Understand colorimetric characterization of cameras and printers

Intended Audience: This program will benefit technologists, engineers, photographers, scientists, programmers and managers who are involved in any application which required a color accurate reproduction of artwork. While the topic using fine art reproduction as an example, the content will benefit anyone wishing to understand accurate digital color reproduction issues.

Nitin Sampat is a professor of Imaging at the Imaging and Photographic Technology Department of the Rochester Institute of Technology (RIT) where he teaches courses in Electronic Imaging Systems, Color Management, Electronic Sensitometry, and Digital Image Processing. He has over 15 years experience designing and characterizing imaging systems. Prior to RIT, he worked at the Laboratory for Laser Energetics, where he designed imaging systems for nuclear fusion applications. He has been teaching engineers, scientists, sales and marketing personnel at corporations for over 15 years. He is an active consultant to the imaging industry.

T14 - \$190/\$240

T15 - 4 hour tutorial Monday, September 29
1:00 to 5:00 pm

EVALUATING INK JET TECHNOLOGY

*Instructor: Ross N. Mills,
imaging Technology international (iTi) Corp.*

This course will cover the methods for evaluating and selecting the correct type of ink jet technology for printing, scientific and manufacturing applications. In addition to an advanced introduction to the different types of ink jet, the fundamental advantages and disadvantages of each type will be discussed. Topics such as the influence of throughput parameters, ink and substrate physical properties, maintenance, and reliability on print head selection for these applications will be presented. Business issues such as make or buy, do-it-yourself or hire-it-done, availability and cost of print heads, and time-cost tradeoffs to complete the application will be covered.

Benefits: This course will enable you to:

- Understand how to balance throughput parameters, materials physical properties and operating environment with print head selection for a given application
- Select measurement equipment and do a performance analysis on ink jet print heads
- Understand the basics of how to integrate a print head technology into an application
- Make technical and business assessments for program and product planning

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Intended Audience: This course is intended for people who have a basic understanding of ink jet technology and who wish to expand their knowledge base in the area of ink jet applications.

Ross N. Mills is currently President and CTO of imaging Technology international (iTi) Corporation. He received his Ph.D. and Masters Degrees in Engineering Science from the University of California Berkeley and his B.S. Degree in Aerospace Engineering from the University of Texas at Austin. Since 1978 he has worked as a research, development, and manufacturing engineer in both staff and management capacities in the areas of piezoelectric and thermal ink jet printers and electrophotographic printers for IBM, Lexmark International, and Topaz Technologies as well as iTi. In 1992, he founded iTi Corporation in Boulder, Colorado as an ink jet consulting firm and as a development and integration facility for advanced non-impact printing and imaging technology. Dr. Mills has twelve patents in this field and he is the inventor of iTi's proprietary ESIJET™ technology.

T15 - \$190/\$240

T16 - 4 hour tutorial Monday, September 29
1:00 to 5:00 pm

COLORANT CHEMISTRY II

Instructor: Jeffrey Banning, Xerox Corporation

Very little work is being conducted in the area of new chromophore research in the dye industry. Instead, most dye research effort is being conducted in the modification or "tuning" of existing dyes, or dye classes in terms of shade, solubility and/or reactivity. The tutorial will assist the attendee in understanding such tuning processes. Utilizing color (in overheads and handouts), the instructor will teach the student about color chemistry with the aforementioned goal in mind. Starting with the concept of a light interacting with a prism, the instructor will guide the student from an understanding of additive and subtractive coloration, further explaining the cause of coloration of a dye or pigment, and continuing on to the area of structure/property (color) relationships. An understanding of how one develops strategies for tuning/tailoring the shade and other physical and chemical properties of a dye will emerge throughout the course of the tutorial.

Benefits: This course will enable you to:

- Understand the concept of additive and subtractive coloration
- Understand the common terms employed by color chemists and their literature
- Understand the four classes that dyes can be divided into based on the electronic origin of the color
- Understand the concept of structure/color relationship, in the major classes of colorants

- Predict shifts in shades (bathochromic/hypsochromic) based on structural changes/modifications within the chromophore
- Understand the major classes of chromophores employed in making dyes of various hues
- Locate commercially available dyes and preps for synthetic strategies to many of them
- Employ the aforementioned benefits in order to expand ones understanding (and capability) in developing strategies to tune/tailor dyes

Intended Audience: This course is intended for the scientist, engineer, technician, or technical marketing person with a chemistry/science background who needs to know about the chemistry of colorants and who is likely to be new to the field. A year of general chemistry and organic chemistry is recommended. Previous attendance of the Colorant Chemistry I course (by C. Wayne Jaeger) would be helpful but not necessary.

Jeff Banning is a Principal Scientist in the Office Printing Business Unit of Xerox, formerly Tektronix Color Printing and Imaging Division. He has worked in the areas of dye, polymer, and organic synthesis as well as coatings and ink formulation at Milliken Chemicals, the BIC Corp., Tektronix Inc., and Xerox Corp. He holds over 35 U.S. patents in these areas and has scaled-up many dye intermediates and dyes, leading to many commercial products and several product lines. Dr. Banning began his career in color chemistry at Milliken Chemicals. It was there that he learned the "tricks of the trade" under many outstanding organic dye and textile chemists, as well as with frequent interactions with two world renowned dye consultants: Max Weaver of Eastman Chemicals (retired) and John Griffiths of the University of Leeds. Dr. Banning's educational background began after 4 years in the US Army (1974-1978), receiving a B.S. in chemistry from Mankato State University in 1983, and a Ph.D. in organic chemistry from the University of North Dakota in 1987.

T16 - \$190/\$240

T17 - 2 hour tutorial Tuesday, September 30
9:15 to 11:15 am

FABRICATION MATERIALS AND PROCESS OF INK JET PRINTHEADS

Instructor: Hue Le, Picojet Ink

This tutorial describes the materials and processes that have been used to fabricate various ink jet printheads with the emphasis on the thermal and piezoelectric ink jet devices. Methods of forming ink jet nozzle, anti-wetting coated nozzle surface, ink channel and chamber, and various bonding methods are then reviewed. Materials of thin film resistor (for thermal ink jet) and piezoelectric ceramic (for piezoelectric ink jet) are also reviewed.

Benefits: This course will enable you to:

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- Understand the basic science and technology in manufacturing methods of various types of thermal and piezoelectric ink jet printheads
- Assess the current development in fabrication materials and processes of ink jet printheads
- Obtain insights into the potentials and limitations of different types of printheads

Intended Audience: Scientist, engineers, product managers, and other charged with development or manufacture of ink jet printing systems will benefit from this class

Hue Le has over 22 years of experience in developing and commercializing ink jet printing systems that include ink jet printhead, ink and printing process. He has taught ink jet printing courses and tutorials in the last six years.

T17 - \$140/\$185

T18 - 2 hour tutorial Tuesday, September 30
9:15 to 11:15 am

THE VALUATION OF R&D PROJECTS

*Instructors: George Gibson and James Larson,
Xerox Corporation*

One of the hardest challenges the technical community faces is communicating the value of new projects and technologies to the business and investment community that must fund our work. Proper metrics for expressing the value of the projects we are considering is essential to making sound decisions. This course will familiarize the participants with the main methods of valuing new projects and technologies and the strengths and weaknesses of each.

Benefits: This course will enable you to:

- Conduct discounted cash flow analysis and derive the sensitivities of the analysis the main variables including discount and opportunity cost
- Understand the differences among net present value, payback and internal rate of return including the strengths and weaknesses of each
- Use the decision theory formalism to value projects
- Know how to use the real options formalism to value projects
- Understand how the projects can be analyzed as a portfolio of real options and the effects of a total risk management approach of the management of multiple projects
- Develop a business case for your project including explicit consideration of both technical and commercialization risk

Intended Audience: The course is intended for technical professionals who need to interact with the business community in deciding among projects or technologies including managers, consultants and potential entrepreneurs.

George Gibson is Manager, Research & Development

Portfolio in the Xerox Innovation Group. Previously he has held research and manufacturing management positions for Savin and AM Graphics. He holds over 35 patents in non-impact printing and has published ~20 papers. He holds a Masters in Chemistry from Binghamton University and an MBA from the University of Rochester's Simon Graduate School of Business.

Jim Larson is a Manager in the Joseph C. Wilson Center of the Xerox Innovation Group. He received a Ph.D. in Chemistry from the University of Washington in 1980. Two years later, after a postdoctoral appointment at the University of Chicago, he joined the DuPont Company. In 1984 he became part of a small DuPont team working on liquid electrostatic toner technology. By 1987 this effort grew into DX Imaging, a partnership company parented by DuPont and Xerox, of which Dr. Larson was a founding member. He joined Xerox in 1991 and continued work on liquid toner technology. He holds 60 issued U.S. patents and has authored 33 technical publications.

T18 - \$140/\$185

T19 - 4 hour tutorial Tuesday, September 30
1:00 to 5:00 pm

IMAGE QUALITY: PERCEPTION AND QUANTIFICATION

*Instructor: Eric K. Zeise,
NexPress Solutions LLC*

A meaningful description of image quality requires an accurate linkage between the measurement of an attribute and its perceived quality. Measurement without a linkage to perception can lead to meaningless specsmanship. Perception without objective measurement can degenerate to opinion.

In this course, we examine the characteristics and limitations of human visual perception and the models of perception used to describe the appearance of objects. From this perspective, we identify important attributes of image quality and investigate measurement techniques used to quantify these attributes. We examine the scope, utility and limitations of standards that permit comparison of non-impact printing device image quality. We will work through short examples of psychometric scaling methods that create the required relationship between instrumental measurement and perceived quality, allowing a meaningful, quantitative measurement of perceived image quality.

Benefits: This course will enable you to:

- Learn how to utilize psychometric scaling methods to provide meaningful, quantitative measurement of perceived image quality
- Understand the limitations of perception to avoid over-specification

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- Understand the applicability of important image quality measurement techniques
- Understand the utility of standards for comparison of device image quality

Intended Audience: This course is directed towards anyone seeking to understand the quantitative measurement of perceived image quality. No prior experience is necessary.

Eric K. Zeise is a research associate and group leader for image quality evaluation at NexPress LLC. He has been involved in many aspects of color systems modeling, printing system architecture and perceptual image quality evaluation since joining the research laboratories of Eastman Kodak Co. in 1981. Dr. Zeise is chair of the ANSI/ISO SC28 & INCITS W1.1 standards project (ISO 19751) for perceptually linked determination of image quality for printing systems. He was an initial staff member of NexPress LLC when it was formed in 1998 as a joint venture between Eastman Kodak Co. and Heidelberger Druckmaschinen AG. He received a Ph.D. in low-temperature physics from Cornell University in 1981.

T19 - \$190/\$240

T20 - 4 hour tutorial Tuesday, September 30
1:00 to 5:00 pm

DIGITAL IMAGING SYSTEM FUNDAMENTALS

*Instructor: Nitin Sampat,
Rochester Institute of Technology*

This comprehensive seminar will offer the attendee an overview of the various components of an electronic imaging system (from scene to output) and how they affect overall image quality. Fundamental concepts in imaging science such as image resolutions, popular color spaces, color management, image compression standards and image processing algorithms will be presented. The mechanism of operation of image input devices (cameras and scanners) and image output technologies will also be presented. While the focus of the course is technical content - specifically system image quality, a perspective on the business side is offered where feasible.

Benefits: This course will enable you to:

- Understand the principal components making up an electronic imaging system
- Explain fundamental terminology used in describing images
- Understand the principles of color technology
- List and compare the popular image file formats in use today
- Compare and judge different aspects of digital cameras and printers
- Understand fundamental image processing algorithms

- List and compare current digital image compression standards
- Differentiate between image resolution metrics like DPI, PPI and LPI
- Understand how imaging scientists quantify image quality

Intended Audience: This program will benefit technologists, engineers, programmers and managers who work with imaging equipment, and system integrators and engineers interested in learning the “big picture” of an electronic imaging system and understanding how components affect overall system performance. It will be particularly useful to people trying to get a quick start into the imaging field.

Nitin Sampat's biographical sketch appears in the description for Tutorial 14.

T20 - \$190/\$240

T21 - 2 hour tutorial Tuesday, September 30
1:00 to 3:00 pm

INK JET MEDIA

*Instructor: Aidan Lavery,
Felix-Schoeller Imaging*

This tutorial will describe the various media types available for ink jet printing. The selection of different media types for particular applications will be considered. A description of the different substrate types available for ink jet printing and the coatings applied to these substrates, to enhance the print performance, will also be provided. The different ink systems, used in ink jet printing and their interaction with the different media types will also be explained. There will be some emphasis on photopapers for ink jet due to the increasing demand for digital photographic printing.

Benefits: This course will enable you to:

- Understand the different media types available for ink jet applications
- Select the optimum substrate for a particular application
- Identify the most compatible media for the different ink systems
- Provide an insight into ink/media interactions

Intended Audience: This course is intended for anyone wanting to learn more about the wide range of media now available for ink jet applications. The course will be suitable for people with little knowledge of media for ink jet but will also provide more experienced media developers with a greater understanding of ink jet substrates and coatings for ink jet media. A prior knowledge of ink jet media is not required.

Aidan Lavery received his B.Sc. and Ph.D. in chemistry from Queen's University Belfast in 1980 and 1984 respectively. He then did two years

Tutorial Program

postdoctoral studies on transition metal chemistry at Edinburgh University before taking up an academic position, as a lecturer in Chemistry at Huddersfield University where he lectured for three years 1986-88. In 1988 he joined ICI/Zeneca where he spent 11 years being promoted to the position of Group Leader of the Physical Science team developing ink jet systems. In 1999 he took up his current position with Felix Schoeller Imaging as Head of R&D for media development. This was based in Wooburn Green until the end of 2002 and now this research group is based in Osnabrueck Germany. His interests have included the development of inkjet ink formulations and ink/media interactions.

T21 - \$140/\$185

T22 - 3 hour tutorial Wednesday, October 1
9:10 am to 12:10 pm

ELECTROSTATIC TONER TRANSFER: METHODS, PHYSICS, AND INTERACTIONS

Instructor: Thomas N. Tombs, NexPress Solutions LLC

An important and potentially quality-limiting step in all electrophotographic machines is the transfer of toner from the photoconductor to paper. A significant degree of complexity is inherent in toner transfer resulting from the many interactions that exist with essentially every other subsystem in the electrophotographic process. In this course, an explanation of the underlying physics that apply to all methods of dry-toner transfer laid the ground work for understanding the many interactions and noise factors. Throughout the course practical working knowledge of transfer technologies is conveyed.

Benefits: This course will enable you to:

- Explain the fundamental physics of toner transfer
- Calculate the electrostatic and surface adhesion forces on toner particles
- Comprehend the operation of various electrostatic transfer technologies
- Identify noise factors and material properties that affect toner transfer
- Describe and explain causes of transfer-related image quality degradation
- List and explain the interactions between the transfer subsystem and other subsystems

Intended Audience: This course is intended for engineers, scientists, and managers involved in electrophotographic research, development, or commercialization. Familiarity with the electrophotographic process and college-level physics are recommended prerequisites.

Thomas N. Tombs received a Ph.D. degree in electrical engineering from the Univ. of Rochester specializing in the fields of electrostatics and

particle electromechanics. Since 1992 he has been researching and developing electrophotographic technologies, first at Eastman Kodak Company and since 1998 with NexPress Solutions, a Kodak/Heidelberg joint venture. Dr. Tombs has over 35 U.S. patents and has published articles on particle electrostatics and electrostatic toner transfer.

T22 - \$165/\$210

T23 - 3 hour tutorial Wednesday, October 1
9:10 am to 12:10 pm

CHEMICAL TONERS

*Instructor: Grazyna Kmiecik-Lawrynowicz,
Xerox Corporation*

This course on chemical toners will enable participants to understand the nature of chemical toner technology in comparison with conventional grinding processes for making xerographic toners. It will cover different chemical processes for toner preparation as well as the history of chemical toner development. It will also discuss current products on the market with chemical toners. It will point out the advantages and disadvantages of chemical toner compared with pulverized toners in their performance and interaction with the xerographic systems.

Benefits: This course will enable you to:

- Understand the nature of the chemical toner process in comparison with conventional grinding process
- Distinguish chemical toner from pulverized toner
- Make judgments and assessments as to the best toner technology for a given xerographic application based on the advantages and disadvantages of each
- Understand the current scenario of chemical toner on the market and its potential for future applications

Intended Audience: This discussion will be the introduction to chemical toner and is directed toward anyone seeking an understanding of the nature of chemical toner and its potential in xerographic application. Some knowledge of xerography and chemistry will be helpful, but is not essential.

Grazyna Kmiecik-Lawrynowicz is a Principal Scientist in Material & Process Technology in Supplies Delivery Unit in Xerox, leading chemical toner technology and polymer carrier coating design activities. She received her M.S.c. & Eng. Degree in Chemistry & Chemical Engineering from Warsaw Technical University in Poland, and her Ph.D. in Chemistry from Rutgers - The State University of New Jersey. After postdoctoral at the University of Toronto, she joined The Xerox Research Center of Canada (XRCC) in Mississauga, Ontario in 1988. During her years at XRCC she

IS&T's NIP19 — Week at a G

| Time | Sunday, Sept. 28 | Monday, Sept. 29 | Tuesday, Sept. 30 | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|--|---|---|-----|---|--|---|---|---|---|--|-------------------------|--|---|-------------------------------------|------------------------------|--|-----|-----|-----|---|--|--|
| 8:00 am | Tutorial Registration <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 12.5%; text-align: center;">T1</td> <td style="width: 12.5%; text-align: center;">T2</td> <td style="width: 12.5%; text-align: center;">T3</td> <td style="width: 12.5%; text-align: center;">T4</td> <td style="width: 12.5%; text-align: center;">T5</td> </tr> <tr> <td style="text-align: center;"><i>Digital Halftoning Image Quality and the Human Visual System</i></td> <td style="text-align: center;"><i>Introduction to Electrophotography</i></td> <td style="text-align: center;"><i>An Overview of Inkjet Printing from an Ink Perspective</i></td> <td style="text-align: center;"><i>Color Quality Factors in Desktop Printing</i></td> <td style="text-align: center;"><i>Digital Photographic Print Permanence: An Update...</i></td> </tr> </table> | T1 | T2 | T3 | T4 | T5 | <i>Digital Halftoning Image Quality and the Human Visual System</i> | <i>Introduction to Electrophotography</i> | <i>An Overview of Inkjet Printing from an Ink Perspective</i> | <i>Color Quality Factors in Desktop Printing</i> | <i>Digital Photographic Print Permanence: An Update...</i> | Registration (7:30 am - 5:00 pm) Introduction Keynote: The Printing Industry is Entering the Digital Era... <i>Benny Landa</i> | Registration (7:30 am - 5:00 pm) Keynote: Chemical Toner Technology and the Future <i>Takayoshi Aoki</i> Awards Ceremony | | | | | | | | | | | | |
| T1 | | T2 | T3 | T4 | T5 | | | | | | | | | | | | | | | | | | | | |
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| 9:00 am | | Exhibit (9:30 am - 5:00 pm) | <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33.3%; text-align: center;">T11</td> <td style="width: 33.3%; text-align: center;">T12</td> <td style="width: 33.3%; text-align: center;">T13</td> </tr> <tr> <td style="text-align: center;"><i>Production Digital Printing: Digital Workflow</i></td> <td style="text-align: center;"><i>Desktop Inkjet Products Performance Study</i></td> <td style="text-align: center;"><i>Colorant Chemistry I</i></td> </tr> </table> | T11 | T12 | T13 | <i>Production Digital Printing: Digital Workflow</i> | <i>Desktop Inkjet Products Performance Study</i> | <i>Colorant Chemistry I</i> | <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33.3%; text-align: center;">T17</td> <td style="width: 33.3%; text-align: center;">T18</td> </tr> <tr> <td style="text-align: center;"><i>Toner Based Printing: Materials Innovative Processes</i></td> <td style="text-align: center;"><i>Image Permanence</i></td> </tr> <tr> <td style="text-align: center;"><i>Electronic Applications (Invited)</i></td> <td style="text-align: center;"><i>Ink Jet Fabrication Materials and Processes</i></td> </tr> </table> | T17 | T18 | <i>Toner Based Printing: Materials Innovative Processes</i> | <i>Image Permanence</i> | <i>Electronic Applications (Invited)</i> | <i>Ink Jet Fabrication Materials and Processes</i> | | | | | | | | | |
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| <i>Electronic Applications (Invited)</i> | <i>Ink Jet Fabrication Materials and Processes</i> | | | | | | | | | | | | | | | | | | | | | | | | |
| 10:00 am | Toner Based Printing: Processes Digital Photofinishing (Invited) Media for Digital Printing | Toner Based Printing: Materials Quality Upgrade & Eval. Image Permanence Electronic Applications (Invited) | Toner Based Printing: Materials Innovative Processes Image Permanence Electronic Applications (Invited) | | | | | | | | | | | | | | | | | | | | | | |
| 11:00 am | Toner Based Printing: Processes Digital Photofinishing (Invited) Media for Digital Printing | Production Digital Printing: Digital Workflow Desktop Inkjet Products Performance Study Colorant Chemistry I | Toner Based Printing: Materials Quality Upgrade & Eval. Image Permanence Electronic Applications (Invited) | | | | | | | | | | | | | | | | | | | | | | |
| 12:00 pm | Lunch Break | Lunch Break | Lunch Break | | | | | | | | | | | | | | | | | | | | | | |
| 1:00 pm | <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 12.5%; text-align: center;">T6</td> <td style="width: 12.5%; text-align: center;">T7</td> <td style="width: 12.5%; text-align: center;">T8</td> <td style="width: 12.5%; text-align: center;">T9</td> <td style="width: 12.5%; text-align: center;">T10</td> </tr> <tr> <td style="text-align: center;"><i>Photographic Quality Digital Imaging: ...</i></td> <td style="text-align: center;"><i>Introduction to Toner Technology</i></td> <td style="text-align: center;"><i>Digital Production Printing...</i></td> <td style="text-align: center;"><i>Color Management Basics and Use for Optimizing CMYK-Output Devices</i></td> <td style="text-align: center;"><i>Introduction to Organic Electronic Materials and Devices</i></td> </tr> </table> | T6 | T7 | T8 | T9 | T10 | <i>Photographic Quality Digital Imaging: ...</i> | <i>Introduction to Toner Technology</i> | <i>Digital Production Printing...</i> | <i>Color Management Basics and Use for Optimizing CMYK-Output Devices</i> | <i>Introduction to Organic Electronic Materials and Devices</i> | <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33.3%; text-align: center;">T14</td> <td style="width: 33.3%; text-align: center;">T15</td> <td style="width: 33.3%; text-align: center;">T16</td> </tr> <tr> <td style="text-align: center;"><i>Accurate, Digital Color Reproduction of Artworks</i></td> <td style="text-align: center;"><i>Evaluating Inkjet Technology</i></td> <td style="text-align: center;"><i>Colorant Chemistry II</i></td> </tr> </table> | T14 | T15 | T16 | <i>Accurate, Digital Color Reproduction of Artworks</i> | <i>Evaluating Inkjet Technology</i> | <i>Colorant Chemistry II</i> | <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33.3%; text-align: center;">T19</td> <td style="width: 33.3%; text-align: center;">T20</td> <td style="width: 33.3%; text-align: center;">T21</td> </tr> <tr> <td style="text-align: center;"><i>Image Quality: Perception and Quantification</i></td> <td style="text-align: center;"><i>Digital Imaging System Fundamentals</i></td> <td style="text-align: center;"><i>Printing Systems Engineering/Optimization</i></td> </tr> </table> | T19 | T20 | T21 | <i>Image Quality: Perception and Quantification</i> | <i>Digital Imaging System Fundamentals</i> | <i>Printing Systems Engineering/Optimization</i> |
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| <i>Image Quality: Perception and Quantification</i> | <i>Digital Imaging System Fundamentals</i> | <i>Printing Systems Engineering/Optimization</i> | | | | | | | | | | | | | | | | | | | | | | | |
| 1:30 pm | Toner Based Printing: Processes (cont'd) Thermal Printing (Invited) continued Textile & Fabric Printing | Digital Photofinishing (Invited) continued Media for Digital Printing Digital Printing | Printing Systems Engineering/Optimization Image Permanence (continued) Photo-electronic Materials and Devices | | | | | | | | | | | | | | | | | | | | | | |
| 3:00 pm | Toner Based Printing: Processes (cont'd) Thermal Printing (Invited) continued Textile & Fabric Printing | Digital Photofinishing (Invited) continued Media for Digital Printing Digital Printing | Image Permanence (continued) Photo-electronic Materials and Devices Image Quality: Perception and Quantification | | | | | | | | | | | | | | | | | | | | | | |
| 4:00 pm | Toner Based Printing: Processes (cont'd) Thermal Printing (Invited) continued Textile & Fabric Printing | Digital Photofinishing (Invited) continued Media for Digital Printing Digital Printing | Image Permanence (continued) Photo-electronic Materials and Devices Image Quality: Perception and Quantification | | | | | | | | | | | | | | | | | | | | | | |
| 5:00 pm | 5:30 to 7:30 Ice Breaker | 5:00 to 6:00 Print Gallery 5:00 to 7:00 Textile Forum | Interactive Poster Sessions 4:30 - 6:30 | | | | | | | | | | | | | | | | | | | | | | |
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Note: Check course descriptions for exact times for each class. Coffee breaks will be held at approximately 10:30

NIP19 — Week at a Glance

| | | Wednesday, Oct. 1 | | | Thursday, Oct. 2 | | | Friday, Oct. 3 | | |
|--|--|---|--|---|--|-----------------------------------|---|---|--|---|
| Registration (7:30 am - 5:00 pm) Keynote: Chemical Toner Technology and the Future <i>Takayoshi Aoki</i> | | Registration (8:00 am - 5:00 pm) Keynote: Evolution of Production Color Printing <i>Arun Chowdry</i> | | | Registration (8:00 am - 5:00 pm) Keynote: Relating Security Printing to Emerging Digital Printing Solutions <i>Jan Van Laethem</i> | | | Registration (8:00 am - noon) | | |
| Awards Ceremony | | | | | | | | | | |
| Exhibit (9:30 am - 5:00 pm) | | Exhibit (9:00 am - 4:00 pm) | | | | | | | | |
| T17 | T18 | | | T22 | T23 | T24 | | T28 | T29 | T30 |
| | <i>The Valuation of R&D Projects</i> | | | | | | | | | |
| | | Inkjet Printing Materials | Pre-press and Post-press Systems (Invited Papers) | Photo-Electronic Materials and Devices | <i>Electrostatic Toner Transfer: Methods, Physics, and Interactions</i> | <i>Chemical Toners</i> | <i>Papermaking, Coating Fundamentals and Media for Digital Printing</i> | Inkjet Printing Materials (Continued) | Security and Forensic Imaging | |
| | | Production Digital Printing | Print and Image Quality | | | | | Inkjet Printing Processes | Color Science/Image Processing | <i>Fusing Technologies for Toner- Based Marking Systems</i> |
| | | | | | | | | <i>Charging Systems and Dependent Processes in Electrophotography</i> | | <i>Business in Japan</i> |
| | | | | | | | | | | Inkjet Printing Processes (continued) |
| | | | | | | | | | | Digital Printing/Quality Control Instrumentation |
| | | | | | | | | | | Advanced and Novel Imaging Systems |
| | | <i>Lunch Break</i> | | | <i>Lunch Break</i> | | | | | |
| T19 | T20 | T21 | | T25 | T26 | T27 | | T31 | T32 | T33 |
| | | <i>Inkjet Media</i> | | | | | | | | |
| | | Inkjet Materials (continued) | Production Digital Printing (continued) | Print and Image Quality (cont'd) | <i>Physics of Electrophotographic Development</i> | <i>The Business of Toner: ...</i> | <i>Introduction to Digital Textile and Fabric Printing</i> | Ink Jet Printing Processes | Printing Systems Engineering and Optimization (continued) | Color Science/Image Processing (continued) |
| | | | | | | | | | <i>Liquid Toner Printing: 2003 Technology and Applications</i> | <i>External Additives for Xerographic Toners</i> |
| | | | | | | | | | | <i>Secure Printing and Imaging Technologies</i> |
| Interactive Poster Sessions 4:30 - 6:30 | | 4:15 to 5:15 Panel Discussion: Security Imaging | | | 6:00 to 8:00 The Conference Reception | | | Interactive Poster Sessions 4:30 - 6:30 | | |

Times for each class. Coffee breaks will be held at approximately 10:30 am and 3:30 pm each day.

Tutorial Program

worked on a variety of projects related to chemical toners. In 1992 she pioneered work on Emulsion Aggregation (EA) toner at Xerox for future color xerographic applications. In 1996 she transferred with EA toner technology, to Supplies Development and Manufacturing at Xerox. Dr. Kmiecik-Lawrynowicz has 88 publications and patents, which includes 68 U.S. patents. She is a recipient of three Eagle Awards for the highest number of patents at Xerox in years 1994, 1997 & 1998. She is a member of Society for Imaging Science and Technology, American Chemical Society and has been invited speaker at Gordon Polymer Conference, Research Conference on Emulsion Polymers/Polymer Colloids, NATO Advanced Study Institute on Recent Advances in Polymeric Dispersions and at Diamond Research Corporation's Toner and Photoreceptor annual Conferences.

T23 - \$165/\$210

T24 - 3 hour tutorial Wednesday, October 1
9:10 am to 12:10 pm

PAPERMAKING, COATING FUNDAMENTALS AND MEDIA FOR DIGITAL PRINTING

Instructor: Sen Yang, International Paper

This short course includes an introduction of papermaking and paper coating technologies and a discussion on media requirements for digital printing with an emphasis on electrophotographic (EP) and inkjet printing applications. Paper attributes that are important for color EP and inkjet printing will be reviewed and discussed.

Benefits: This course will enable you to:

- Learn the basic of papermaking and paper coating processes
- Understand paper property and testing methods
- Comprehend key media properties for achieving good color printing performance for EP and inkjet printing

Intended Audience: This class is directed toward anyone seeking an introduction to papermaking and paper coating fundamentals and for a better understanding the relationship of media properties and performance for EP and inkjet printing. No working knowledge of papermaking and coating techniques will be presumed or required.

Sen Yang is manager of Surface Science and Digital Printing in the corporate research center of International Paper Company in Tuxedo, New York. He received his Ph.D. degree in polymer science from Brown University. Since 1990, he has worked in the field of specialty paper and film coatings for digital imaging applications. Prior to joining International Paper, he worked for Océ-Arkwright and Champion International Corporation where he led and contributed to a number of successful spe-

cialty paper and coated film products both for private label and OEM businesses. He has several patents in the area of coated inkjet paper and specialty films.

T24 - \$165/\$210

T25 - 3 hour tutorial Wednesday, October 1
1:00 to 4:00 pm

PHYSICS OF ELECTROPHOTOGRAPHIC DEVELOPMENT

*Instructor: Lawrence B. Schein,
Consultant*

One of the most challenging steps in electrophotography is the development step, in which the latent image is converted into a real toner image. In this tutorial, the physics of the various manifestations of the main types of development systems, will be discussed (1) dual component (insulative, conductive, mechanically agitated, ac biased), (2) monocomponent (magnetic, non-magnetic, contact, non-contact, Moore), (3) 1.5 development, and (4) liquid development (standard theory, theory including excess ions, Indigo configuration).

Benefits: This course will enable you to:

- Describe the historical evolution of electrophotographic development systems
- Identify and compare the characteristics of the various manifestations of each of the main types of known development systems, dual component, monocomponent, 1.5, and liquid
- Understand the physics driving toner development in each of these development systems
- Identify the relevant hardware and material parameters for each the development systems
- Identify the aspects of the development systems which makes them suitable for specific applications

Intended Audience: This course should be of interest to anyone working in the field of nonimpact printing. Educational level of at least a Bachelors degree with some college level physics and mathematics is assumed.

Lawrence B. Schein's biographical sketch appears in the description for Tutorial 2.

T25 - \$165/\$210

T26 - 4 tutorial Wednesday, October 1
1:00 to 5:00 pm

THE BUSINESS OF TONER: A VALUE-CHAIN ORIENTED INTRODUCTION

Instructor: Brian Springett, Fingerpost Advisors

This course has as its aim a brief introduction to the total business of toner: from design & development in order to match printing system requirements, to

Tutorial Program

manufacturing processes and economics, to distribution, costs and prices, to market dynamics and trends. The course will address both Black & White and Colour printing aspects and the interplay along the value chain of the above elements.

Benefits: This course will enable you to:

- Understand the basics requirements of toner viewed as a printing ink
- Identify the major toner manufacturing processes and their connections to toner design
- Explain and summarize the major cost elements of a toner and their relationship to both intrinsic design and manufacturing processes and procedures
- Describe the current market dynamics in terms of producers, applications, sales channels, and price structures
- Describe the projected market trends in terms of toner types, applications, and quantities
- Finally, the attendee should be able to diagram the toner value chain and illustrate by example the connections and interdependencies among its component parts

Intended Audience: The intended audience for this course is anyone who wishes to learn more about toner viewed as a business within an overall digital printing product enterprise. This includes anyone who is involved in electrophotographic machine R&D or manufacturing and who wishes to gain an understanding of toner as a supply item and a source of revenue and profit, as well as those who are less directly involved with electrophotography but wish to obtain some basic understanding of that industry from a consumables point of view.

Although intended mainly for those with a degree in a science or an engineering discipline, the course will not be intensively technical and so should be readily appreciated by anyone with a four year university degree. Additionally, no prior knowledge of toner or of electrophotography will be assumed, a familiarity with the basic electrophotographic process will prove helpful.

Brian Springett has a Ph.D. in physics from the University of Chicago and an M.A. from the University of Cambridge. He spent nine years as a member of the physics faculty at the University of Michigan and as a visiting professor at other universities in the USA and Canada. He has 27 years of experience in the R&D of copiers, duplicators, printers, and digital presses based on electrophotography.

In his last 12 years at Xerox Corporation he was the manager of materials technology strategy and integration: he left Xerox in March 2001, officially retiring from that company in December 2001. Since that time he has operated his own consulting business called Fingerpost Advisers which assists clients in the digital printing business –

from materials design problems, to manufacturing process and work process issues, to patent issues, to business and market considerations, to presenting educational or training seminars on these topics. For many years he has taught an introductory course in black & white and colour electrophotography at the Diamond Research Corporation's Toner & Photoreceptor annual conferences, as well as presenting many papers at other conferences on associated topics. He holds more than a dozen U.S. patents and has published over 50 papers on a wide range of topics.

T26 - \$190/\$240

T27 - 4 hour tutorial Wednesday, October 1
1:00 to 5:00 pm

INTRODUCTION TO DIGITAL TEXTILE AND FABRIC PRINTING

*Instructor: Ming Xu,
Sawgrass Technologies, Inc.*

This course will include an introduction to digital printing in the area of textile and fabric application. Three major areas of digital printing technology will be discussed and analyzed. Advantages and disadvantages will be compared in both direct and transfer methods. Ink chemistry, ink physical properties and other general requirement for these printing methods will also be discussed for the goals of ink design/formulate and application.

Benefits: This course will enable you to:

- Understand the various digital printing technologies that have been applied in textile and fabric printing including basic concept and mechanism
- Describe the general chemistry of textile and fabric materials and their conventional printing methods including dyeing/coloring with both dyes and pigments
- Display general knowledge in ink/toner design, especially inkjet ink design including aqueous ink and non-aqueous ink
- Comprehend general trends in textile and fabric printing for both short run users and mass production
- In addition, fabric treatment, printer selection, color management, and other related issues will also be briefly discussed

Intended Audience: This discussion is directed toward anyone seeking an introduction to digital printing in textile materials. Digital ink chemist, formulator, potential manufacturer, printhead designer/manufacture, print system integrator, digital textile/fabric printing quality control person, raw material (colorant, resin, surfactant/dispersant, additives) will benefit from the course. No working knowledge of digital printing required.

Ming Xu is the Vice President of Research and

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Development at Sawgrass Technologies, Inc. He has been involved in digital printing in areas of wax thermal transfer printing, inkjet ink development and electrographic toner research and development for over ten years. He received his Ph.D. in Physical Chemistry from the Brigham Young University and MBA from The Citadel in 2001. Dr. Ming Xu is also a registered patent agent with the USPTO.

T27 - \$190/\$240

T28 - 3 hour tutorial Thursday, October 2
9:15 am to 12:15 pm

CHARGING SYSTEMS AND DEPENDENT PROCESSES IN ELECTROPHOTOGRAPHY

Instructor: Kenneth Pietrowski, Xerox Corp.

Charging systems are employed in Electrophotography to enable a variety of electrostatic functions, the most common including photoreceptor charging, toner transfer, paper handling and toner charge conditioning for both transfer and cleaning. The device requirements and their operational modes can be quite different for each function. This course will address the applied principles of operation in meeting those requirements including critical parameters and known failure modes. The application dependent requirements and supporting analysis in the form of examples will be discussed with a stronger focus on photoreceptor charging and toner transfer processes. Novel charging system concepts will also be reviewed.

Benefits: This course will enable you to:

- Differentiate between charging devices and describe their fundamental differences in terms of geometry, operating modes, current voltage behavior and polarity
- Describe the variety of applications and related principles of operation of devices utilized in various electrophotographic process steps
- Define the critical parameters governing electrical performance and impacting failure modes
- Relate current-voltage behavior to equivalent electrical circuits
- Derive and utilize a simplified model incorporating hardware and process parameters to estimate charging performance in various process steps such as photoreceptor charging and toner transfer
- Comprehend the impacts of photoreceptor electrical behavior on charging subsystem performance
- Define some of the issues associated with toner transfer

Intended Audience: This course should be of interest to scientists and engineers involved in the development of electrophotographic marking subsystems and systems employing corona devices

and their variants. The attendee should have a basic understanding of electrophotographic processes such as xerography.

Kenneth Pietrowski is a Principal Technology Manager/Specialist in the Wilson Center for Research and Technology at Xerox Corp. He joined Xerox in 1963 and has worked in both R&D and product engineering environments addressing electro-optic image devices, thin film technology and xerographic processes. He spent much of the last 25 years as a principal contributor in the development of charging and toner transfer systems appearing in many of today's xerographic marking engines. Mr. Pietrowski holds several patents in these disciplines. He currently manages a team of technologists and engineers focused on processes for future electrophotographic products. He is a member of IS&T, past member of the NIP Technical Council and served as a Session and Publications Chairman at prior NIP conferences. Tutorials on this topic and electrophotography were also presented at previous NIP Congresses. He received his B.S. in Electrical Engineering from RIT.

T28 - \$165/\$210

T29 - 2 hour tutorial Thursday, October 2
9:15 to 11:15 am

FUSING TECHNOLOGIES FOR TONER-BASED MARKING SYSTEMS

*Instructor: James H. Hurst,
NexPress Solutions LLC*

This course will include a description of the physics of the fusing process and an introduction to fusing technologies that have found commercial application. The most commonly used technology, roll fusing, will be discussed in detail, paying particular attention to the technical hurdles that will likely be encountered during product development. Typical fusing materials (toners, roll coverings, release agents, etc.) and their influence on the fusing process will be discussed.

Benefits: This course will enable you to:

- Understand the physical changes that toner experiences during the fusing process
- Compare the technologies that are available for delivering fusing energy to the toner
- Select the fusing technology that is most appropriate for a given application
- Anticipate the opportunities and challenges that will arise during development of the chosen fusing technology

Intended Audience: This course is intended to be an introduction to people who are new to the field or who wish to expand their familiarity with fusing technologies.

James H. Hurst is a Senior Staff Engineer at

Tutorial Program

NexPress Solutions LLC where he is responsible for developing new fusing technologies for high-speed digital color printing. His prior experience since 1993 at Eastman Kodak and Texas Instruments includes development of fusing hardware for both black and white and color digital printer products. He received his Ph.D. and Masters degrees in Chemical Engineering from the University of Florida and B. S. degrees in Chemical Engineering and Chemistry from the University of Utah.

T29 - \$140/\$185

T30 - 3 hour tutorial Thursday, October 2
9:15 am to 12:15 pm

BUSINESS IN JAPAN

*Instructor: Robert J. Nash, Consultant,
Hafren Associates*

Since Japan continues to be an active center for research, development and marketing for non-impact marking technologies, travel to Japan has become a routine event for many Western engineers, technologists and business professionals involved in such technologies. However, for many Westerners, repeated travel to Japan does not eliminate the strong feeling of being a foreigner in a distinctly non-Western environment. Though survival in such a foreign environment can be eased thanks to written instructions provided by thoughtful Japanese hosts, by willingness for Japanese counterparts to use English as a common language, etc., subtle cross-cultural issues still remain as causes for unease in the Western mind.

Unfortunately, such issues tend to increase as a result of repeated visits — gradually, an observant Western visitor will begin to comprehend some of the unwritten rules that govern life in Japan, and in retrospect will appreciate just how many social gaffes can be made during initial, casual visits. While such gaffes may be viewed as minor embarrassments by some Westerners, it is important to realize, from a working relationship viewpoint, that Japanese hosts will evaluate Western visitors on the basis of such gaffes — it is human nature to use internal benchmarks to form opinions, and since the Japanese rules of behavior are significantly non-Western, there are great opportunities for misunderstandings and erroneous judgments. From problems with footwear, with chopsticks, with forms of verbal address, with overall decorum, etc., the possibilities for transgressions seem endless, even if the "cures" are often trivial. Accordingly, in my tutorial I hope that I can provide an inside Western perspective on some of the more baffling aspects of interactions in a Japanese environment, and offer some pointers for behavior that will delight and impress Japanese hosts and colleagues.

The course will focus on general cultural and

interpersonal topics — advanced business-oriented topics such as Western vs. Japanese negotiation strategies, "Japanese financial systems, Japanese labor rules, etc., will not be covered.

Benefits: This course will enable you to:

- Learn about Japanese life through the experiences of a resident foreigner living daily in a Japanese environment
- Handle the logistics of everyday life in Japan — travel by trains and taxis, dining in restaurants, etc.
- Use and comprehend key, short Japanese phrases — greetings, questions, expressions of thanks, etc.
- Develop a clear and understandable pronunciation of common Japanese words and phrases
- Develop an understanding of the historical and cultural framework to life in Japan
- Appreciate the importance of introductions, of gift-giving, etc.
- Identify and interpret the "Japanese Unwritten Rules of Behavior" — body language, "code words", expected responses, etc.
- Recognize the need for harmony, for a quiet self-effacing demeanor, for patience, for apologies, etc.
- Understand the style of business interactions — consensus, teamwork, attention to detail, devotion to Company, etc.

Intended Audience: This course will be of interest to all "foreigners" who travel to Japan on business, especially those who still feel confused and uncomfortable even after repeated short-term visits.

Japanese nationals might also appreciate the foreigner's view of their homeland presented in the tutorial — such a perspective might help explain some of the puzzling behavior typically shown by visiting foreigners.

Robert J. Nash was a xerographic research technologist at the Xerox Corporation from 1970 until 2001. After fifteen years of short technology-interchange visits to Japan, he finally relocated to Japan in 1988 for a long-term expatriate assignment. For almost three years he spent his days as the lone Xerox Resident at Fuji Xerox, Takematsu, while his wife steadily expanded her circle of Japanese friends through activities such as quilting and informal English Conversation classes. They lived in a hybrid Japanese/Western house in a totally Japanese residential area away from Tokyo, and since all of their friends were Japanese they became well-established as the local resident "foreigners". By driving their own cars and by shopping unaided at the local shops, they were definitely recognized as non-tourists, and consequently were often assumed to be magically fluent in Japanese. Unfortunately, however, the truth is that they were proficient enough to get

Tutorial Program

into trouble, but not enough to extricate themselves! Overall, however, they certainly felt more "at-home" than the average casual visitor does, and hope that he can transmit some of their hard-won insights during his tutorial.

T30 - \$165/\$210

T31 - 4 hour tutorial Thursday, October 2
1:00 to 5:00 pm

LIQUID TONER PRINTING: 2003 TECHNOLOGY AND APPLICATIONS

*Instructors: George Gibson and James Larson,
Xerox Corporation*

Liquid toner technologies have long been held as providing versatile methods for imaging in a variety of applications. Known for high image quality, especially high quality color, liquid toners are nevertheless, less widely used today. This course will cover the variety of liquid toner processes that are and have been used including the strengths and limitations of each and the major application areas in which these techniques are used. The course will include an analysis of improvements of liquid toner systems found in recent technical literature and patents. Much of this material will be new and has not been included in previous versions of this course.

Benefits: This course will enable you to:

- Recognize the fundamentals of five generations of liquid toner device architectures
- Appreciate the composition and preparation methods for liquid toners
- Describe how the components of the toner and characteristics of the process drive print properties
- Know the major market applications where liquid toners are employed today
- Learn about recent innovations in liquid toner technology

Intended Audience: The course is intended for technical professionals who want to become more knowledgeable about non-impact printing technology.

George Gibson & James Larson's biographical sketches appear in the description for Tutorial T18.

T31 - \$190/\$240

T32 - 4 hour tutorial Thursday, October 2
1:00 to 5:00 pm

EXTERNAL ADDITIVES FOR XEROGRAPHIC TONERS

*Instructor: Robert J. Nash, Consultant,
Hafren Associates*

With few exceptions, present-day xerographic toners are surface-coated with sub-micron particulates, such as fumed silicas, titanias, etc. These surface additives, which are typically dry-blended onto the toner particles in the final stage of toner

production, enhance toner performance in key process steps such as development and transfer. In particular, external additives are especially important in full-color toner applications, for performance optimization of four individual toner types. This course will provide an overview of toner external additives and their effective application to single and dual-component toners.

Benefits: This course will enable you to:

- Understand the impact on toner performance of key additive properties such as size and surface composition
- Compare the various processes used to blend external additives onto toner surfaces
- Identify and quantify the effect of toner external additives on key toner development characteristics such as charge level, polarity, charging rate, etc., and developer properties such as conductivity
- Evaluate the effect of toner external additives on the response of xerographic developers to changes ambient humidity
- Describe the impact of external additives on toner charging in terms of a simple model

Intended Audience: This course is intended to provide a quantitative review of toner external additive effects. It should be of interest to scientists involved in pure xerographic materials research, and to scientists and engineers active in applied toner concept development or toner manufacturing technologies.

Robert Nash received his Ph.D. in Physical Chemistry from the University of Bristol, England. He joined the Xerox Corporation in 1970. His research and modeling studies at Xerox were focused on the design and evaluation of xerographic toners, carriers and developers, with especial emphasis on "aging" mechanisms and additive effects. From 1998 until the end of 2000 he served an expatriate assignment at Fuji Xerox, Takematsu, Japan, as the Senior Manager, Resident for the Xerox Supplies Development, Manufacturing and Supply Chain Operations organization. He retired from Xerox in early 2002, and currently provides a consulting service on a variety of subjects, ranging from xerographic materials to cross-cultural interactions with Japan. Starting with the 4th. International NIP Congress in 1988, he yearly presented the results of his studies at the IS&T NIP Conference. In 1990, he served as Publication Chairman for the 6th NIP Congress, and in 1992 he was Chairman of the IS&T Honors & Awards Committee. In 1999, he was named as a Fellow of the IS&T, and in 2002 he jointly received the Chester Carlson Award with his long-time colleague, Dr. J.T. Bickmore.

T32 - \$190/\$240

T33 - 4 hour tutorial Thursday, October 2

Tutorial Program

1:00 to 5:00 pm
SECURE PRINTING AND IMAGING TECHNOLOGIES

Instructor: Ping Wah Wong, Consultant

This course will cover the fundamental concepts of secure printing and related imaging technologies. Both system issues and algorithmic components of secure printing will be addressed. We will examine the roles of cryptographic algorithms and protocols in secure printing. We will also discuss important classes of watermarking technologies, and analyze the advantages and limitations of state-of-the-art watermarking techniques.

Benefits: This course will enable you to:

- Identify the basics concepts and issues of secure printing
- Examine system protocols and algorithmic components in secure printing systems
- Understand the basic concepts and structures of important cryptographic algorithms
- Recognize the applications of image watermarking, and associate the appropriate watermarking technology to various applications
- Comprehend the theory of image watermarking techniques, as well as understand their

advantages and limitations

Intended Audience: This course is intended for managers and engineers who want to understand the basics of state-of-the-art secure printing and imaging techniques. The emphasis will be on a descriptive, rather than analytical treatment. No background in image processing and cryptography will be assumed, although some familiarity with these concepts will be helpful.

Ping Wah Wong is a consultant specializing in digital halftoning, image watermarking, image processing, data compression and security technologies. He received his Ph.D. in Electric Engineer from Stanford University. Previously he was with Hewlett-Packard managing research teams in halftoning and image processing, as well as software teams in internet imaging. Later he founded IDzap LLC which specializes in internet security and privacy. Dr. Wong has published extensively in the imaging area. He co-chairs the annual IS&T/SPIE Conference on Security and Watermarking of Multimedia Contents. He is an Associate Editor for the Journal of Electronic Imaging.

T33 - \$190/\$240

Separate registration for classes is required. Register on-line at www.imaging.org

Conference Program

Track I

Monday September 29, 9:20 am to 4:10 pm

TONER BASED PRINTING: PROCESSES

Session Chairs: Koji Hiarakura, Ricoh Co., Ltd.; Diane Herrick, NexPress Solutions L.L.C.; and Detlef Schulze-Hagenest, NexPress GmbH

2,540 dpi Full Color Image Creation With a Liquid Electrophotography System (Focal), *Koichi Ishii¹, Masaki Takahashi¹, Hitoshi Nagato¹, Kazuhiko Higuchi¹, Masahiro Hosoya¹, and Kimio Komata², ¹Toshiba Corporation (Japan); and ²Opcell (Japan)*

Effects of Silica on the Adhesion of Toner to a Composite Photoconductor, *S.O. Cormier¹, D. S. Rimai¹, P. Alexandrovich¹, and D. J. Quesnel², ¹NexPress Solutions LLC (USA); and ²University of Rochester (USA)*

An Experimental Design for Non-Contact Type Single Component Developing System, *Jong Moon Eun, Samsung Electronics Co., Ltd (Korea)*

Measurements and Analyses of Toner Motion in the Development Process, *Jun Hirabayashi and Norio Takahashi, Canon Inc. (Japan)*

Conductivity and Time-Constant Measurements on Magnetically-Agitated Electrophotographic Developer Using the Method of the Compensated Probe, *Graham S. Wright, NexPress Solutions LLC (USA)*

A Study of Transfer Process by Observation of Discharge Light Emission, *Tomoko Takahashi, Sadayuki Iwai, and Masami Kadonaga, Ricoh Co. Ltd. (Japan)*

Effect of Two Component Electrophotographic Developer Properties on Image Quality, *Ichiro Kadota and Hideki Kosugi, Ricoh Co., Ltd. (Japan)*

Statistical Analyses of Adhesive Forces on Electrophotographic Toners (Focal), *Inan Chen, Webster, NY (USA)*

Conference Program

Paper Transport in Duplex Color Radiation Fusing, Continuous and Flash, Detlef Schulze-Hagenest and Domingo Rohde, NexPress GmbH (Germany)

Liquid Toner Transfix Print Process, James R. Larson, John Berkes, John Chambers, and Rasin Moser, Xerox Corporation (USA)

Banding Sources in the Electrophotographic Process and Analysis Techniques for Identifying Those (Focal), Ulrich von Huelsen, NexPress Solutions LLC (USA)

High Speed Liquid Development Using Highly Concentrated Liquid Toner, Shogo Matsumoto, Yoshinobu Fukano, and Junichi Matsuno, Mechanical Engineering Research Laboratory, Hitachi Ltd. (Japan)

Simulation of Electrophotographic Development, Ulrich Mutze¹, Eric Stelter², and Thomas Dera¹, Heidelberg Digital L.L.C. (¹Germany and ²USA)

Color Fusing Technology Using Induction Heating, Masahiro Samei¹, Tomoyuki Noguchi¹, Kazunori Matsuo², Hideki Tatematsu¹, Masaru Imai¹ and Tadafumi Shimizu², ¹Digital Imaging Development Center, Panasonic Communications Co., Ltd. (Japan); ²Digital Imaging Company, Panasonic Communications Co., Ltd. (Japan)

Monday September 29, 4:30 to 5:10 pm

TONER BASED PRINTING: PROCESSES INTERACTIVE SESSION

Session Chairs: Koji Hiarakura, Ricoh Co., Ltd.; Diane Herrick, NexPress Solutions L.L.C.; and Detlef Schulze-Hagenest, NexPress GmbH

Analysis of the Surface Properties of a Development Roller for Mono-Component Toner Charging by Using a Current Measurement Technique, Koji Takagi¹, G.S.P. Castle², and Manabu Takeuchi¹, ¹Ibaraki University (Japan); and ²The University of Western Ontario (Canada)

Experimental and Numerical Study on the Bead-Carry-Out in Two-Component Development Process in Electrophotography, Nobuyuki Nakayama¹, Yoichi Watanabe¹, Yasuaki Watanabe¹, and Hiroyuki Kawamoto², ¹Fuji Xerox Co., Ltd. (Japan); and ²Department of Mechanical Engineering, Waseda University (Japan)

Influence of Toner Charge on Magnetic Chain Formation in Magnetic Single-Component Development System of Electrophotography, Masao Nakano¹, Hiroyuki Kawamoto¹, and Isami Itoh², ¹Department of Mechanical Engineering, Waseda University (Japan), and ²EP Technical Development Center, Canon Inc. (Japan)

The Conductive Toner Cloud Confinement Using the Cone Shape of Dented Electrode, Witchanikul Sripho¹, Suda Kaitkomjornwong¹, and

Yasushi Hoshino², ¹Chulalongkorn Univ. (Thailand) and ²Nippon Institute of Technology (Japan)

Monte Carlo Simulation of the Effects of Process and Manufacturing Variability on a Roller Transfer Subsystem, Graham S. Wright, NexPress Solutions LLC (USA)

Influence of Paper Dust on Electrophotographic Images in Mono-Component Impression Developing Process, Shougo Sato and Manabu Takeuchi, Ibaraki University (Japan)

PC Surface Charge Density from a Vertically Gaussian, Laterally Exposure-Based Volume Charge Distribution in the CGL, Jang Yi and Richard B. Wells, University of Idaho (USA)

Automating Cylinder Surface Inspection, Steve Cormier¹, Diane Herrick¹, Dave Jackson¹, Yair Kipphan², Kate Johnson², and Tahl Solomon², ¹NexPress Solutions, LLC and ²ImageXpert (USA)

Tuesday September 30, 9:10 to 10:40 am

TONER-BASED PRINTING MATERIALS - INNOVATIVE PROCESSES

Session Chairs: Manabu Takeuchi, Ibaraki Univ.; Patricia Burns, Xerox; and Manfred Muenz, OPS, Germany

Traveling Wave Transport of Particles and Particle Size Classification, Hiroyuki Kawamoto, Naoto Hasagawa, and Kyogo Seki, Waseda Univ. (Japan)

Charging Characteristics of Synthesized Monodisperse Colored Particle, Takahide Mizawa, Yoosuke Nakata, Yusuke Mizuno, and Toshihiko Oguchi, Soken Chemical & Engineering Co., Ltd. (Japan)

Electrophoresis of Polymer Particles Charged by Acid-Base Dissociation in Silicone Oil-Dependence on a Concentration of Acid/Base Dispersing Polymer (Focal), Tsutomu Teraoka and Masahiko Itaya, Ricoh Co., Ltd. (Japan)

Phase Change Ink for Liquid Electrophotography, Julie Qian, Bao Tran, Gay Herman, and James Baker, Samsung Information Systems America (USA)

Tuesday September 30, 11:00 am to 3:10 pm

TONER-BASED PRINTING MATERIALS - QUALITY UPGRADE AND EVALUATION

Session Chairs: Suda Kiatkamjornwong, Chulalongkorn University; Jodi Walsh, Lexmark; and Ian Neilson, Coates Electrographics

The Effect to the Toner of Various Properties of the Crystalline Polyester (Focal), Eiji Shirai, Katsutoshi Aoki, and Masayuki Maruta, Kao Corporation, Performance Chemicals Research Laboratories (Japan)

The Effect of Toner Blend Conditions on Charge-Admix Performance, Robert J. Nash,

Conference Program

James McNamara, Richard N. Muller, Marsha Butler, and Charles Dickerson, Xerox Corp. (USA)

The Pulverized Full-Color Toner with High Performances, Jun Shimizu, Shinichirou Omatsu, and Yasuhiro Hidaka, Kao Corporation (Japan)

Toner Characteristics and Xero Interactive Performance of EA (Emulsion Aggregation) Particles with Specific External Additives, Chiaki Suzuki, Masahiro Takagi, Satoshi Inoue, Takao Ishiyama, Yasuo Matsumura, Haruhide Ishida, and Takayoshi Aoki, Fuji Xerox Co. (Japan)

Characterisation of Liquid Toners Using a New Dynamic Method, Susann Reuter, Sigrid Franke, Tino Zillger, and Arved C. Hübler, TU Chemnitz, Institute for Print and Media Technologies (Germany)

New Characteristic Additives Designed for Toner - Fine Metallic Soaps & Purified Solid Esters, Kouhei Sawada and Miki Konaka, Oleochemicals Research Laboratory, NOF Co. Ltd. (Japan)

A Study of Flow Properties of Toners in Relation to Physical and Environmental Factors, Ian Neilson, Coates Electrographic, and Reg Freeman, Freeman Technology (UK)

Tuesday September 30, 3:30 to 3:45 pm
TONER-BASED PRINTING MATERIALS - INNOVATIVE PROCESSES INTERACTIVE SESSION

Session Chairs: Manabu Takeuchi, Ibaraki Univ.; Patricia Burns, Xerox; and Manfred Muenz, OPS, Germany

Influence of Properties of Magnetite on Tribocharging Characteristics of Mono-Component Magnetic Toners, Tatusya Tada¹, Yoshinobu Baba², and Manabu Takeuchi³, ¹Graduate School of Science and Engineering, Ibaraki University; ²Fuji-Susono Research Park, Canon Inc.; ³Department of Electrical and Electronic Engineering, Ibaraki University (Japan)

Some Singularities of Polystyrene Adsorption on Technical Carbon, Iryna Opaynych, Igor Maleyev, and Zenowij Yaremko, Ivan Franko L'viv National University, Department of Physical and Colloidal Chemistry (Ukraine)

Plastisol Based Liquid Electrophotographic Toners, Eric Morrison, Julie Qian, Chris Wolters, James Baker, and Kam Law, Samsung Information Systems America (USA)

Adhesion of Silica Particles and Silylated Silicon Tips on Model Toner Surfaces - A SFM Study, Sabine Hild¹, Mario Heinemann², Ute Voelke², and

Interactive Poster Sessions

Tuesday, September 30, 4:30 to 6:30 pm

The poster presenters will be standing by their posters to discuss their work with participants.

Herbert Barthe¹, ¹Experimental Physics, Univ. of Ulm, and ²Wacker-Chemie GmbH (Germany)

Tuesday September 30, 3:45 to 4:10 pm
TONER-BASED PRINTING MATERIALS - QUALITY UPGRADE AND EVALUATION INTERACTIVE SESSION

Session Chairs: Suda Kiatkamjornwong, Chulalongkorn University; Jodi Walsh, Lexmark; and Ian Neilson, Coates Electrographics

Charging Characteristics of Polymerized and Pulverized Toner in the Roller, Hidetaka Ishihara and Yasushi Hoshino, Nippon Institute of Technology (Japan)

Toner Having High Durability for Non-Magnetic Mono-Component Process, Nobuyuki Aoki, Tomoegawa Paper Co., Ltd. (Japan)

Mixed State of Color Toner Particles in Two-Component Developer via Shaker, Youichi Nakamura, Zhou Ye, Pranchalee Rattanasakornchai, Yasushi Hoshino, Yutaka Terao, and Yasuyuki Suzuki, Nippon Institute of Technology (Japan)

Triboelectrification and Fusing Characteristics of COC Based Toner, Klaus Berger¹, Doug Hammond², and Toru Nakamura³, ¹Ticona GmbH (Germany), ²Topas (USA) and ³Ticona (Japan)

Designing Physicochemical Properties of Wax-Containing CM Toner[®], Chul-Hwan Kim, Eui-Jun Choi, Jong-Kwan Kim, and Hyun-Nam Yoon, DPI Solutions, Inc. (Korea)

Wednesday October 1, 9:10 am to 2:50 pm
INK JET PRINTING MATERIALS
Session Chairs: Hiromichi Noguchi, Canon Inc.; Jim Mayo, Xerox; and Katri Vikman, Helsinki University of Technology

Key Factors of UV Curing for Ink Jet Printing, R. W. Stowe, Fusion UV Systems, Inc. (USA)

The Influence of Pigment Selection on Particle Size and Migration Stability in Aqueous Inkjet Inks, Peter Rose and Nick Walker, ILFORD Imaging UK Limited (UK)

New Methods of Carbon Black Surface Modification (Focal), Thomas Lüthge, Degussa AG (Germany)

Carbon Black Dispersions for High Optical Density on Plain Paper, Eric Langenmayr, Stephen Crescimanno, Richard Wu, and Tabb Champlin, Rohm and Haas Company (USA)

Gas Fastness of Dye Based Ink, T. Tsutsumi, Y. Nakano, S. Wakabayashi, M. Sakakibara, and Y. Hidaka, Kao Corporation, Materials Development Research Laboratories (Japan)

Particle Size Reduction for Ink Jet Pigment Dispersions, Harry Way¹, Steven A. Schwartz²,

Conference Program

Sallie J. Lee², and Adam Chan², ¹Netzsch, Inc. (USA) and ²Lyondell Chemical Company (USA)

Imbibition of Dye and Pigment-Based Aqueous Inks into Dry and Wetted Porous Substrates (Focal), *G. Desie, S. Allaman, O. Lievens, K. Anthonissen, and A. Soucemarianadin, Agfa-Gevaert N.V., Mortsel (Belgium); LEGI, University Joseph Fourier, Grenoble (France)*

The Use of Comb-Branched Copolymers as Pigment Dispersants, *Steven A. Schwartz, Sallie J. Lee, and Adam Chan, Lyondell Chemical Company (USA)*

Polymer Emulsion for Thermal Inkjet System, *T. Tsutsumi, M. Sawada, and K. Azuma, Kao Corporation, Materials Development Research Laboratories (Japan)*

Thermally Stable Aqueous Pigmented Inks for Printing on Vinyl, *Dheya Alfekri, Encad, Inc. (USA)*

A Novel Pigment Dispersant and Surfactant for Radiation Curable Waterborne Ink Jet Inks, *William R. Dougherty, James Goodrich, Lisa Hahn, James S. Balcerski, and John C. Schmidhauser, Sartomer Company, Inc. (USA)*

Wednesday October 1, 2:50 to 3:20 pm

INK JET PRINTING MATERIALS INTERACTIVE SESSION

Session Chairs:

Hironichi Noguchi, Canon Inc.;

Jim Mayo, Xerox; and

Katri Vikman, Helsinki University of Technology

Can a Polyamide Resin be Formulated into a High-Performance Digital Printing Ink?, *Mark S. Pavlin, Arizona Chemical Company (USA)*

High Glossy and Wide Color Gamut Pigmented Inks for Ink Jet Printing, *Kiyohiko Takemoto, Kazuhide Kubota, and Shuichi Kataoka, Seiko Epson Corporation (Japan)*

Effects of Glycine Derivatives in Dispersed Colorant Based Ink, *Michitaka Sawada, Takehiro Tsutsumi, and Koji Azuma, Kao Corporation (Japan)*

Highly Concentrated Pastes of Nano-Sized Metal Particles for Ink Jet Printing, *Toshikatsu Kobayashi, Hideo Ishibashi, Ayako Iwakoshi, and Taizo Nanke, Nippon Paint Co., Ltd. (Japan)*

Physical Effects on Image Quality of Inkjet Printing Media; Polymer and Nanopigment Sol, *Tai-Sung Kang and Myung-Cheon Lee, Hanmi Filmtech Co., Ltd. (Korea)*

Polymeric Material Performance in the Harsh Environments of Jettable Fluids, *Susan Krawiec, Chih Min Cheng, and Robert Palmer, Emerson & Cuming Inc. (USA)*

Thursday October 2, 9:10 to 10:40 am

INK JET PRINTING MATERIALS

Session Chairs: Hironichi Noguchi, Canon Inc.;

Jim Mayo, Xerox; and

Katri Vikman, Helsinki University of Technology

Behaviour of Ink Droplet Media Interactions in Model Systems (Focal), *D.G. Bucknall, A. Dupius, J. Leopoldes, S. Wilkins, and J. Yeomans, University of Oxford (UK)*

Development of UV-Curing Inks for Food Packaging Applications, *Nigel Caiger, SunJet (UK)*

Soft-Solvent Based Inkjet Inks for Uncoated Vinyl Printings, *Jie Wang, Graphic Digital (USA)*

New Raw Materials for UV Inkjet Inks, *A. Fuchs, M. Richert, S. Biry, S. Villeneuve, and T. Bolle, Ciba Specialty Chemicals (Switzerland)*

Thursday, October 2, 11:00 am to 2:50 pm

INK JET PRINTING PROCESSES

Session Chairs: Shinri Sakai, Seiko Epson Corp.;

Rob Beeson, Hewlett-Packard; and

Ramon Borrell, HP

Increased Inkjet Printing Frequency from 'Offset Channel' Printheads, *Werner Zapka^{1,2}, Mark Crankshaw¹, Jürgen Brünahl², Lars Levin², Uwe Herrmann², and Götz Münchow², ¹Xaar, Science Park (UK) and ²XaarJet AB (Sweden)*

Using Perturbed and Asymmetric Microflow Architectures to Statistically Clarify Droplet-Ejected Deflection in Picoliter and High-Frequency Inkjet, *Chien-Hung Liu, Chi-Ming Huang, Chia-Cheng Chiu, Je-Ping Hu, and Chun-Jung Chen, Opto-Electronics & Systems Laboratories, Industrial Technology Research Institute (Taiwan)*

Methods to Mitigate Dot Position Error Amplification of Phase Change Inks, *James Padgett, Xerox Corporation (USA)*

Inkjet Head for the UltraChrome Inks, *Munehide Kanaya, Seiko Epson Corporation (Japan)*

PIV Measurements of Airflow and Ink Mist Motion around Ink Jet Nozzles, *Nobuyuki Hirooka, Yoshihiko Ono, Nobuyuki Nakayama, and Kazuhiro Mori, Fuji Xerox Co., Ltd. (Japan)*

A Simulation Model of Multi Drop Operation in Inkjet Head, *Ryutaro Kusunoki, Toshiba TEC Corporation (Japan)*

Design and Fabrication of Thermal Bubble Fuel Injector, *C. Y. Mao, J. C. Yang, J. L. Wu, C. L. Chiu, and C. J. Chen, Industrial Technology Research Institute (Taiwan)*

Interactive Poster Sessions

Thursday, October 2, 4:30 to 6:30 pm

The poster presenters will be standing by their posters to discuss their work with participants.

Conference Program

Thursday, October 2, 2:50 to 3:40 pm

INK JET PRINTING PROCESSES INTERACTIVE SESSION

*Session Chairs: Shinri Sakai, Seiko Epson Corp.;
Rob Beeson, Hewlett-Packard; and
Ramon Borrell, HP*

Research on Micro Heater Efficiency for Thermal Inkjet Head, *K. Kuk, J.H. Lim, M.S. Kim, M.C. Choi, C.H. Cho, and Y.S. Oh, Samsung Advanced Institute of Technology (Korea)*

Ink-Jet Printing Technology on Manufacturing Color Filter for Liquid Crystal Display, Part I: Ink-Jet Manufacturing Processes, *Wanda Chiu, Kevin Cheng, Chun Fu Lu, Fanny Hsieh, and Jane Chang, Opto-Electronics and Systems Laboratories of Industrial Technology Research Institute (Taiwan)*

Ink-Jet Printing Technology on Manufacturing Color Filter for Liquid Crystal Display, Part II: Printing Quality Improvement, *Kevin Cheng, Wanda Chiu, Chau-Shin Jang, Chien-Chang Lai, Yung-Kuo Ho, and Jane Chang, Opto-Electronics and Systems Laboratories of Industrial Technology Research Institute (Taiwan)*

The Simulation of the Viscosity and Surface Tension for the Inkjet Print Head, *Ching-Long Chiu, Chou-Lin Wu, Jinn-Cherng Yang, Ching-Yi Mao, Huen-Ling Chen, Mon-Da Yang, Chi-Bin Lo, and Chun-Jung Chen, OEAC, Industrial Technology Research Institute (Taiwan)*

Piezo Ink Jet Simulations Using the Finite Difference Level Set Method and Equivalent Circuit, *Jiun-der Yu and Shinri Sakai, Epson R & D, Inc (USA) and Seiko Epson Corporation (Japan)*

Design and Validation of a One-Dimensional Ink Jet Model, *Sharon S. Berger¹ and Gerald Recktenwald², ¹Xerox Corporation (USA) and ²Portland State University (USA)*

A Study of the Ink Reservoir for an Inkjet System, *Yi-Chia Wen, Shyh-Haur Su, and Chun-Jung Chen, OES/ITRI (Taiwan)*

Five Different Systems of Epoxy Adhesives for Use with Ink-Jet Print Head, *Huen-Ling Chen, Ming-Shiu Li, Chi-Bin Lo, and Chun-Jung Chen, Opto-Electronics & Systems Laboratories, Industrial Technology Research Institute (Taiwan)*

Application of Micro-Ruel Injection System by Thermal Bubble Inkjet Technology, *C. Y. Mao, J. C. Yang, J. L. Wu, C. L. Chiu, and J. R. Chen, K200/OES/ITRI (Taiwan)*

Friday October 3, 9:00 to 10:50 am

INK JET PRINTING PROCESSES

*Session Chairs: Shinri Sakai, Seiko Epson Corp.;
Rob Beeson, Hewlett-Packard; and
Ramon Borrell, HP*

Modeling and Numerical Simulation of the Crosstalk Behavior of a DOD Printhead, *Hermann Seitz, Research Center Caesar (Germany)*

Multiple Drop Interaction with a Solid Substrate, *Guido Desie, Sandrine Allaman, and Arthur Soucemarianadin, Agfa-Gevaert N.V., Mortsel (Belgium); LEGL, University Joseph Fourier, Grenoble (France)*

High Speed High Image Quality Printing on Plain Paper Using Symmetrically Arranged Color Bubble Jet Print Head (Focal), *Mineo Kaneko, Hiroto Matsuda, and Kazuhiro Nakajima, i Printer Technology Development Center, Canon (Japan)*

Electrostatic Inkjet Phenomena in Pin-to-Plate Discharge System, *Hiroyuki Kawamoto, Kenji Arai and Ryuta Koizumi, Waseda University (Japan)*

Curing with UV LED's, *Stephen Siegel, RadTech, Screen Print Association (USA)*

Track II

Monday September 29, 9:20 am to 3:00 pm

DIGITAL PHOTOFINISHING (INVITED PAPERS)

Session Chair: David Clark, Consultant

Kodak Digital Photofinishing Products and Technology (Invited), *William Atkinson, Eastman Kodak Co. (USA)*

HP Digital Photofinishing Products and Technology (Invited), *Gary Cutler, Hewlett Packard Co. (USA)*

Noritsu Digital Photofinishing Products and Technology (Invited), *Pete Mador and David Wilkie, Noritsu America Corp. (USA)*

Analysis of Trends in Digital Photography and

Digital Photofinishing (Invited), *Michelle Slaughter, InfoTrends Research Group, Inc (USA)*

Photofinishing in the Digital Age (Invited), *Yishai Amir, Hewlett-Packard (Israel)*

Challenges in Digital Photofinishing (Invited), *Jeannine Smith, Shutterfly (USA)*

Monday September 29, 3:20 to 4:40 pm

THERMAL PRINTING

Session Chairs:

*Hiroto Teruo, Alps Electric Co., Ltd.; and
Richard Henzel, Eastman Kodak*

Use of a Thermal Dye Diffusion Model to Predict Printing Line Times, *Edward J. Ozimek, Eastman Kodak Company (USA)*

Conference Program

Full Colour Fluorescent Images Printed by Thermal Dye Transfer, *Richard Hann, ICI Imagedata (UK)*

Study of Thermal Print Head for High-Speed Print, *Hirotooshi Terao and Toshifumi Nakatani, Alps Electric Co., Ltd. (Japan)*

TBA, *Rick Collins, Kyocera (USA)*

Monday September 29, 4:40 to 4:50 pm

THERMAL PRINTING INTERACTIVE SESSION

Session Chairs:

*Hirotooshi Terao, Alps Electric Co., Ltd.; and
Richard Henzel, Eastman Kodak*

Expanding Applications on the Thermal Transfer Printing Technology, *Yoshi Oyamada, Takara Ishikou, and Hirotooshi Terao, Alps Electric Co., Ltd. (Japan)*

New Heat Sensitive Recording Composition Containing Phenolisatine Polymers, *Youngsoon Kim, Chanyoung Kim, and Eunkyoun Kim, Dongguk University (Korea) and Korea Research Institute of Chemical Technology (Korea)*

Tuesday September 30, 9:10 am to 4:40 pm

IMAGE PERMANENCE

Session Chairs: Takao Abe, Shinshu Univ.;

*Larrie Deardurff, Hewlett-Packard; and
Rita Hofmann, Ilford Imaging Switzerland GmbH*

Materials for Providing High Print Quality and High Image Stability, (Kosar Award Talk), *Takao Abe, Shinshu University (Japan)*

Stability of Ink Jet Prints to Gas Fading - New Developments, *Josef Geisenberger, Klaus Saitmacher, Hans-Tobias Macholdt, and Heidi Menzel, Clariant GmbH (Germany)*

VOC Based End-Point Criteria for Lightfastness of Harcopy Prints, *David Oldfield, Gary Pino, Rise Segur, John Paul Twist, and Scott O'Dell, Eastman Kodak Company (USA)*

Update on Reciprocity Effects for Accelerated Ozone Fade Testing of Inkjet Photographic Prints (Proposed Focal Paper) (Focal), *D. E. Bugner, R. VanHanehem, P. Artz, and D. Zaccour, Eastman Kodak Company (USA)*

The Characterization of Humidity Sensitivity of Ink-jet Prints, *Eduard Baumann and Rita Hofmann, Ilford Imaging Switzerland GmbH (Switzerland)*

Correlations Between Xenon Arc Accelerated Weathering Tests and Outdoor Weathering, *Bruce M. Klemann, Brady Corporation (USA)*

Image Stability and Display Life of Digital Prints (Focal), *Hiroshi Ishizuka, Yoshio Seoka, Yoshihiko Shibahara, and Eiichi Sakai, Fuji Photo Film Co., Ltd. (Japan)*

A Study of Fading Property Indoors Without Glass Frame From Ozone Accelerated Test, *Kazuhiko Kitamura, Hiroko Hayashi, Yasuhiro Oki, and Tetsuya Aoyama, Seiko Epson Corporation (Japan)*

Correlating Line Width and Color Changes in Inkjet Prints Exposed to High Relative Humidity, *Mark McCormick-Goodhart, and Henry Wilhelm, McCormick-Goodhart, Inc. (USA) and Wilhelm Imaging Research, Inc. (USA)*

Comparison of Inkjet Print Air Fade and Ozone Fade (Focal), *Matthew Thornberry and Steven Looman, Hewlett-Packard Company (USA)*

Progress in Permanence: Improved Products and Better Predictions from "Gas Fading", *Paul Wight and Thomas Paul, Avecia (UK)*

Contribution of Spectroscopic Techniques to the Analysis of Permanence Properties of Ink-Jet Printed Materials, *Anne Blayo, Cyril Murie, and Bernard Pineaux, EFPG, Grenoble (France)*

Comparison of Different Methods for Estimating the Sensitivity of Printed Images to Gas Fading, *Michael Berger and Henry Wilhelm, Wilhelm Imaging Research (USA)*

Yellowish Stain Formation in Inkjet Prints and Traditional Color Photographs, *Henry Wilhelm, Wilhelm Imaging Research, Inc. (USA)*

Tuesday September 30, 4:40 to 5:00 pm

IMAGE PERMANENCE INTERACTIVE SESSION

Session Chairs: Takao Abe, Shinshu Univ.;

*Larrie Deardurff, Hewlett-Packard; and
Rita Hofmann, Ilford Imaging Switzerland GmbH*

Activation Energy of Dye Degradation Processes on Different Ink-jet Papers, *Umberto De Rossi¹, Ulrich Litz², and Christian Blendl², ¹Tetenal Photowerk and ²FH Köln (Germany)*

The Impact of Polymer Morphology on the Light Stability of Ink Jet Graphics, *Andrew Naisby, Joseph Suhadolnik, and Donna Pennant, Ciba Specialty Chemicals (USA)*

The Effect of Ozone on the Quality and Stability of Inkjet, Chromogenic and Silver Digital Images, *David F. Kopperl and Mark B. Mizen, Creative Memories (USA)*

Stabilization of Dye Based Images on Porous Media, *Mervin G. Wood, Joseph Suhadolnik, Andrew Naisby, and Donna Pennant, Ciba Specialty Chemicals (USA)*

Wednesday October 1, 10:50 to 11:30 am

PRE-PRESS AND POST-PRESS SYSTEMS (INVITED PAPERS)

Session Chairs: Sabine Roob, NexPress GmbH

Workflow Automation from End to End, *Sabine Roob, NexPress (Germany)*

Conference Program

Tools and Requirements for Merging Offset and Digital EP Workflows, Leonard R. Christopher, Heidelberg Digital L.L.C. (USA)

Wednesday October 1, 11:30 am to 3:40 pm

PRODUCTION DIGITAL PRINTING

Session Chairs: Dr. Masahiro Hosoya, Toshiba Corp.; Eric Hanson, Hewlett-Packard; and Peter Bracke, Dotrix (Belgium)

Integrating Digital Printing and Converting for the Label Market, Ken Daming, Mark Andy, Inc. (USA)

High Speed Laser Scanning Unit Using 12-Beam Laser Diode Array and Image Tracking System (ITT) for High Quality Color Printing, Haim Livne and Michael Plotkin, HP/Indigo (Israel)

Digital Labels Printing, Ronen Samuel, Hewlett-Packard Company (Israel)

A Variable Data Digital Offset Workflow, Dhiraj Kacker and Russell Muzzolini, Shutterfly, Inc. (USA)

Digital Production Printing with UV-Curable Dry Toners (Focal), Lode Deprez¹, Werner Op de Beeck¹, and Karolina Rosenberger², ¹Xeikon International NV, (Belgium) and ²Alcan Packaging Services Ltd. (Switzerland)

A Scalable, Media Processor Based Image Data Path for the Xerox DocuSP Platform, Norm Zeck and Bill Nelson, Xerox Corporation (USA)

Implementation of a Hard Copy Remote Proofing Workflow, Albert Such and Jim McCullough, Hewlett-Packard (Spain)

Scitex Digital Printing and Production Digital Technology, Eric K. Wilson, Scitex Digital Printing

Thursday October 2, 9:10 to 9:50 am

SECURITY AND FORENSIC IMAGING

Session Chairs: Makoto Omodani, Tokai Univ.; Annette Jaffe, Consultant; and Jan Van Laethem, Dotrix, Belgium

Digital Counterfeiting of Security Documents - Is Digital Reproduction Still in Advance of the Security Print Industry?, Tony Harris, Software 2000 Ltd. (UK)

Geometric Attack Resistant Image Watermarking for Copyright Protection, Dimitrios Simitopoulos, Dimitrios Koutsonanos, and Michael G. Strintzis, Informatics and Telematics Institute (Greece)

Thursday October 2, 10:30 am to 3:30 pm

PRINTING SYSTEMS ENGINEERING & OPTIMIZATION

Session Chairs: Takashi Kitamura, Chiba Univ.; Bob Fields, Heidelberg Digital L.L.C.; and Bart Verlinden, AGFA-Gevaert

General Alignment Strategy of InkJet Devices (Focal), Jorge Castaño Aspas, Hewlett-Packard (Spain)

Printhead Maintenance - Low Pressure Assist Effect on Effectiveness, Rodney Hill, Xerox Corp. (USA)

The Effect of Temperature and Relative Humidity on Dimension, Volume Resistivity and Ionic Depletion Rate of Semi-Conductive Polyurethane, Charles J. Matteliano, Winfield Industries, Inc. (USA)

Manifold Ringing Mitigation through Tuned, Lumped Compliance, John M. Brookfield, Xerox Corporation (USA)

Method of Adjusting LED Printbar Uniformity, Howard Mizes and Daniel Viassolo, Xerox Corporation (USA)

Understanding the Role of Print Quality in Perceived Printer Quality (Focal), Paul Jeran¹, Steve Korol², and Abbie Parker¹, ¹Hewlett Packard and ²Xerox (USA)

Achieving "Reliability" Through an Operator Replaceable Component Strategy, David Bettioli, NexPress Solutions, LLC (USA)

Modular Ink Jet Print Engine for Industrial Applications, Paul Morgavi, Impika (France)

IMAGE-IN: Improved Ink-Jet Printing by Control of Ink-Media Interactions, D.G. Bucknall, University of Oxford (UK)

High Precision Jetting and Dispensing Applications Using A Piezoelectric Micropump, Marlene McDonald, Spectra, Inc. (USA)

Thursday October 2, 3:30 to 3:35 pm

PRINTING SYSTEMS ENGINEERING & OPTIMIZATION INTERACTIVE SESSION

Session Chairs: Takashi Kitamura, Chiba Univ.; Bob Fields, Heidelberg Digital L.L.C.; and Bart Verlinden, AGFA-Gevaert, Belgium

Paper Separation and Feed Mechanisms Utilizing Electrostatic Force, Shinjiro Umez, Jumpei Shiraiishi, Hideaki Nishimura, and Hiroyuki Kawamoto, Waseda University (Japan)

Friday, October 3, 9:00 am to 12:20 pm

DIGITAL PRINTING/QUALITY CONTROL INSTRUMENTATION

Session Chairs: Masahiko Itaya, Ricoh. Co., Ltd.; Eric Zeise, NexPress Solutions L.L.C.; and Marcel Slot, Océ Technologies

The Substrate Influence on Color Measurement (Focal), Mattias Andersson¹, Ole Norberg¹, and Björn Kruse², ¹Mid Sweden University (Sweden) and ²Linköping University (Sweden)

Inspection Method for Roller Parts Using Phase-Shift-Moire 3D Measurement Method, Ryuji Sakita, Osamu Nakayama, and Teruki Kamada, Ricoh Company, Ltd. (Japan)

Print Quality Test Page, Woonyoung Jang and

Jan P. Allebach, Purdue University (USA)

Perceptual Color Contouring Detection and Quality Evaluation Using Scanners (Focal), Chunghui Kuo, Yee Ng, and Dmitri A. Gusev, NexPress Solutions LLC (USA)

Electro-Photographic & Ink Jet Color Consumable Yield Test Documents: Problems, Approaches & Suggestions, Paul L. Jeran and David R. Spencer, Hewlett-Packard Company (USA)

Color Print Quality Evaluation on Structured

Papers, Bernhard Steuernagel, Eggert Jung, NexPress GmbH (Germany)

A Novel High Field Electrophoretic Cell for Characterisation of Concentrated Liquid Toners, Alexander B. Ozerov and Charlie M. Mao, Research Laboratories of Australia (Australia)

Using Machine Vision Based System for Benchmarking Various Printing Plate Surfaces, Eugene Langlais¹, Shiva Adudola¹, and Prashant Mehta², ¹Presstek, Inc. and ²ImageXpert, Inc. (USA)

Track III

Monday September 29, 9:20 am to 2:20 pm

MEDIA FOR DIGITAL PRINTING

Session Chairs:

Toshihiko Oguchi, Morimura Chemicals. Ltd;
Velliyur Sankaran, Consultant; and
Florian Eder, Neusiedler Ag

Design Considerations for Matte- and Glossy-Coated Microporous Media for Pigmented Inks, David M. Chapman, W. R. Grace & Co. (USA)

What Can a Chemical Manufacturer Offer for Print Quality? (Focal), Roland Ettl and Hildegard Kukula, BASF Aktiengesellschaft (Germany)

A Study of the Dye-Location for Microporous Ink Jet Media Printed with Dye-Based Inks, Marc Graindourze, Agfa-Gevaert N.V. (Belgium)

About Paper Properties for Modern Dry Toner Presses (Focal), Petri Sirviö, Stora Enso Oyj, Research Centre Imatra (Finland)

Dye Recognition in Ink Jet Photopapers, Aidan Lavery, Felix-Schoeller Imaging (Germany)

Effect of Filler Distribution and Caliper Variations on Toner Transfer in Electrophotographic Printing, Nikolas Provatas, Andrew Cassidy, and Mitsuo Inoue, Paprican (Canada)

Influence of Pigment Particle Size and Packing Volume on Printability of Glossy Inkjet Paper Coatings, Hyun-Kook Lee, Margaret K. Joyce, and Paul D. Fleming, Western Michigan University (USA)

Media/Toner Interactions in Laser Printing, Bhima Sastri and Velliyur Sankaran, MeadWestvaco Corporation (USA)

Monday September 29, 2:30 to 4:20 pm

TEXTILE & FABRIC PRINTING

Session Chairs: Takao Abe, Shinshu Univ.;
Vince Cahill, VCE Solutions; and
Martin Smallegange, Stork Digital Imaging BV

Implementing Digital Print for Production Textile Printing (Focal), Vibeke Dank, Scitex Vision Ltd. (Israel)

Textile Ink Jet Printing with Low Viscosity Pigment

Inks, Ulrike Hees, Mike Freche, Michael Kluge, John Provost, and Juergen Weiser, BASF AG (Germany)

The Development of New Disperse Dye Ink for Ink Jet Textile Printing, Yasuhiko Kawashima, Hitoshi Morimoto, Toshiya Takagi, and Takao Abe, Konica Corp., Corporate Technology Center, Ink Jet Technology Division (Japan)

The Successful Interaction Digital Printing Methods for Depositing Ink on Fibers, Vincent Cahill, VCE Solutions (USA)

Report on the State of Ink Jet and Related Development for Textile and Fiber Printing, Patrice Giraud, Institut National De Grenoble (INPG) ESISAR (France)

Monday September 29, 4:25 to 4:30 pm

MEDIA FOR DIGITAL PRINTING INTERACTIVE SESSION

Session Chairs:

Toshihiko Oguchi, Morimura Chemicals. Ltd;
Velliyur Sankaran, Consultant; and
Florian Eder, Neusiedler Ag

Gelatine and Dye Fixation, Peter Reiter and Berthold Köhler, DGF Stoess AG (Germany)

Monday September 29, 4:40 to 4:55 pm

TEXTILE & FABRIC PRINTING INTERACTIVE SESSION

Session Chairs: Takao Abe, Shinshu Univ.;
Vince Cahill, VCE Solutions; and
Martin Smallegange, Stork Digital Imaging BV

Comparison of Textile Print Quality between Screen Printing and Inkjet Print, Piriya Putthimai¹, Hiromichi Noguchi², and Suda Kiatkamjornwong¹, ¹Chulalongkorn University (Thailand) and ²Canon, Inc. (Japan)

Integration of Fabric Formation and Coloration Processes in Digital Inkjet Printing, Hitoshi Ujii, Muthu Govindaraj, Brian George, and Deanna Wood, Philadelphia University (USA)

Digital Printing in Textile Production, Ann Noonan, Sophis Systems, NV (Belgium)

Conference Program

Tuesday September 30, 9:10 am to 12:10 pm

ELECTRONIC APPLICATIONS OF IMAGING MATERIALS AND DEVICES (INVITED PAPERS)

Session Chairs:

Yoshikazu Nakayama, Osaka Prefecture Univ.;
Masaaki Yokoyama, Osaka Univ.; and
Jim Stasiak, Hewlett-Packard

Manufacturing Printed Circuit Boards Using Ink Jet Technology (Invited), Mark R. James, Avecia (UK)

Formation of Precise Electrically Conductive Pattern Using Metal Colloid I-J Ink (Invited), Toshihiko Oguchi¹, Keiki Suganami¹, Taizo Nanke², and Toshikatsu Kobayashi², ¹Morimura Chemicals Ltd. (Japan) and ²Nippon Paint Co., Ltd. (Japan)

Electrostatic Printing of Functional Liquid Toners for Electronic Manufacturing Applications (Invited), Robert H. Detig, Electrox Corporation (USA)

Pentacene Thin Film Transistors (Invited), George Malliaras, Cornell University (USA)

Tuesday September 30, 1:30 to 4:10 pm

PHOTO-ELECTRONIC MATERIALS AND DEVICES

Session Chairs:

Jin Mizuguchi, Yokohama National University;
Jim Stasiak, Hewlett-Packard; and
Reinhard Baumann, Man Roland

Polymorph of a Latent Pyrrolopyrrole Pigment: 1,4-diketo-3,6-diphenyl-pyrrolo-[3,4-c]-pyrrole (Focal), Jin Mizuguchi, Yokohama National University (Japan)

Light Emitting Devices from Transition Metal Complexes, Jason Slinker, Alon Gorodetsky, Paul L. Houston, Héctor D. Abuña, Stefan Bernhard, and George G. Malliaras, Materials Science and Engineering, Cornell University (USA)

Development of Positive Charging Multi-Layered Organic Photoconductor for Liquid Electrophotographic Process, Nam-Jeong Lee, Hae-Ree Joo, Kyung-Yol Yon, and Young No, Samsung Electronics (Korea)

Photogeneration Efficiency Study of The New Sol-Gel Materials, Xin Jin, David S. Weiss, and Wayne T. Ferrar, Heidelberg Digital LLC (USA)

Color Generation Mechanism of Quinacridone Derivatives as Viewed from the Intermolecular Hydrogen Bond, Takatoshi Senju and Jin Mizuguchi, Yokohama National University (Japan)

Time-Resolved Absorption Study on the Photocarrier Generation Process in Layered Organic Photoreceptors: A Role of Delocalized Holes, Kan Takeshita, Yutaka Sasaki, Takayuki Shoda, and Tetsuo Murayama, Center for Analytical Chemistry and Science Inc., Mitsubishi Chemical Cooperation (Japan)

Study of the Photoconductivity Mechanism in Phthalocyanine Pigment Particles by Electric Field Modulated Time Resolved Fluorescence (Focal), Zoran D. Popovic¹, M. Iltaf Khan², Ah-Mee Hor¹, Joshua L. Goodman², John F. Graham¹, ¹Xerox Research Centre of Canada (Canada), and ²University of Rochester (USA)

Tuesday September 30, 4:20 to 4:50 pm

PHOTO-ELECTRONIC MATERIALS AND DEVICES INTERACTIVE SESSION

Session Chairs:

Jin Mizuguchi, Yokohama National Univ.;
Jim Stasiak, Hewlett-Packard; and
Reinhard Baumann, Man Roland

Electroluminescence Overshoot Induced in DCM-Doped Alq₃ Devices, C. W. Ma, City University of Hong Kong (Hong Kong)

Desorption of Water Molecules and its Effect on the Dark Conductivity and Photoconductivity in X-Magnesiumphthalocyanine, J. Mizuguchi, H. Takahashi, and K. Shiokawa, Yokohama National University (Japan)

Crystal Structure of Chlorinated Thiazine-Indigo, Takatoshi Senju and Jin Mizuguchi, Yokohama National University (Japan)

Crosslinkable Branched Hydrazones as Potential Hole Transporting Materials, Z. Tokarski¹, N. Jubran¹, V. Getautis², O. Paliulis², M. Daskeviciene², I. Paulauskaite², V. Jankauskas³, V. Gaidelis³, and J. Sidaravicius⁴, ¹Samsung Information Systems America (USA), ²Kaunas University of Technology (Lithuania), ³Vilnius University (Lithuania), ⁴Vilnius Gediminas Technical University (Lithuania)

Dimeric Electron Transport Materials and Their Use in Electrophotography, Zbig Tokarski, Ron Moudry, Kam Law, Nusrallah Jubran, Vytautas Getautis, Vyintas Jankauskas, Jonas Sidaravicius, and Edmundas Montrimas, Samsung Information Systems America (USA) and Kaunas University of Technology (Lithuania), Vilnius University (Lithuania), Vilnius Gediminas Technical University (Lithuania)

Characterization of Electric Charge Density Using Electrophoretic Mobility, Keisuke Ichikawa, Kosuke Tanaka, Ryushi Ishikawa, and Makoto Omodani, Tokai University (Japan)

Wednesday October 1, 9:10 to 11:00 am

PHOTO-ELECTRONIC MATERIALS AND DEVICES

Session Chairs:

Jin Mizuguchi, Yokohama National University;
Jim Stasiak, Hewlett-Packard; and
Reinhard Baumann, Man Roland

Molecular Electronics and Resistance of Molecule-Metal Interfaces (Focal), Pavel

Conference Program

Kornilovich, Hewlett-Packard Company (USA)

Analysis of Trap Distribution Using Time of Flight Spectroscopy, *David H. Dunlap¹, Akira Ohno², and Jun-ichi Hanna², ¹University of New Mexico (USA) and ²Tokyo Institute of Technology (Japan)*

Charge Carrier Transport in Polymeric Smectic Liquid Crystals, *Tepei Shimakawa and Jun-ichi Hanna, Imaging Science and Engineering Laboratory, Tokyo Institute of Technology (Japan)*

Carbon Nanocoil Field Emitter Synthesized by Using Fe-In-Sn-O Composite Catalyst, *Yoshikazu Nakayama^{1,3}, Lujun Pan^{1,3}, Osamu Suekan^{2,3} and Toshikazu Nosaka^{2,3}, ¹Dept. of Physics and Electronics, Osaka Prefecture Univ., ²Materials Technology Division, Technology Research Institute of Osaka Prefecture, and ³Innovation Plaza Osaka, Japan Science and Technology Corp. (Japan)*

SuMBE Growth of Organic Materials for Optoelectronic Devices, *S. Iannotta, T. Toccoli, L. Aversa, N. Coppedè, A. Pallaoro, C. Corradi, M. Mazzola, A. Boschetti, and R. Verucchi, CNR - Istituto Fotonica e Nanotecnologie - Sezione ITC di Trento (Italy)*

Wednesday October 1, 11:20 am to 3:20 pm

PRINT AND IMAGE QUALITY

Session Chairs:

*Tsutomu Shodoji, Nippon Institute of Tech.;
Marguerite Doyle, Lexmark; and
Eggert Jung, NexPress GmbH*

Evaluation for Effects of Ink Penetration from Experimental and Simulation Perspectives (Focal), *Li Yang, Campus Norrköping, University of Linköping (Sweden)*

DIN 33871-1: Rebuilding of Used Inkjet Printheads and Compatibles for Inkjet Printers, *Joachim Kretschmer, Pelikan Hardcopy Production AG (Switzerland)*

Discrimination Based Banding Assessment, *Yousun Bang, Zygmunt Pizlo, Norman Burningham, and Jan P. Allebach, Purdue University (USA)*

System and Method of Automating Psychophysics Experiments, *Yue Qiao, IBM Corp. (USA)*

Method of Measuring Resolution for Printer, *Howard (Chen-Hao) Liu, OES/ITRI (Taiwan)*

Optimizing Halftone Masks with Genetic Algorithms and a Printer Models (Focal), *Peter G. Anderson and J.S. Arney, Rochester Institute of Technology (USA)*

Evaluation of Glossy Inkjet Papers Using Distinctness of Image (DOI) Measurement, *Sanjay A. Monie, Natalia V. Krupkin, Beate Stief, W.R. Grace and Co. (USA)*

Wednesday October 1, 3:20 to 4:00 pm

PRINT AND IMAGE QUALITY INTERACTIVE SESSION

Session Chairs:

*Tsutomu Shodoji, Nippon Institute of Tech.;
Marguerite Doyle, Lexmark; and
Eggert Jung, NexPress GmbH*

Spectral Based Analysis and Modeling of Dot Gain in Ink-jet Printing, *Jun Yamashita, Hisato Sekine, Norimichi Tsumura, and Yoichi Miyake, Department of Information and Image Sciences, Chiba University (Japan)*

Application of Ink Jet Printer Model to Evaluate the Sharpness of Printed Images, *Chawan Koopipat, Department of Imaging and Printing Technology, Chulalongkorn University (Thailand)*

Effect of Dot Clustering on Stability of Printed Image, *Shigeru Kitakubo, Yasushi Hoshino, and Shi-Biao Xu, Nippon Institute of Technology (Japan)*

Determination of the Combined Index of Quality of Braille Printouts and Convex Copies for the Blind, *Ludwik Buczynski, Warsaw University of Technology and Research and Development Center PREBOT Radom (Poland)*

Quantifying Fringing in Digital AgX Writing, *Mamie Kam-Ng, Patrick Reed, and Frank Byrne, Eastman Kodak Company (USA)*

Thursday October 2, 9:10 am to 3:50 pm

COLOR SCIENCE/IMAGE PROCESSING

Session Chairs: Hiroaki Kotera, Chiba Univ.;

*Ping Wah Wong, Consultant and
Anne Blayo, Ecole Française de papeterie*

Optimization of the Predicting Model for Dye-Based Inkjet Printer, *Takayuki Ogasahara, Canon Inc. (USA)*

A Study of Harmonics Screen for Four Color Reproduction, *Akira Ishii, Fuji Xerox Co., Ltd. (Japan)*

A Unified Framework for Digital Halftoning and Dither Mask Construction: Variations on a Theme and Implementation Issues (Focal), *Chai Wah Wu, Gerhard R. Thompson, and Mikel J. Stanich, IBM T. J. Watson Research Center and IBM Printing Systems Division (USA)*

Spectral Color Prediction by Advanced Physical Modelling of Toner, Ink and Paper, with Application to Halftoned Prints, *Gerben van Oosterhout¹ and Wolfgang Theiss², ¹Océ-Technologies B.V. (The Netherlands) and ²M.Theiss Hard- and Software (Germany)*

RGB to Spectral Image Transform by Spectral Palette and Color Print Simulation Under Different Illuminants, *Hiroaki Kotera, Chiba University (Japan)*

Conference Program

Color Gamut Boundaries in CIELAB Space (Focal), *Henry R. Kang, Aetas Technology Inc. (USA)*

Adaptive 3D Gamut Mapping Based on Color Distribution of Image, *Ryoichi Saito and Hiroaki Kotera, Department of Information and Image Sciences, Chiba University (Japan)*

A Simple Image Coding by Projection of Principal Component in Segmented Color Areas, *Koichi Shibasaki and Hiroaki Kotera, Chiba University (Japan)*

A New Gamut Mapping Method Dependent on Image Characteristics, *Swati Bandyopadhyay¹, Tapan Paul^{1,2}, and Sivaji Bandyopadhyay³, ¹Printing Engineering Dept., Jadavpur University (India), ²presently working in ABP Pvt. Ltd. (India), ³Computer Science and Engineering Dept., Jadavpur University (India)*

Explicit General Formulation of Color Matching Functions for Chromaticity Diagram Convexity and Its Application to Shape Structure Analysis, *Nobuhito Matsushiro¹ and Noboru Ohta², ¹Okidata Corporation (Japan) and ²Rochester Institute of Technology (USA)*

Efficient Grayscale Rendering of Large Images Using a Signal Processing Model and the Arc-tangent Function, *Jang Yi and Richard Wells, University of Idaho (USA)*

The Influence of Paper Properties on Color Reproduction and Color Management, *Ole Norberg¹, Mattias Andersson¹, and Björn Kruse², ¹Mid Sweden University (Sweden) and ²Linköping University (Sweden)*

Content-Based Image Retrieval System by Multi-dimensional Feature Vectors, *Shinya Asami and Hiroaki Kotera, Chiba University (Japan)*

Thursday October 2, 4:10 to 4:55 pm

COLOR SCIENCE/IMAGE PROCESSING INTERACTIVE SESSION

Session Chairs: Hiroaki Kotera, Chiba Univ.; Ping Wah Wong, Consultant and Anne Blayo, Ecole Française de papeterie

3D Image Input System for High Resolution Integral Photography, *Hideo Kasuga, Kazuhisa Yanaka, Susumu Sasak, and Yasushi Hoshino, Kanagawa Institute of Technology (Japan)*

Image Compression for Integral Photography, *Kazuhisa Yanaka, Hideo Kasuga, and Yasushi Hoshino, Kanagawa Institute of Technology (Japan)*

A Study on Mechanisms of Human Vision by an Investigation of the Visual Illusions, *Naoki Ebata, Makoto Omodani, and Yasusuke Takahashi, Dept. of Electro-photo-optics, Tokai Univ. (Japan)*

A Neural Network Based Color Document Segmentation, *Hsiao Yu Han, Opto-Electronics &*

Systems Laboratories in Industrial Technology Research Institute (Taiwan)

A Table-based Color Matching Approach to Improve Color Calibration for Non-Release Color Output Devices, *Tung-Lin Wu and Yen-Hsing Wu, Opto-Electronics & Systems Laboratories, Industrial Technology Research Institute (Taiwan)*

Segmentation-Based JPEG for Document Images, *Mohamed Nooman Ahmed, Lexmark International Inc. (USA)*

Imaging System Free from Dyes and Pigments, Study of the Structural Color on Organisms, *Yoichi Nomura, Makoto Omodani, and Kenichiro Nakamura, Tokai University (Japan)*

A New Algorithm for Reduction of the Mosquito Noise in Decoded Images, *Tsutomu Shohdohji and Masao Shinohara, Nippon Institute of Technology (Japan)*

Flexible Image Codec on Digital Printing, *Chieh-Chieh Lin, Chien-Long Kao, Chieh-Yi Huang, and Yin-Yao Hsu, Opto-Electronics & System Laboratories/ Industrial Technology Research Institute (Taiwan)*

Friday October 3, 9:00 to 10:50 am

ADVANCED AND NOVEL IMAGING SYSTEMS

Session Chairs: Yasushi Hoshino, Nippon Institute of Tech.; George Gibson, Xerox; and Arthur Soucemarianadin, Univ. Joseph Fourier, Grenoble

Dispensing of Polymeric Fluids for Bio-MEMS Applications (Focal), *N. Ishikawa¹, D. Obara¹, F. Vinet², E.S. Ang³, A. Guelbi³, and A. Soucemarianadin³, ¹Yamatate Corporation, Kanagawa (Japan), ²LETI-CEA, Grenoble (France), and ³LEGI, University Joseph Fourier, Grenoble (France)*

The Use of Inkjet to Produce Tactile Maps, *Don McCallum, Anglia Polytechnic University (UK)*

Experimental Study on a Condition of Rotating a Magnetic Ball by Applying the Pulse Magnetic Field, *Norio Kokaji, Department of Electrical Engineering, Meisei University (Japan)*

Movement of Triboelectrically Charged Particles in Toner Display, *Takashi Kitamura, Hirotaka Nakayama, Nobuhiro Mizuno, Sakiko Nakamura, and Katsuyoshi Hoshino, Information and Image Sciences Department, Faculty of Engineering, Chiba University (Japan)*

Novel Imaging Systems: Multivariate Optical Computing from UV TO NIR, *R. J. Priore, (Raymond Davis Scholarship Winner), A. G. Greer, F. G. Haibach, M. V. Schiza, D. L. Perkins, M. L. Myrick, Univ. of South Carolina (USA)*

Hotel Reservation Request Form

IS&T's NIP19 Digital Printing Technologies
September 28 - October 3, 2003
Hyatt Regency Hotel, New Orleans, Louisiana USA
(Reservations Deadline - August 28, 2003)

Name _____ No. in party _____

Company _____

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Arrival Date _____ Time _____ Departure Date _____

A special block of rooms at a discounted rate is being held at the Hyatt Regency Hotel for IS&T attendees for the nights of September 27 through October 3. The discounted rate will also be extended for 3 days before and after these dates if space is available. Reservations will be assigned on a priority basis to the IS&T group provided they are received by August 28, 2003. In order to guarantee your room, a deposit equal to one night's housing must accompany your reservation request. Deposits can be made by check or a major credit card number, expiration date and signature.

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1-800-233-1234 or 504-561-1234 ask for reservations; Fax: 504-587-4141 or online using the hotel reservation link at www.imaging.org.

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Plus 13% Tax and \$3.00 per day.

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Mail this form to: Reservations Manager
Attn: IS&T's NIP19
The Hyatt Regency New Orleans Hotel
Poydras Plaza at Loyola Avenue
New Orleans, LA 70113-1805

Conference Registration Form

IS&T's NIP19, 2003—Digital Printing Technologies
 September 28 - October 3, 2003
 Hyatt Regency, New Orleans, Louisiana

Name _____

Title/Position _____

Company _____

Mailing Address _____

Telephone (_____) _____ Fax(_____) _____

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Full registration includes admission to all regular sessions, the final program/proceedings book, and ticketed receptions. Separate registration fees are required for the short courses.

| Full Conference Registration (CHECK ONE) | until 8/28 | after 8/28 | Tutorial Registration | Member | Non-mbr |
|---|------------|------------|--|-------------|----------|
| | | | | (per class) | |
| <input type="checkbox"/> IS&T Member | \$515.00 | \$560.00 | <input type="checkbox"/> 4hr. tutorial | \$190.00 | \$240.00 |
| <input type="checkbox"/> Non-member | \$625.00 | \$670.00 | <input type="checkbox"/> 3hr. tutorial | \$165.00 | \$210.00 |
| <input type="checkbox"/> Student (ID required) | \$135.00 | \$135.00 | <input type="checkbox"/> 2hr. tutorial | \$140.00 | \$185.00 |
| <input type="checkbox"/> Student Non-member | \$165.00 | \$165.00 | | | |
| <input type="checkbox"/> Speaker Member | \$405.00 | \$405.00 | | | |
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| Session Pass (one per booth) | no charge | | | | |
| <input type="checkbox"/> Extra Proceedings Book | \$ 75.00 | | | | |
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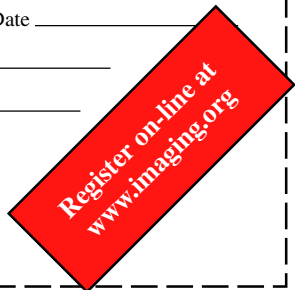
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