



**25th International Conference on
Digital Printing Technologies**

PRELIMINARY PROGRAM

**September 20-24, 2009
Louisville, KY**

5th Anniversary Conference

Digital Fabrication 2009



Sponsored by the
Society for Imaging Science and Technology (IS&T) www.imaging.org
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*If you work in the fields of digital printing,
digital fabrication, or any related technology,
and you are looking for the best training,
exposure to cutting edge technology advances, and/or
to expand your professional network,
NIP25 and Digital Fabrication 2009 are the conferences to attend!*

Join us in Louisville where two great conferences come together under one roof for one low price!

The 25th anniversary of NIP and the 5th anniversary of Digital Fabrication mark important milestones for these meetings. Join us this year to commemorate our past and contemplate our future.

Colocation lends tremendous synergy and optimal networking opportunities, plus allows you to mix and match technical sessions of interest under a single registration fee.

A full day of short courses followed by four FULL days of technical sessions, a stellar exhibit, additional short courses, two Interactive Sessions, two Panel Discussions, and an array of networking events make this a week not to miss.

You will find stimulating and engaging content-packed days that include:

- four tracks of technical sessions
- five informative plenary talks
- two timely Panel Discussions on “Mass Customization” and “Digital Packaging”
- a special session on Digital Packaging
- two joint Interactive Paper Sessions
- in-depth short courses designed with all levels of knowledge in mind with a *20% discount for those who take 3+ courses and \$50 course fees for students*
- high-quality exhibits and an exhibit hall happy hour
- the Welcome and Conference Receptions, one held at the Louisville Slugger Museum and Factory and the other featuring a slideshow of past meeting highlights
- the annual Print Sample Gallery
- a display of historical posters from NIP’s 25 years
- a single fee that gives you access to the full conference program *(separate fee required for short courses)*

See details of the whole week beginning on page 3.

Please mark your calendars to join us in Louisville, Kentucky, on the banks of the Ohio River, home of the Kentucky Derby, the Louisville Slugger baseball bat, and last, but by no means least, Kentucky Bourbon. We look forward to seeing you in Louisville!

—Huoyjen Yuh, General Chair NIP25
Reinhard Baumann, General Chair Digital Fabrication 2009

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Huoy-Jen Yuh

Technical and Social Program

All papers are oral unless marked as focal or interactive. Program is subject to change.

Plenary speaker bios are found on page 17.

SPECIAL EVENT

Kick off the conference by meeting friends and colleagues Sunday evening.

NIP/DF Welcome Reception
Louisville Slugger Museum
Sunday, September 20
6:00 – 8:00 pm

Monday September 21, 2009

ALL TRACKS

WELCOMING REMARKS AND PLENARY SESSION

Session Chair: HuoyJen Yuh, Xerox Corp.

8:00 - 9:15 AM

The Future of Research and Development in the Digital Printing Industry, Marcel Slot, Océ-Technologies BV (the Netherlands)

NIP TRACK 1

TONER-BASED PRINTING: MATERIALS

Session Chairs: Dinesh Tyagi, Eastman Kodak Co.; Volkhard Maess, Océ Printing Systems GmbH; and Yoshihiro Hattori, Konica Minolta Business

Technologies, Inc.

9:20 AM - 3:30 PM

Adhesion and Adhesion Distribution in a Model Toner System (Focal), Kock-Yee Law,¹ Grazyna E. Kmiecik-Lawrynowicz,^{1,2} Weiqiang Ding,² and Cetin Cetinkaya:²
¹Xerox Corp. and ²Clarkson University (USA)

The Properties of Novel Ester Acetal Polymers and Their Application for Computer-to-Plate Lithographic Material (Interactive), Liyuan Wang, Jinxing Yu, and Na Xu, Beijing Normal University (China)

Effect of Surface Treatment of Carrier on Toner Charge Characteristics (Interactive), Disna Jayampathi Karunanayake and Yasushi Hoshino, Nippon Institute of Technology (Japan)

A Conceptual Model of Toner Charge Admixing, Robert J. Nash, Hafren Associates (USA)

External Additives for Toners: Treatment with Functional Silanes for Active Triboelectrostatic Charge Control, Jinsong Liu, Hairuo Tu, Amar Pawar, Dmitry Fomitchev, and Joachim K. Floess, Cabot Corp. (USA)

Tribocharge Performance of Colloidal Silica Additives in a Dual Component Developer, Dmitry Fomitchev, Alyson Christopher, George Eid, and Joachim Floess, Cabot Corp. (USA)

Comparison Between De-Agglomerated and

Traditional Fumed Silica External Additives and Their Performance in Toner Formulations, Yuki Amano,¹ Steffen Hasenzahl,² Robert Johnson,³ Akira Inoue¹; ¹Nippon Aerosil Co., Ltd. (Japan), ²Evonik Degussa GmbH (Germany), and ³Evonik Degussa Corp. (USA)

Charge Controlling Capability of Ultra-Thin Shell Layers Formed on a Spherical PMMA Core Particle Surface, Takashi Imura,^{1,2} Osami Abe,¹ Atsushi Suka,² and Toshihiko Oguchi²; ¹Ibaraki University and ²Morimura Chemicals, Ltd. (Japan)

Surface Modified Pigments for Improved Color in Chemically Prepared Toners (Focal), Joseph Carroll, Joshua Chase, Trung Truong, Angelos Kyrlidis, and Eilidh Bedford, Cabot Corp. (USA)

Low Energy Fusing Toner by Controlling Compatibility of Crystalline Polyester with Amorphous Polyester, Takeshi Ashizawa, Akihiro Eida, Youko Hanada, and Jun Shimizu, Kao Corp. (Japan)

Frictional Flow and Developer Charge (Interactive), Suresh Ahuja, Xerox Corp. (USA)

Polyester Chemical Toner with Low Fusing Temperature (Interactive), Kwan-Sik Seo, Moon-Soo Kim, Eui-Jun Choi, and Hyun-Nam Yoon, DPI Solutions, Inc. (Korea)

Effects of Particle Size on Imaging Performance of Chemical Color Toner, Eui-Jun Choi, Kyoung-Ha Lee, and Hyun-Nam Yoon, DPI Solutions, Inc. (Korea)

Do We Need Better Materials than Teflon in Digital Printing?, Kock-Yee Law and Hong Zhao, Xerox Corp. (USA)

Role of Charge Injection in Electrophotographic Performance of Rollers and Belts, Ming-Kai Tse and Inan Chen, Quality Engineering Associates (QEA), Inc. (USA)

Digital Packaging Panel

4:00 - 5:30 PM

see details, page 4

NIP TRACK 2

INK JET PRINTING: PROCESSES

Session Chairs: Hrishikesh Panchawagh, Eastman Kodak Co.; Stephen Yeates, University of Manchester; and Mineo Kaneko, Canon, Inc.

9:20 AM - 3:30 PM

Droplet Velocity Fluctuations in Thermally Stimulated Continuous Liquid Jets (Focal), Jeremy M. Grace and Giuseppe Farruggia, Eastman Kodak Co. (USA)

Flow Stability in Liquid Inkjets Printers (Interactive), Suresh Ahuja, Xerox Corp. (USA)

Three Methods of Measuring Velocity of Drops in Flight Using JetXpert (Interactive), Yair Kipman, Prashant Mehta, and Kate Johnson, ImageXpert, Inc. (USA)

A Model for Ligament Contraction in Drop-on-Demand Inkjet Printing, Stephen D. Hoath, Graham D. Martin, and Ian M. Hutchings, University of Cambridge (UK)

Liquid Jet Instability and Dynamic Surface Tension Effect on Breakup, Lisong Yang and Colin D. Bain, Durham University (UK)

Silicon Micromachined Continuous Inkjet (CIJ) Printhead with Integral Deflection and Guttering, Hrishikesh V. Panchawagh,¹ Constantine. N. Anagnostopoulos,² Ali G. Lopez,¹ Kathleen M. Vaeth,¹ and Gilbert A. Hawkins¹; ¹Eastman Kodak Co. and ²University of Rhode Island (USA)

Lateral Merging Continuous Inkjet, Yonglin Xie and Carolyn Ellinger, Eastman Kodak Co. (USA)

High Speed Printing with a Piezoelectric Line Inkjet Printhead, Shin Ishikura, Ayumu Matsumoto, Wataru Ikeuchi, and Kentaro Mori, Kyocera Corp. (Japan)

Three-Fold Increase in Inkjet Speed of Piezoelectric Shared Wall Technology Exploiting a Single Cycle Operation (Focal), Paul Drury, Julian Bane, Mario Massucci, Tri Tuladhar, and Alison Morris, Xaar Technology Ltd. (UK)

Development of an Aqueous Compatible Piezoelectric Drop-on-Demand Printhead Module for Textile Printing Applications, Matthew J. Aubrey, FUJIFILM Dimatix, Inc. (USA)

Predicting the Performance of an Electrostatic MEMS Drop Ejector (Interactive), Edward P. Furlani and Hrishikesh V. Panchawagh, Eastman Kodak Co. (USA)

Influence of the Rotation of Inkjet Printing Heads on the Print Quality, Christopher Mercier,¹ Olivier Morel,¹ Ron Todd,² Lindsay MacDonald,² and James Fox¹; ¹Xennia Technology Ltd. and ²London College of Communication (UK)

A Large-Scale Print-Head for Drop-on-Demand and Continuous Inkjet Studies, Jose Rafael Castrejón-Pita, Graham D. Martin, and Ian M. Hutchings, University of Cambridge (UK)

Study on the Equal Pressure Distributed Hydrokinetics of the Supplying Ink for Continuous Ink Jet Printing System, Guang-Xue Chen and Qi-Feng Chen, South China University of Technology (China)

Digital Packaging Panel
4:00 - 5:30 PM
see box above for details

SPECIAL EVENT

Digital Packaging Panel

Please join us for this panel and audience discussion on issues related to digital packaging.

Moderator:

Behnam Bastani, Memjet Photo Retail

Panelists:

Sean Marske, Memjet Labels
Eric Hanson, Hewlett-Packard Labs
Leonard Christopher, Eastman Kodak Co.
Geert De Proost, Esko
Fred Noll, VIPColor Technologies

Monday, September 21
4:00–5:30 PM

NIP TRACK 3

IMAGE PERMANENCE

Session Chairs: Franziska Frey, Rochester Institute of Technology; Branka Lozo, University of Zagreb; and Masahiko Ilaya, Samsung Electronics
9:20 AM - 2:20 PM

Improved Dark Storage Test Method, Matthew Comstock and Ann McCarthy, Lexmark International, Inc. (USA)

Light Fastness of Heat Transfer on Polyester Blend Fabrics, Yu-Ju Wu, Jean K. Dilworth, and Gabriel Grant, Eastern Illinois University (USA)

Test Methods and Fade Stability of Color Photographic Images in the Presence of Ozone Gas: An Update, Joseph E. LaBarca and David A. Miller, Eastman Kodak Co. (USA)

Photo Books: A New Take on an Old Preservation Technology, Mark Mizen, Creative Memories; Joseph LaBarca, Eastman Kodak Co.; and James Peyton, I3A (USA)

Humidity Fastness Metrics of Ink-Jet Paper Prints (Focal), Rita Hofmann and Juerg Reber, IIFORD Imaging Switzerland GmbH (Switzerland)

The Durability of UV Ink-Jet Prints on Special Papers upon Accelerated Aging (Interactive), Mirica Debeljak and Diana Gregor-Svetec, University of Ljubljana (Slovenia)

Further Studies on Reciprocity Effects for Accelerated Ozone Tests Compared to Ambient Air Exposure (Interactive), Matthew Comstock and Ann McCarthy, Lexmark International, Inc. (USA)

Brittleness of Digital Reflection Prints, Eugene Salesin, Daniel Burge, Peter Adelstein, and James Reilly, RIT Image Permanence Institute (USA)

Investigations into Potential Reactivity Between Silver-Halide and Digitally Printed Photographic Images in Long-Term Storage,

Interpreting the Schedule

By knowing the amount of time allotted for each type of presentation, you can estimate when a particular presentation will occur. Order and times are subject to change; exact times will be published in the conference proceedings. On most days, 30-minute coffee breaks occur sometime between 10:00–11:00 am and 3:30–4:30 pm; lunch is generally from 12:30–2:00 pm. Presentation lengths include time for Q&A.

Plenary: 50 minutes

Focal: 30 minutes

Oral: 20 minutes

Interactive (preview): 5 minutes

To facilitate planning, we've color coded the technical session as follows:



NIP Session/Focus



Digital Fabrication Session/Focus

Daniel Burge and Lindsey Rima, RIT Image Permanence Institute (USA)

Influence of Light on Typographic and Colorimetric Properties of Ink Jet Prints (Interactive), *Klementina Mozina, Tanja Medved, and Sabina Bracko, University of Ljubljana (Slovenia)*

2D Codes - Light Fastness and Readability (Interactive), *Tadeja Muck,¹ Urška Bogataj,² and Sabina Bračko,^{1,2}; ¹University of Ljubljana and ²Valkarton (Slovenia)*

The Tendency for Digitally Printed Materials to Ferrotyp or Block during Short-Term Exposures to High Humidity, *Lindsey Rima and Daniel Burge, RIT Image Permanence Institute (USA)*

SECURITY AND FORENSIC PRINTING

Session Chairs: Steven Simske, Hewlett-Packard Co.; Alan Hodgson, 3M Security Printing and Systems Ltd.; and Yusuke Takeda, Ricoh Co., Ltd.
2:30 - 3:35 PM

New Findings in Security Printing and Imaging, *Steven J. Simske, Hewlett-Packard Laboratories (USA)*

Information Embedding in Electrophotographic Document Forms through Laser Intensity Modulation: A Communications Systems Perspective, *Maria V. Ortiz Segovia, George T.-C. Chiu, Edward J. Delp, and Jan P. Allebach, Purdue University (USA)*

Digital Print Technology: An Opportunity for Security Print, or a Threat?, *Glenn Wood and Astrid Mitchell, Reconnaissance International (UK)*

SPECIAL EVENT

The Print Gallery will open Monday morning and will be available for viewing until Thursday afternoon.

To participate, see page 8.

Barcode Structural Pre-Compensation Optimization (Interactive), *Steven J. Simske, Jason S. Aronoff, and Marie Vans, Hewlett-Packard Laboratories (USA)*

Digital Packaging Panel

4:00 - 5:30 PM

see details, page 4

NIP TRACK 4

DESIGN FOR ENVIRONMENTAL SUSTAINABILITY

Session Chairs: Abbie Parker, Hewlett-Packard Co.; Axel Fischer, INGEDE; and Yoshio Watanabe, Ricoh Co., Ltd.
9:20 - 11:25 AM

Presentation of a New Environmental Rating Scale for Evaluating the Sustainability of Digital Printing Systems, *Werner Sobotka, VFG (Austria)*

Deinking of Digital Commercial Prints: Effect of Chemicals and Their Loadings on Speck Contamination, *Hou T. Ng, Manoj K.*

Bhattacharyya, Laurie Mittelstadt, and Eric G. Hanson, Hewlett-Packard Laboratories (USA)

Environmental Advantages Inherent to Digital Printing, *Eric Stelter and Eric Zeise, Eastman Kodak Co. (USA)*

Deinkability Certification for Public Procurement and Marketing of Printed Products (Focal), *Axel Fischer, International Association of the Deinking Industry (INGEDE) (Germany)*
Using Pre-Competitive Collaboration and Open Innovation to Find Solutions to Industry-Wide Materials or Process Changes that Address Regulatory, Market, or Environmental Issues (Interactive), *Kevin P. Andrews and Frank Evan, NineSigma, Inc. (USA)*

ADVANCED AND NOVEL IMAGING SYSTEMS

Session Chairs: David Thompson, Xerox Corp.; Daniel Hall, Inkski Ltd.; and Yasushi Hoshino, Nippon Institute of Technology
11:30 AM - 12:30 PM

Inkjet Print to Plate with Nano-Materials, *Haihua Zhou and Yanlin Song, Chinese Academy of Sciences (China)*

Hypermodular Parallel Printing Systems, *David Biegelsen, Lara Crawford, Dave Duff, Craig Eldershaw, Markus Fromherz, Dan*

Larner, Bryan Preas, Greg Schmitz, and Lars Swartz, PARC, Inc.; and Barry Mandel and S. Moore, Xerox Corp. (USA)

Influence of Aperture Electrodes Thickness on Toner Cloud Beam Control Characteristics (Interactive), Kai Li and Yasushi Hoshino, Nippon Institute of Technology (Japan)

A Novel Method to Control Microcapsule Release Behavior Via Photo-Crosslink Polyurethane Acrylate Shells (Interactive), Jie Wei, Xiao Wang, and Gangqiang Li, Beijing University of Chemical Technology (China)

DIGITAL PACKAGING

Session Chairs: Omer Gila, Hewlett-Packard Co., and Guy Newcombe, Tonejet Ltd.
12:35 - 3:30 PM

Single-Pass Inkjet for High Quality Package Printing (Focal), Chris Lynn and Mark Alexander, Xaar Americas, Inc. (USA)

Tonejet: Delivering a Complete Solution for Packaging (Focal), Guy Newcombe, Tonejet (UK)

Extending Packaging through Addition of Readable Information to the Printing (Focal), Steven J. Simske and Margaret Sturgill, Hewlett-Packard Laboratories (USA)

Handheld Printing and Scanning Solution for Commercial and Industrial Applications (Focal), Kevin E. Swier, Dennis T. So, and Mark S. Giordano, Hewlett-Packard Co. (USA)

Digital Packaging Panel

4:00 - 5:30 PM

see details, page 4

PHOTOELECTRONIC IMAGING MATERIALS AND DEVICES

Session Chairs: Yu Qi, Xerox Corp.; Hans-Josef Humpert, AEG Elektrofotografie GmbH; and Norio Nagayama, Ricoh Co., Ltd.

4:00 - 5:30 PM

Photo-Induced and Dark Discharge Mechanisms of High Gamma Photoreceptors, Kuniki Seino, Hideaki Hirahara, Takaaki Konuma, Ichiro Yoshida, and Shozo Kaieda, AFIT Corp. (Japan)

Surface Modification of an Organic Photoconductor in an Electrophotographic Charging Environment, K. Nauka, Seongsik Chang, and Hou T. Ng, Hewlett-Packard Laboratories (USA)

Real Time Observation of Surface Potential Distribution with an EFM on CTL, Toshio Uehara,¹ Yoshiki Kogiso,² Jumpei Higashio,¹ Yoshiito Ashizawa,² Kouichi Aizawa,³ Katusji Nakagawa,² and Akiyoshi Itoh¹; ¹TREK JAPAN K.K., ²Nihon University, and ³Fuji Electric Advanced Technology Co., Ltd. (Japan)

Progress Towards Understanding The Charge Transport Hopping Mechanism in Molecularly Doped Polymers, L.B. Schein,¹ Andrey Tyutnev,² P.E. Parris,³ D.H. Dunlap,⁴ and D.S. Weiss¹; ¹consultant (USA), ²Moscow State Institute of Electronics and Mathematics (Russia), ³University of Missouri-Rolla (USA), and ⁴University of New Mexico, (USA)

Elastohydrodynamic Study of Deformable Blade-Organic Photoconductor Conjunction (Interactive), Wael Salalha and Doron Avramov, Hewlett-Packard Indigo (Israel)

Study on Photosensitive Imaging System and Its Performance (Interactive), Wei-Min Zhang and Jia-Ling Pu, Beijing Institute of Graphic Communication (China)

Tuesday September 22, 2009

ALL TRACKS

PLENARY SESSION AND AWARD PRESENTATIONS

Session Chair: Reinhard Baumann, Fraunhofer Einrichtung für Electronic Nano Systems ENAS
8:15 - 9:25 AM

Applications for Ink Jet Printing in Biology and Medicine, Brian Derby, University of Manchester (UK)

NIP TRACK 1

TONER-BASED PRINTING: PROCESSES

Session Chairs: Marc Cousouls, Lexmark International, Inc.; Detlef Schultze-Hagenest, Kodak Graphic Communications GmbH; and Hitoshi Nakai, Brother Industries, Ltd.
9:30 AM - 12:40 PM

Numerical Simulation of Townsend Discharge, Paschen Breakdown and Dielectric Barrier Discharges for Electrophotography Charging Units, Napoleon Leoni, Hewlett-Packard Laboratories, and Bhooshan Paradkar, University of California at San Diego (USA)

Momentum-Control Scavengless Jumping Development (MC-SJD), John G. Shaw, Paul Morehouse, and John Knapp, Xerox Corp. (USA)

Image Darkness Variations Between Subsequent Developer Roll Revolutions, Marc Cousouls, Colin Goggin, Jared Lin, and Devon Strain, Lexmark International, Inc. (USA)

Simulation of Two-Component Development Process for Frontloading Design (Focal), Nobuyuki Nakayama, Tomoyuki Ito, Youichi Watanabe, Nobuyuki Hirooka, and Tomohiro Seko, Fuji Xerox Co., Ltd. (Japan)

TUESDAY AFTERNOON

Please note that Tuesday afternoon begins with a plenary for all tracks, followed by Interactive Paper Session I. Individual tracks then resume, with the Exhibit Hall Happy Hour concluding the day.

See details at right.

Dynamics of Toner and Carrier Particles in Two-Component Development System of Electrophotography, Hiroyuki Kawamoto and Satoshi Iesaka, Waseda University (Japan)
Toner Replenishment System Using Auto Volume Decreasing Soft Toner Cartridge, Emi Kita, Jun-ichi Matsumoto, Nobuo Takami, Satoshi Muramatsu, and Nobuo Iwata, Ricoh Co., Ltd. (Japan)

The Development of the Pad Transfer Method for Laser Printer, Yasuo Yoda, Ryosuke Hamamoto, Yoichiro Maebashi, Masaru Shimura, Kazuhiro Doda, Toyoshige Sasaki, and Seishirou Nasu, Canon Inc. (Japan)

A Model Predictive Controller Design for a Toner Concentration Control System (Interactive), Sohail A. Diana, Rochester Institute of Technology, and Lalit K. Mestha, Xerox Corp. (USA)
Properties of Continuous and Discrete Electrostatic Charge Distributions (Interactive), Eric Stelter, Eastman Kodak Co. (USA)

NIP TRACK 2

INK JET PRINTING: MATERIALS

Session Chairs: Jim Mrvos, Lexmark International, Inc.; Hartley Selman, Sun Chemical; and Hiroyuki Onishi, Seiko Epson Corp.

9:30 AM - 12:30 PM

Sensient's Suite of Self-Dispersed Color Nano Particle Dispersions – 1, 3, 5-Triazine Derivatives as Versatile Intermediates for Attachment on Pigments, P. K. Sujeeth, Dan Ouellette, Mark Ulrich, and John Kane, Sensient Technologies (USA)

Polymeric Dispersants with Specific Affinity to Pigments for Ink Jet Applications (Focal), Alex Shakhnovich, Joseph Carroll, and Darryl Williams, Cabot Corp. (USA)

Deformation of Cartridge Assembly (Interactive), Suresh Ahuja, Xerox Corp. (USA)

New Inkjet Yellow Pigments—Halogenated Quinolonoquinolones (Interactive), Alex Shakhnovich, Cabot Corp. (USA)

Study and Stabilization of Liquid Crystal Drop Formation Using a Piezoelectric Inkjet Printhead (Interactive), Stephanie Poirier,^{1,2} Ludvine Fadel Taris,¹ Pierre Temple-Boyer,¹ and Sylvie Vinsonneau²; ¹CNRS LAAS and ²Essilor (France)

SPECIAL EVENT

The 2009 NIP/DF Exhibit
opens Tuesday at 10:00 AM

Please visit our exhibitors!

Tuesday (10:00 AM – 6:30 PM)
and
Wednesday (9:30 AM – 4:00 PM)

There will be an Exhibit Hall Happy Hour Tuesday evening from 5:15 - 6:30 PM

Next Generation Self-Dispersed Pigments for Aqueous Ink Jet (Interactive), Barry B.

Corden, Cabot Corp. (USA)

Developments in Dispersants for Digital Inks (Interactive), Ian D. Maxwell, Lubrizol Ltd.

(UK) and Jeff Norris, Lubrizol Advanced Materials (USA)

Effect of Additives on Colloidal Properties and Printing Performance of Disperse Dye Blue Inks for Inkjet Printing (Interactive),

Lei Ding, Shaohai Fu, and Chaoxia Wang, Jiangnan University (China)

Preparation of Organic Pigment/Polyvinyl Alcohol Composite Dispersion for Inkjet Printing Ink (Interactive),

Mingjun Zhang, Shaohai Fu, An-li Tian, Xia Zhang, and Chaoxia Wang, Jiangnan University (China)

Preparation of Macro-RAFT Copolymer and Its Application in Pigment Dispersion for Inkjet Inks (Interactive), Lianbing Zhang,¹

Kuanjun Fang,² Xia Zhang,¹ An-li Tian,¹ and Shaohai Fu¹; ¹Jiangnan University and ²Qingdao University (China)

Multi Color Pigmented Inks for Large Format Ink-Jet Printing, Tsuyoshi Sano, Shinichi Kato,

Yasuhiko Uchida, and Kiyohiko Takemoto, Seiko Epson Corp. (Japan)

Flow Characteristic at a Micro-Nozzle with Various Liquids (Interactive), Horyul Lee,

Heungsup Park, and Seungmin Ryu, Samsung Electronics (Korea)

Novel Black Dye Composition for Inkjet Application (Interactive), Hsiao-San Chen

and Jen-Fang Lin, Everlight Chemical Industrial Corp. (Taiwan)

Surface Oxidized Carbon Blacks for Improved Inkjet Ink Performance (Interactive),

Leo M. Nelli,¹ Gerd Tauber,² and Christoph Batz-Sohn;² ¹Evonik Degussa Corp. (USA) and ²Evonik Degussa GmbH (Germany)

Evaluation of the Pigment Dispersion of UV-Curable Inkjet Ink Using UV Absorption Spectrum (Interactive), Xianfu Wei,

Na Wang, Beiqing Huang, Beijing Institute of Graphic Communication (China)

The Influence of Surfactants on the Interfacial Tension and Droplet Formation in UV

Curable Jet Inks, Ingo Reinhold,¹ Kai

Steenweg,² Susanne Struck,² Wolfgang Voit,¹ and Werner Zapka¹; ¹XaarJet AB (Sweden) and ²Evonik Tego Chemie Service GmbH (Germany)

Quantified Evaluation of Various Spectral Encoding Techniques (Interactive), Marc Cousoulis, Lexmark International, Inc., and Mitch Rosen, RIT (USA)

**NIP TRACK 3
COLOR SCIENCE/
IMAGE PROCESSING**

Session Chairs: Edul Dalal, Xerox Corp.; Aleix Oriol, Hewlett-Packard Co.; and Shinjiro Umezu, Tokai University
9:30 AM - 12:30 PM

Determination of Significant Color Map, Teck Ping Sim and Perry Y. Li, University of Minnesota (USA)

Theoretical Analysis of Metamer Intersection Locations, Nobuhito Matsushiro, OKI Data Corp. (Japan)

Study on the Phenomena of Moire Fringe in Digital Halftoning, Guang-Xue Chen, Qi-Feng Chen, and De Zhang, South China University of Technology (China)

A Hardcopy Backup and Reconstruction System for Digital Images (Focal), Eric Hoarau, Ingeborg Tastl, and Nathan Moroney, Hewlett-Packard Laboratories (USA)

Disassembling of Composite Images, Reem El Asaleh, Paul D. Fleming III, and Alexandra Pekarovicova, Western Michigan University (USA)

Detection of Monochrome Pages in Color Document Scans, Nathir A. Rawashdeh and Mohamed N. Ahmed, Lexmark International, Inc. (USA)

Recent Developments Towards Control-Based Color Profiling Technology (Interactive), Lalit K. Mestha, Alvaro E. Gil, and Yao Rong Wang, Xerox Corp. (USA)

Image Binarization Based on Patch Random Fields (Interactive), Yadong Mu and Bingfeng Zhou, Peking University (China)

Simple Identification Process Using Vein Pattern (Interactive), Shigeru Kitakubo, Nippon Institute of Technology (Japan)

**DIGITAL FABRICATION
DIGITAL FABRICATION
PROCESSES**

Session Chairs: Jan Sumerel, FUJIFILM Dimatix; Wolfgang Voit, XAAR; and Masaya Ishida, Seiko Epson Corp., and Masahiko Fujii, Fuji Xerox Co., Ltd.
9:30 AM - 12:40 PM

Detection Techniques for Jetting Failure of Inkjet Dispensers, Kye-Si Kwon, Soonchunhyang University (South Korea)
Machine-Vision-Based Analytical Tools for Digital Fabrication, Yair Kipman, Prashant Mehta, and Kate Johnson, ImageXpert, Inc. (USA)

Drops-on-Drops Micro-Film Formation by Stable Electrostatic Jets, Kazuyuki Tada, Masato Nishiura, Nozomi Yoshida, Noritaka Hara, Kiyohito Maruo, and Hiroyuki Kawamoto, Waseda University (Japan)

Laser-Based Digital Microfabrication (Focal), Alberto Piqué, Ray Auyeung, Heungsoo Kim, Tom Sutto, Jiwen Wang, and Scott Mathews, Naval Research Laboratory (USA)

A New Ejector for Highly Viscous Liquid Using Inertia of Beam Buckling Deformation, Torahiko Kanda, Kenji Ikeda, Kenichi Ohno, and Ken Hashimoto, Fuji Xerox Co., Ltd. (Japan)

R2R Technology for Organic Electronics and Photovoltaics, J. Hänel, B. Keiper, S. Albert, R. Busch, M. Clair, and C. Scholz, 3D-Micromac AG (Germany)

Phenomena in Multilayer Printing of Functional Particle Inks (Focal), Ulrike Currie, Waldemar Diel, Marcel Waßmer, and Klaus Krüger, Helmut-Schmidt-University/University of German Armed Forces (Germany)

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**ALL TRACKS
AFTERNOON PLENARY**

Session Chair: Huoyjen Yuh, Xerox Corp.
2:00 - 2:50 PM

Electronic Paper Comes of Age, Michael McCreary, E Ink Corp. (USA)

**ALL TRACKS
INTERACTIVE SESSION I**

and coffee break
2:50 - 4:15 PM

NIP TRACK 1
**TONER-BASED PRINTING:
PROCESSES CONTINUED**

Session Chairs: same as morning
4:20 - 5:00 PM

Impedance Technique for Assessing Indigo Blanket Electrical Properties, *Michael H. Lee and William D. Holland, Hewlett-Packard Laboratories (USA)*

Efficient Estimation of Critical Transfer Belt Parameters from an Electrical Characterization Fixture, *Brandon Kemp, Christopher Bennett, and Julie Whitney, Lexmark International, Inc. (USA)*

Exhibit Hall Happy Hour
5:15 - 6:30 PM

NIP TRACK 2
**INK JET PRINTING: MATERIALS
CONTINUED**

Session Chairs: same as morning
4:20 - 5:00 PM

Advances in Dryfilm Photoresist for Microfluidic Device Applications, *Sean Weaver, Melanie Mathis, Paul Dwyer, and Eric Hall, Lexmark International, Inc. (USA)*

On the Effect of Variations in Paper Composition on Inkjet Print Quality, *Anna Lundberg and Jonas Örtengren, Mid Sweden University; and Elisabeth Alifhan, M-real Corp. (Sweden)*

Exhibit Hall Happy Hour
5:15 - 6:30 PM

NIP TRACK 3
**COLOR SCIENCE/
IMAGE PROCESSING CONTINUED**

Session Chairs: same as morning
4:20 - 5:25 PM

Enhancement of Monochrome Text Quality in CIS Document Scans, *Nathir A. Rawashdeh and Mohamed N. Ahmed, Lexmark International, Inc. (USA)*

Quantization Frequencies in AM Screens, Spectral Gamut Characteristics Based on Number of Primaries and Their Characteristics, *Behnam Bastani, Memjet Photo Retail (USA)*

Subjective Evaluation of Required Area of Color Gamut for Preferred Color Reproduction Using a Laser Light Source Display (Interactive), *Masahi Kanai,¹ Toru Kitano,² Akira Minabe,² Kenji Fukasawa,¹ and Takao Abe;¹ Seiko Epson Corp. and ²Shinshu University (Japan)*

Exhibit Hall Happy Hour
5:15 - 6:30 PM

**DIGITAL FABRICATION
PRINTING OF BIOMATERIALS**

Session Chairs: Thomas Boland, Clemson University; Reinhard Baumann, Fraunhofer Einrichtung for Electronic Nano Systems ENAS; and Masaya Ishida, Seiko Epson Corp.
4:10 - 5:20 PM

Fundamental Characteristics of Printed Cell Structures Utilizing Micro Drop Injection (Focal), *Shinjiro Umezumi, Tokai University and Riken; and Takashi Kitajima, Hitoshi Ohmori, and Yoshihito Ito, Riken (Japan)*

Direct Drop-on-Demand Printing of 3D Vascular Structures in Hydrogels for Tissue Engineering Applications, *Kristopher Pataky, Mathieu Ackermann, Matthias Lutolf, and Juergen Brugger, Swiss Federal Institute of Technology Lausanne (EPFL) (Switzerland)*
Ink-Jet Microdispensing: A Tool for Fabrication and Packaging of BioMEMS Devices, *Donald Hayes and David Wallace, MicroFab Technologies, Inc. (USA)*

Exhibit Hall Happy Hour
5:15 - 6:30 PM

Wednesday September 23, 2009

**ALL TRACKS
PLENARY SESSION**

Session Chair: Huoyjen Yuh, Xerox Corp.
8:15 - 9:15 AM

Environmental Strategy of Japanese Digital Printing Industry, *Koji Hirakura, Ricoh Co., Ltd. (Japan)*

NIP TRACK 1
**FUNDAMENTAL PHYSICS AND
CHEMISTRY FOR PRINTING
TECHNOLOGIES**

Session Chairs: Howard Mizes, Xerox Corp.; and Graham Martin, University of Cambridge
9:20 AM - 12:50 PM

Toner Printing Technology (Focal), *Yasushi Hoshino, Nippon Institute of Technology (Japan)*

From Fundamental Physics to Novel Inkjet Technology: Harnessing Innovation (Focal), *James M. Chwalek, Eastman Kodak Co. (USA)*
Understanding Inkjet Inks and Factors Influencing the Jetting Behaviour (Focal), *Tri Tuladhar, Rob Harvey, and Paul Drury, Xaar Technology, Ltd. (UK)*

Piezoelectric and Other Drop Ejection Technologies for Drop-On-Demand Inkjet (Focal), *Ross N. Mills, imaging Technology international (iTi) Corp. (USA)*

Nanotechnology and Opportunities in Digital Color Printing (Focal), Kock-Yee Law, Xerox Corp. (USA)

The Role of Technical Innovation in the Physics of Electrophotography (Focal), Larry Schein, consultant (USA)

PRINTING TECHNOLOGIES FROM DRUPA 2008

Session Chairs: Kathleen Vaeth, Eastman Kodak Co., and Detlef Schulze-Hagenest, Kodak Graphic Communications GmbH
2:00 - 5:00 PM

Hewlett Packard's Advances in Digital Commercial Print at Drupa 2008 (Focal), Eric G. Hanson, Hewlett-Packard Laboratories (USA)

A Xaar Perspective on 'The Inkjet DRUPA' (Focal), Chris Lynn and Mark Alexander, Xaar Americas, Inc. (USA)

Kodak Digital Printing Technology at Drupa 2008 (Focal), Leonard R. Christopher, Eastman Kodak Co. (USA)

Océ Printhead and CrystalPoint™ Technology (Focal), Marcel Slot, Océ-Technologies BV (the Netherlands)

Production Printing Strategy and Products (Focal), Osamu Namikawa, Ricoh Co., Ltd. (Japan)

NIP TRACK 2 ELECTRONIC PAPER AND PAPER-LIKE DISPLAYS

Session Chairs: Jeff Mabeck, Hewlett-Packard Co.; Alex Henzin, iREX Technology; and Makoto Omodani, Tokai University
9:20 AM - 12:10 PM

Paper Display Module Having Backside Electrode (Focal), Taik-Min Lee, Jae-Ho Noh, Dong-Youn Shin, Chung Hwan Kim, Jeongdai Jo, Dong-Soo Kim, Korea Institute of Machinery and Materials (South Korea)

Novel Liquid Toner Manufacturing Method for Electrophoretic Display (Interactive), Pinyen Lin, Chieh-Min Cheng, and David H. Pan, Xerox Corp. (USA)

Color Electrophoretic Image Display Based on Movement of Particles in Color Insulating Liquid (Interactive), Yoshitaku Yoshimatsu, Masahiro Masuzawa, Sakiko Nakamura, Nobukazu Miyagawa, and Takashi Kitamura, Chiba University (Japan)

Roll-to-Roll Manufacturing of Electronic Skins with Print-Like Color, Tim Koch, Don Hill, Mike Delos-Reyes, Jeff Mabeck, Jong-Souk Yeo, Joe Stellbrink, Dick Henze, Zhang-Lin Zhou, and Yaron Grinwald, Hewlett-Packard Co. (USA)

SiPix Microcup Electrophoretic Epaper for

Ebooks (Focal), Robert A. Sprague, SiPix Imaging Inc. (USA)

Analysis of Fatigue Difference Between Paper and Display—Evaluation of Effects of Medium Handling Style, Sonomi Inoue and Makoto Omodani, Tokai University (Japan)

Integral Photography Using Electronic Paper, Kazuhisa Yanaka and Miho Kijima, Kanagawa Institute of Technology (Japan)

Study on Charge Mechanism of EPID Particles (Interactive), Ming Wang, Sakiko Nakamura, Nobukazu Miyagawa, and Takashi Kitamura, Chiba University (Japan)

Movement of Electrophoretic Particles Between Two Electrodes in Electrophoretic Image Display System (Interactive),

Yuichi Nobusawa, Sakiko Nakamura, Nobukazu Miyagawa, and Takashi Kitamura, Chiba University (Japan)

PRINT AND IMAGE QUALITY

Session Chairs: Susan Farnand, Rochester Institute of Technology; Udi Chatow, Hewlett-Packard Indigo; and Shigeru Kitakubo, Nippon Institute of Technology
12:20 - 5:45 PM

Measurement of Electrostatic Latent Image on Photoconductors by Use of Electron Beam Probe (Focal), Hiroyuki Suhara, Ricoh Co., Ltd. (Japan)

A New Approach for Art Reproduction Using Digital Technology: The Altarpiece of Guimera Project (Focal), Jordi Sender, Hewlett-Packard Española (Spain)

Image Banding Based on Opto-Mechanics Considering Laser Scanning Unit in Printing Systems, Jun-Hyeon Jo and Jae-Hwan Yoo, Samsung Electronics (South Korea)

Quality Comparison of HP Indigo to Offset Lithography, Xiaoying Rong, California Polytechnic State University (USA)

Automatic Mechanical-Band Perceptual Evaluation (Interactive), Hila Nachlieli, Doron Saked, Shai Druckman, Maya Shalev, and Yaniv Yona, Hewlett-Packard Laboratories (Israel)

Dependence of Edge Enhancement Condition on Pixel Size (Interactive), HongMei Cheng and Yasushi Hoshino, Nippon Institute of Technology (Japan)

Methods to Automate Print Quality Assessment (Interactive), Robert Booth, Lexmark International, Inc. (USA)

Modeling of Photoconductor Print Artifacts Using a Mixture of Gaussians (Interactive), Ahmed Eid, Lexmark International, Inc. (USA)

Research on the Quality Evaluation Method of Color Reproduction of Ink-Jet Image (Interactive), Guang-Xue Chen, Qin-Wen Wang, Qi-Feng Chen, South China University of Technology (China)

Minding the Gap: An Examination of the Image Quality Differences Between Digital Print Technologies and Traditional Offset Lithography (Focal), Susan Farnand, Rochester Institute of Technology (USA)

Measuring Cockling On-Line in High Speed Inkjet Printing, Sebastian Gepp,^{1,2} Jonas Örtengren,¹ and Jan-Erik Häggglund³; ¹Mid Sweden University (Sweden), ²Technical University Chemnitz (Germany), and ³MoRe Research (Sweden)

The Challenges in Modeling Image Quality in Digital Printing, Raisa Halonen,¹ Tuomas Leisti,² and Pirkko Oittinen¹; ¹Helsinki University of Technology and ²University of Helsinki (Finland)

Towards Instrumental Analysis of Perceptual Image and Print Quality, Ming-Kai Tse and David Forrest, Quality Engineering Associates (QEA), Inc. (USA)

Evaluation of Interpolation Errors on Scanned Images (Interactive), Yoon Gyoo Lee and Choon-Woo Kim, Inha University; and Kyoung Youn Lee, You Sun Bang, and Heui-Keun Choh, Samsung Electronics (Korea)

A Mathematical Framework for Print Masking (Interactive), J. William Boley and George T.-C. Chiu, Purdue University (USA)

Printing System Optimization via Supplemental Light Colorants (Interactive), Chunghui Kuo, Hwai-Tzou Tai, Peter Alexandrovich, and Frederick Gilley, Eastman Kodak Co. (USA)

NIP TRACK 3

MEDIA FOR DIGITAL PRINTING

Session Chairs: Eric Burch, Hewlett-Packard Co.; Christopher Batz-Sohn, Evonik Degussa GmbH; and Toshiharu Enomae, University of Tokyo

9:20 AM - 12:40 PM

Nano-Hybrid Technology: A New Tool for Improving Print Quality, Andreas Kornherr, Paul Achatz, and Gerhard Drexler, Mondi Uncoated Fine Paper (Austria)

Improving Inkjet Print Performance of Plain Sized Paper with Nanostructured Pigments, Christoph Batz-Sohn,¹ Leo Nelli,² and Astrid Müller¹; ¹Evonik Degussa GmbH (Germany) and ²Evonik Degussa Corp. (USA)

Nanoporous Ink-Jet Photo Paper with a High Dynamic Range, Pierre-Alain Brugger, Urs Fuerholz, Rita Hofmann, Vincent Ruffieux, and Meinrad Schaer, ILFORD Imaging Switzerland GmbH (Switzerland)

High Speed Ink Absorption of Microporous RC Based Photomedia, Fundamentals, Overview and Challenges (Focal), Knut Hornig,^{1,2} Rainer Klein,² Carsten Schoenfeld,² Felix Schoeller Service GmbH and ²PTS Heidenau (Germany)

Application of Polyolefin Dispersions in Paper Coatings, Roland Gong,¹ Elizabeth

SPECIAL EVENT

This year's conference reception will take place at the Gillespie, a beautiful Art Deco building in downtown Louisville. Slides from the last 24 years of NIP will be shown.

NIP25/Digital Fabrication 2009 Conference Reception

**Wednesday, September 23
6:30 – 9:30 pm**

Yuan,² Paul D. Fleming,¹ Margaret Joyce,¹ and Erika Hrehorova¹; ¹Western Michigan University and ²Baker Hughes (USA)

Seeking New Alternatives: The Evaluation of Precipitated Silicates for Inkjet Media, Stephanie Rose,¹ Gemma Morea-Swift,² and Madeleine Jagger^{1,2}; ¹PQ Corp. (USA) and ²PQ Silicas UK Ltd. (UK)

Investigation of Ink-Substrate Adhesion in LEP Printing, Manoj K. Bhattacharyya, Hou T. Ng, and Eric G. Hanson, Hewlett-Packard Laboratories (USA); Bruce J. Jackson and Stanley D. Morse, Hewlett-Packard Co. (USA); and Marc Aronhime, Hewlett-Packard Indigo, Ltd. (Israel)

UV-Inkjet Ink Penetration into the Coating Structure and Its Effect to Print Quality Formation and Drying, Pasi Puukka, Taina Lamminmäki, Anu Ilmonen, and Satu Sundqvist, Oy Keskuslaboratorio (Finland)

COMMERCIAL AND INDUSTRIAL PRINTING

Session Chairs: Eric Stelter, Eastman Kodak Co.; Dror Kella, Hewlett-Packard Indigo; and Nobuyuki Nakayama, Fuji Xerox Co., Ltd.

2:00 - 5:00 PM

High-Performance Charging Unit for Liquid Electrophotographic Presses (Focal), Omer Gila, Michael H. Lee, and Seongsik Chang, Hewlett-Packard Laboratories (USA); and Boaz Tagansky, Hewlett-Packard Indigo (Israel)

Trends of Technology at DRUPA 2008, Charles E. Case, Roger's Hill Associates, Inc. (USA)

High Speed Page Matching, Robert Ulichney and Matthew Gaubatz, Hewlett-Packard Co.; and David Rouse, Cornell University (USA)

Numerical Simulation and Analysis of Commercial Print Production Systems, Jun Zeng, Ijong Lin, Eric Hoarau, and Gary Disposto, Hewlett-Packard Laboratories (USA)

Proposal for Next Generation Print Infrastructure: Gutenberg-Landa TCP/IP, Ijong Lin, Eric Hoarau, Jun Zeng, and

Gary Disposito, Hewlett-Packard Laboratories (USA)

Distributed Printing, Eric Stelter, Eastman Kodak Co. (USA)

Kodak Unified Workflow for Commercial Printing, Leonard R. Christopher and Eric Stelter, Eastman Kodak Co. (USA)

DIGITAL FABRICATION PRINTED ELECTRONICS AND DEVICES

Session Chairs: Brendan Florez, Polyera Corp.; Mark Crankshaw, Cambridge Display Technology Ltd; and Shinichi Nishi, Konica Minolta IJ Technologies, Inc.

9:20 AM - 12:40 PM

Dynamic Correction of Interconnections in Printed Electronics Manufacturing, Heikki Huttunen, Tapio Manninen, Kalle Rutanen, and Pekka Ruusuvuori, Tampere University of Technology; and Risto Rönkkö, Nokia Research Center (Finland)

Inkjet Printed MRI Coils and Increased Conductivity Found in Tracks Printed in Embossed Channels, Patrick J. Smith, Dario Mager, Ute Loeffelmann, and Jan G. Korvink, University of Freiburg (Germany)

Printed Polymer Electronics, Alexander Knobloch, PolyC GmbH & Co. KG (Germany)

Direct Printing Zinc Oxide Thin-Film Transistors (Focal), Yu-Pei Chang, Ming-Huan Yang, Chao-Feng Sung, and Yuh-Zheng Lee, Industrial Technology Research Institute; and Heh-Chang Huang, Wen-Juan Wang, and Tsung-Eong Hsieh, National Chiao Tung University (Taiwan)

Inkjet Printed Quantitative Indicators, Jali Heilmann, VTT Technical Research Center of Finland (Finland)

The Prospects of Inkjet Printing for Displays and Sensor Tapes, Jurgen Daniel, Ana Claudia Arias, Tina Ng, Sanjiv Sambandan, Sean Garner, Beverly Russo, and Brent Krusor, Palo Alto Research Center (USA)

Use of Direct-Write Metallization for Photovoltaic, Maikel F.A.M. van Hest, Alexander Miedaner, Calvin J. Curtis, Robert P. Pasquarelli, and David S. Ginley, National Renewable Energy Laboratory (USA)

Optimization of Inkjet-Based Process Modules for Printed Transistor Circuits, Huai-Yuan Tseng, Shong Yin, and Vivek Subramanian, University of California Berkeley (USA)

INDUSTRIAL AND COMMERCIAL APPLICATIONS

Session Chairs: Jim Stasiak, Hewlett-Packard Co.; Jolke Perelaer, Friedrich-Schiller-University; and Kelvin Cheng, Industrial Technology Research Institute
1:50 - 3:30 PM

Precise Inkjet Fabrication for Large Size OLED Displays (Focal), Shinri Sakai, Shuichi Takei, Atsushi Kitabayashi, Hidetaka Hanaoka, Kazuto Shinohara, Masashi Goto, and Satoru Miyashita, Seiko Epson Corp. (Japan)

Novel Fine Electrode Patterning Using Ink-jet Method and Its Application to All-Printed Organic TFT Backplane, Takanori Tano, Hidenori Tomono, Atsushi Onodera, Keiichiroh Yutani, Akishige Murakami, and Koei Suzuki, Ricoh Co., Ltd. (Japan)

Inert Piezoelectric Inkjet Print Head Technology for Alkaline Etch Process in Solar Cell Fabrication, Ty Chen, Trident, An ITW Co. (USA)
From DMP to 40" TV: The Challenges of Scaling-Up Inkjet (Focal), Mark Crankshaw, Lee Foster, Alan Owens, Laura Webb, and Eric Mayes, Cambridge Display Technology Ltd. (UK)

MATERIALS AND SUBSTRATES

Session Chairs: Jim Stasiak, Hewlett-Packard Co.; Patrick Smith, University of Freiburg; and Masaaki Oda, Ulvac Corp.
4:00 - 5:10 PM

Fine Patterning Technology with Screen Printing, Heishiro Fudo, Alps Electric Co., Ltd. (Japan)

Sintering Methods for Silver Nanoparticle Inks on Flexible Substrates, Thomas Öhlund, Jonas Örtengren, Henrik Andersson, and Hans-Erik Nilsson, Mid Sweden University (Sweden)

Conductive Ink-Jet Inks for Plastic Electronics: Air Stable Copper Nanoarticles and Room Temperature Sintering (Focal), Shlomo Magdassi, Alexander Kamyshny, and Michael Grouchko, Hebrew University of Jerusalem (Israel)

Thursday September 24, 2009

**ALL NIP TRACKS
MASS CUSTOMIZATION PANEL
DISCUSSION**

8:15 - 9:40 AM
see details at right

**NIP TRACK 1
FUSING, CURING, AND DRYING**

Session Chairs: David Thompson, Xerox Corp.;
Marcel Slot, Océ Technologies B.V.; and
Tatsuya Tada, Canon, Inc.
9:45 AM - 12:00 PM

Contact and Non-Contact Fusing and Fixing of Toners (Focal), Suresh Ahuja, Xerox Corp. (USA)

Considerations on Energy Supply of Heat and Pressing Work for Toner Fusing, Teruaki Mitsuya, Ricoh Co., Ltd. (Japan)

New Materials for Radiation Curable IJ Inks, Stephane Biry and Sebastien Villeneuve, Ciba Speciality Chemicals (Switzerland); and Ian Hutchinson, Helene Dulongpont, and Herve Cavallie, Sartomer Europe (France)

Practical Application of UV-LED Curing Technology to UV Inkjet, Tom Molamphy, Michael Beck, Sara Jennings, and Collin Matsumoto, Phoseon Technology (USA)

Reactive Inkjet Formulations—Curing by Electron Beam, Hartley Selman and Steve Hall, Sun Chemical (UK)

TEXTILE AND FABRIC PRINTING

Session Chairs: Hitoshi Ujiie, Philadelphia University;
and Takao Abe, Shinshu University
12:05 - 12:35 PM

Colloidal Properties of Surface-Modified and Micro-Encapsulated Pigment Dispersion and Its Application in Inkjet Printing Inks (Interactive), Shaohai Fu and Chunxia Wang, Jiangnan University (China)

Preparation of Polymer-Encapsulated Pigment for Formulations of Inkjet Inks (Interactive), Kuanjun Fang, Qingdao University; and Lianbing Zhang, Xia Zhang, and Shaohai Fu, Jiangnan University (China)

Pigment Inkjet Printing Performance of Polyester Fabrics Surface-Modified by Atmospheric Plasma (Interactive), Kuanjun Fang, Qingdao University and Chunming Zhang, Jiangnan University (China)

Effect of Pigment Particle Size on Color and Dyeing Properties of Inkjet Printing Ink (Interactive), Chunxia Wang and Shaohai Fu, Jiangnan University (China)

Color Performance of Cotton Fabrics Pre-treated by Low-Temperature Plasma and

SPECIAL EVENT

**Mass Customization
Discussion Panel**

Please join us for this panel and audience discussion on issues related to mass customization.

Moderator:

Franziska Frey, RIT

Panelists:

Frank Cost, RIT

(check online closer to the meeting for other panelists)

**Thursday, September 24
8:15 – 9:40 AM**

Inkjet-Printed with Pigment Inks (Interactive), An-li Tian,¹ Kuanjun Fang,² Xia Zhang,¹ and Shaohai Fu¹; ¹Jiangnan University and ²Qingdao University (China)

Organic Pigment Encapsulation by Miniemulsion Polymerization (Interactive), Xia Zhang,¹ Kuanjun Fang,² Lianbin Zhang,¹ and Mingjun Zhang¹; ¹Jiangnan University and ²Qingdao University (China)
Interactive Session II and lunch, see page 15

**NIP TRACK 2
PRINTING SYSTEMS
ENGINEERING/OPTIMIZATION**

Session Chairs: David Craig, Xerox Corp.;
Jordi Sender, Hewlett-Packard Española; and Teruaki Mitsuya, Ricoh Co., Ltd.
9:45 AM - 12:25 PM

Maintaining Color Consistency of the Xerographic Color Printing Process, Teck Ping Sim and Perry Y. Li, University of Minnesota (USA)

New Technologies for Image Stability and Reliability Used in the Latest Ricoh Production Printer (Focal), Toshihiro Sugiyama, Yoshitaka Fujinuma, Masayoshi Nakayama, Shinichi Akatsu, Takuma Higa, Tomohide Takenaka, Takehide Mizutani, Satoru Miyamoto, and Masumi Sato, Ricoh Co., Ltd. (Japan)

Improving Tone Prediction Accuracy in Calibration for Color Electrophotography Part I: Environmental and Consumable Factors, Chao-Lung Yang,¹ Yan-Fu Kuo,¹ Yuehwen Yih, George T.-C. Chiu,¹ Dennis A. Abramsohn,² Gary R. Ashton,³ and Jan P. Allebach¹; ¹Purdue University, ²Hewlett-Packard Co., and ³consultant (USA)

Analysis of Idle Time Effect on Color Consistency of Electrophotographic Printer, Sangbok Lee, Yuehwen Yih, George T.-C. Chiu, and Jan P. Allebach, Purdue University (USA)

A Study on Mechanism of Local Dot Positioning Errors Caused by a Paper Fed into

Second Transfer, Takashi Hashimoto and Toshiyuki Andoh, Ricoh Co., Ltd. (Japan)
Evanescence Wave Device for Monitoring Particles in Submicron Layers at a Surface, Henryk Birecki and Thomas C. Anthony, Hewlett-Packard Co. (USA)

Modeling of Tone Deviation During Switch-on Transient for Color Electrophotography (Interactive), Yan-Fu Kuo, Chao-Lung Yang, George T.-C. Chiu, Yuehwern Yih, and Jan P. Allebach, Purdue University; and Carl Geleyense, Hewlett-Packard Co. (USA)

Interactive Session II and lunch, see page 15

NIP TRACK 3

DIGITAL PRINTING/QUALITY CONTROL INSTRUMENTATION

Session Chairs: Brian Cooper, Lexmark International Inc.; Lutz Engisch, University of Chemnitz; and Toshio Uehara, TREK Japan K.K.
 9:45 - 11:45 AM

A New Method to Assess the Jetting Behaviour of Drop-on-Demand Inkjet Fluids, Sungjune Jung, Stephen D. Hoath, Graham D. Martin, and Ian M. Hutchings, University of Cambridge (UK)

Automated Print Quality Assessment of Inkjet Nozzle Plates, Edward Rippetoe and Herb Toews, Lexmark International, Inc. (USA)

Scanner Characterization for Color Measurement of EP Printed Output (Interactive), Andrew J. Asman, Edward E. Rippetoe, and Brian E. Cooper, Lexmark International, Inc. (USA)

The Printing Quality Control of HP Indigo Digital Printing Machine (Interactive), Beiqing Huang, Lingya Gu, Wan Zhang, Xianfu Wei, Jianghao Liu, and Wenjie Xian, Beijing Institute of Graphic Communication (China)

The Effect of Inkjet Ink Composition on Complex Rheology and Its Influence on Jetting Behaviour, Damien Vadillo, Malcolm R. Mackley, and Amit Mulji, University of Cambridge; and Tri Tuladhar, Xaar Technology Ltd. (UK)

Improving Tone Prediction Accuracy in Calibration for Color Electrophotography Part II: Principal Component Regression, Yan-Fu Kuo, Chao-Lung Yang, George T.-C. Chiu, Yuehwern Yih, and Jan P. Allebach, Purdue University (USA)

A Second-Generation Portable Instrument for DOI (Distinctness of Image) Measurement (Interactive), Ming-Kai Tse, Eugene Hong, and David Forrest, Quality Engineering Associates (QEA), Inc. (USA)

THERMAL PRINTING

Session Chairs: Narasimharao Dontula, Eastman Kodak Co.; and Hirotooshi Terao, Alps Electric Co., Ltd.
 11:55 AM - 12:45 PM

Segmented Multi-Digit Thermal Printhead (Interactive), Hideo Taniguchi, HIT Devices Ltd.; Ellery Potash, Lathem Time Corp.; and Jiro Oi, HIT Devices Ltd. (USA)

On-Demand Transcript Foil Print Technology for Inn Molding and Hot Stamp (Interactive), Hiroshi Kobayashi, Masahito Watanabe, Mitsuo Hirano, and Yasutoshi Inoue, Alps Electric Co., Ltd. (Japan)

Study of Nib Formation on a High-Resolution Thick Film Thermal Head (Interactive), Takeshi Toyosawa, J. C. Wang, and Tatsuya Murakami, OYO Geospace (USA); and Masahito Shiraki, Wide Techno Co., Ltd. (Japan)

Alteration of Reflection Spectra of Images from Color-Formers in a Single-Sheet Thermal Imaging System (Interactive), Fariza B. Hasan, Zink Imaging, Inc. (USA)

Development of FUJIFILM Quality Thermal Photo Paper: A New Thermal Photo Printing Material (Focal), Shigeaki Ohtani and Shigeru Shibayama, FUJIFILM Corp. (Japan)

Interactive Session II and lunch, see page 15

DIGITAL FABRICATION

2D & 3D DIGITAL FABRICATION

Session Chairs: Greg Herman, Sharp Laboratories of America; Jali Heilmann, VTT; and Akira Suzuki, Ricoh Co., Ltd.
 8:15 - 10:45 AM

Electrostatic Printing of Nano-Particles for Photo-Voltaic Applications (Focal), Robert Detig, ElectroX Corp. (USA)

Digital Fabrication of Support Structures for Improved Mechanical Stability of Fragile Microsieves, Jens Hammerschmidt, Stephan F. Jahn, Doreen Wachner, Werner A. Goedel, and Reinhard R. Baumann, Chemnitz University of Technology (Germany)

Jetting of Reactive Materials for Additive Manufacturing of Nylon Parts, Saeed Fathi, Phill Dickens, Khosrow Khodabakhshi, Marianne Gilbert, and Richard Hague, Wolfson School of Mechanical and Manufacturing Engineering (UK)

Inkjet-Printing of Polymer Microspheres, Enrico Sowade,¹ Jens Hammerschmidt,¹ David Polster,¹ Rebecca Wagner,² Thomas Baumgärtel,³ Thomas Blaudeck,¹ Harald Graaf,¹ Frank Cichos,² Christian von Borczyskowski,¹ and Reinhard R. Baumann¹; ¹Chemnitz University of Technology (Germany), ²University of Leipzig (Germany) and ³Osaka University (Japan)

Fabrication of Two and Three-Dimensional Structures by Using Inkjet Printing, Jolke

Perelaer, Rebecca Eckardt, Peter Kröber, Joseph T. Delaney, and Ulrich S. Schubert, Friedrich-Schiller-University Jena (Germany)

3D Printing and Fabrication of “Smart”

Responsive Devices: A Comparative

Investigation, Peter Walters, University of the West of England (UK)

Further Developments in the Digital Fabrica-

tion of Ceramic Artworks, David Huson, University of the West of England (UK)

NOVEL DIGITAL FABRICATION APPLICATIONS

Session Chairs: Thomas Boland, Clemson University; Alexander Knobloch, PolyIC GmbH & Co. KG; and Taro Terashi, Ricoh Co., Ltd.
11:00 AM - 12:00 PM

Using Thermal Transfer Print Technology in

Printed Electronics (Focal), Claire Jalbert, International Imaging Materials, Inc. (USA)

Inkjet Fabrication Involving Pd Thiolate,

Carbon Nanotubes, and Single-Strand DNA

(Focal), J. William Boley,¹ T. Bhuvana,²

Bridget D. Dolash,¹ Robert A. Sayer,¹

George T.-C. Chiu,¹ Ronald G. Reifenberger,¹

G. U. Kulkarni,² Donald E. Bergstrom,¹

Timothy S. Fisher¹; ¹Purdue University (USA)

and ²Jawaharlal Nehru Centre for Advanced Scientific Research (India)

DIGITAL FABRICATION INTERACTIVE PAPER PREVIEWS

Session Chair: Alexander Knobloch, PolyIC GmbH & Co. KG
12:00 - 12:25 PM

Direct Fabrication of Polymer Microlens Arrays Having Tunable Optical Properties

(Interactive), Joo Yeon Kim,¹ Victor Javier

Cadarso Busto,¹ Vahid Fakhfouri,¹ Karl

Pfeiffer,² Anja Voigt,² Marion Fink,² Gabi

Gruetzner,² and Jürgen Brugger¹; ¹Ecole

Polytechnique Fédérale de Lausanne (EPFL)

(Switzerland) and ²Micro Resist Technology

GmbH (Germany)

Shear-Based Droplet Production for Biomaterial Printing (Interactive), Evgeniya

Moiseeva and Cindy Harnett, University of Louisville (USA)

Preparation and Characterization of Nano-

Sized Silver Particles (Interactive), Zhongxiao

Li and Jialing Pu, Beijing Institute of Graphic

Communication (China)

Image Analysis of Surface Elements Repro-

duction Quality in 3D Ink-Jet Printing (Inter-

active), Maja Stanic,¹ Peter Walters,² and

Branka Lozo¹; ¹University of Zagreb (Croatia)

and ²University of the West of England (UK)

A Study on the Effect of a Surfactant

Additive on the Performance of a Thermo-

THURSDAY SPECIAL EVENTS

Thursday promises to be an exciting day! Please join us for the following special events:

Mass Customization

Panel Discussion

8:15 – 9:40 AM

Interactive Paper Session II and Lunch

12:30 – 2:00 PM

Final Plenary

Ambient Electronics and Digital

Fabrication: Print Electronics Everywhere,

Takao Someya, University of Tokyo (Japan)

3:10 - 4:00 PM

Farewell Reception

End the conference with a final networking event.

4:00 - 5:00 PM

Sensitive Imaging Material (Interactive),

Wei Wei, Jia-Ling and Zhong-Xiao Li, Beijing Institute of Graphic Communication (China)

Interactive Session II and lunch, see below

ALL TRACKS

INTERACTIVE SESSION II

and pizza lunch

12:30 - 2:00 PM

NIP TRACK 1

TEXTILE AND FABRIC PRINTING CONTINUED

Session Chairs: same as morning

2:00 - 2:30 PM

Inkjet Printing of PEDOT: Towards Smart Textiles and Flexible Organic Photovoltaics

(Focal), Veronica Sanchez Romaguera,¹

Dolores Caras Quintero,¹ Kees Heil,² and

Stephen G. Yeates¹; ¹University of Manchester

(UK) and ²Ten Cate Advanced Textiles (the Netherlands)

Afternoon Plenary followed by

Farewell Reception, see page 16

NIP TRACK 2

PRINTING SYSTEMS ENGINEERING/OPTIMIZATION CONTINUED

Session Chairs: same as morning

2:00 - 3:00 PM

Key Polyurethane Attributes and Their Effect on Electro Photographic Roller Life and

Performance, Krishna Chaurasia, Fenner Precision (USA)

Real Time Alignment of Direct Marking Print Heads, Howard Mizes, Stan Spencer, Cary Sjolander, and Andrew Yeh, Xerox Corp. (USA)

Balancing Inkjet Printing System Design with Printhead Jetting Performance and Tolerances, Thomas G. Duby, FUJIFILM Dimatix, Inc. (USA)

Afternoon Plenary followed by Farewell Reception, see next column

NIP TRACK 3 THERMAL PRINTING CONTINUED

Session Chairs: same as morning
2:00 - 3:00 PM

Thermal Transfer Printing for 21st Century Manufacturing, James R. Williams, Polyonics, Inc. (USA)

Development of Power Saving Thermal Print Head, Tsuneyuki Sasaki, Toshifumi Nakatani, Taishi Numata, Hisashi Hoshino, and Hirotoishi Terao, Alps Electric Co., Ltd. (Japan)

Development of Ultra High Density Thermal Printhead, Youichi Moto, Hidekazu Akamatsu, Hidenobu Nakagawa, Yoshihiro Inokuma, Yoshihiro Muguruma, and Kenji Myamura, Kyocera Corp. (Japan)

Afternoon Plenary followed by Farewell Reception, see next column

DIGITAL FABRICATION MATERIALS AND SUBSTRATES CONT

Session Chairs: Jim Stasiak, Hewlett-Packard Co.; Patrick Smith, University of Freiburg; and Masaaki Oda, Ulvac Corp.
1:50 - 3:00 PM

Temperature Dependent Resistance of Multi Wall Carbon Nanotube by Inkjet Printing (Focal), Kyoung Il Lee, Dae Young Lee, Seong

Hyun Kim, Chul Seung Lee, Kwon Woo Shin, Jong Hoon Han, and Jin Woo Cho, Korea Electronics Technology Institute (Korea)

Low Curing Temperature Silver Tracks from Soluble Inks, Bojun Xu, Jonathan Stringer, Andrew Wallwork, and Brian Derby, University of Manchester (UK)

Choosing the Optimal Substrate Surface for Digital Fabrication Printing, Wolfgang A. Schmidt, Felix Schoeller Service GmbH & Co. KG (Germany)

Afternoon Plenary followed by Farewell Reception, see below

ALL TRACKS PLENARY SESSION

Session Chair: Reinhard Baumann, Fraunhofer Einrichtung for Electronic Nano Systems ENAS
3:10 - 4:00 PM

Ambient Electronics and Digital Fabrication: Print Electronics Everywhere, Takao Someya, University of Tokyo (Japan)

Farewell Reception
4:00 - 5:00 PM

SPECIAL COLLOCATED EVENT



OE-A 7th North America Working Group Meeting Focus: Printing Technologies

Galt House, Louisville, KY, Sept. 24-25, 2009
meeting begins at the conclusion of NIP25/Digital Fabrication2009

Founded in December 2004, the OE-A (Organic Electronics Association) is the key international industry association for organic and printed electronics. Members are leading international companies and institutions, ranging from component, material, equipment, and tool suppliers to producers/system integrators, end-users, and R&D institutes. Representing the entire value chain of this emerging industry, more than 120 member companies worldwide are working together to promote the establishment of a competitive production infrastructure for organic and printed electronics. A working group within the German Engineering Federation (VDMA), which has 3,000 members, the vision of OE-A is to build a bridge between science, technology, and application. Activities include networking, strategic market understanding, and a roadmap for organic and printed electronics. Dedicated working groups cover applications, technologies, quality control and measurement, demonstrators, and education.

Join us for the annual North America Working Group meeting!
For more information contact barbara.fisher@oe-a-na.org; www.oe-a.org

PLENARY SPEAKER BIOS

Brian Derby is a professor of Materials Science at the School of Materials, University of Manchester (UK), where he leads a research group of 12 students and postdoctoral workers. Prior to that, he was on the faculty of the University of Oxford, and director of the Oxford Centre for Advanced Materials and Composites. For more than 10 years he has been one of the pioneers of the application of ink jet printing as a general manufacturing tool and has carried out pioneering work in the 3-D printing of ceramics, polymers, and biomaterials. Derby has been active in the field of bioprinting: the use of printing technology (particularly ink jet printing) to deposit biomaterials along with proteins and cells for applications as sensors and tissue engineering scaffolds. His research has been funded by a number of sources including the Engineering and Physical Sciences Research Council (UK), Biotechnology and Biological Sciences Research Council (UK), the Technology Strategy Board (UK), the Office of Naval Research (USA), the European Commission, and directly by industry.

Koji Hirakura joined Ricoh Reprography Research and Development Center of Tokyo in 1970. His initial studies focused on stabilizing the high-spectral sensitivity of photoreceptors, especially of cadmium sulfide, under repetitive exposure. He also worked on toner charge to mass ratio measuring technologies. Hirakura invented original measurement technologies for toner developability and applied them to the output image density control systems of electrophotographic (EP) engines. In 1985, he began work on a number of projects for the Digital Color EP System as a project manager. In 1991, Hirakura presented and published Four Drum Digital Color EP System at NIP7, proving the realization of the Four Drum Tandem Digital Color Laser EP System for the first time. This paper presented the original architecture of the Tandem EP engine system and subsystems, as well as suggested a desirable way to optimize halftone dot density according to types of printed matter. For these contributions, he received the 2003 IS&T Chester F. Carlson Award and the 2004 ISJ Technical Award. At present, the Four Drum Tandem System makes the main stream of versatile color MFPs and printers, including digital production printing systems. Currently, Hirakura is an associate director of Ricoh Research and Development Group, and the executive engineer for the marking technology of Ricoh. He also serves as president of the Imaging Society of Japan (ISJ). He received his BS in physics from Saga University.

Michael McCreary is the vice president of Research and Advanced Development of E INK Corp., where his responsibilities include the creation of advanced technologies that is enabling a new generation of flexible, ultra-low power, daylight-readable displays. McCreary is a 35-year veteran of the imaging industry. He previously held a number of leadership positions with Eastman Kodak Co., including general manager of Kodak's Microelectronics Technology Division, a semiconductor business unit that developed high-performance solid state image sensors. McCreary serves on the Board of Directors of FlexTech Alliance and has served as a board member of the ASU Flexible Display Center. He earned a BS with honors in chemistry from Principia College, a PhD in physical organic chemistry from MIT, and has done additional coursework in solid-state physics at RIT.

Marcel Slot is vice president of development at R&D of Océ-Technologies BV in the Netherlands. He studied physics at Twente University of Technology after which he joined Océ 19 years ago. Slot was involved in technology and product development for 14 years as a project leader. His professional focus has been directed towards electrophotography as well as ink jet printing process technology and material science. Before he was appointed vice president of development, he was director of a research department for three years. Married, with two daughters, Slot lives in a small farmhouse in a village near the headquarters of the Océ group.

Takao Someya received a PhD in electrical engineering from the University of Tokyo (1997). Since 2009, he has been a professor in the Department of Electrical and Electronic Engineering, at the University of Tokyo. From 2001 to 2003, Someya worked at the Nanocenter (NSEC) of Columbia University and Bell Labs, Lucent Technologies, as a visiting scholar. His current research interests include organic transistors, flexible electronics, plastic integrated circuits, large-area sensors, and plastic actuators. Someya has received a number of awards including a Japan Society for the Promotion of Science (JSPS) prize, the first prize of the newly established German Innovation Award, and the 2004 IEEE/ISSCC Sugano Award. He has been a member of the board of directors of the US Materials Research Society since 2008 and is an IEEE/EDS Distinguished Lecturer. Someya's "large-area sensor array" electronic thin film was featured in Time Magazine (November 21, 2005) as one of the "Best Inventions of 2005."

Week At-a-Glance

1 2 3 4 5 6

SC08-S3 / SC09-S3 / SC10-S3 / SC11-S3 / SC12-S3
 SC13-S3 SC14-S4

SC17-M3 / SC18-M3 / SC19-M3

Pack.	Toner-based Printing Materials con't.	Digital Packaging Panel Discussion See details, page 4
	IJ Printing Processes con't.	
	IP Con't. Security & Forensic Printing	
	Digital Packaging	
Coffee break and goes until end of day, Thursday.		Photoelec. Imag. Mats. & Devs.

Plenary: Electronic Paper Comes of Age, Michael McCreary (E Ink Corp.)	Interactive Paper Session I & Coffee Break	Toner-based Printing Processes con't.
		Ink-jet Printing Materials con't.
		Color Science/Image Proc. con't
		Printing of Biomaterials
		Exhibit Hall Happy Hour 5:15-6:30

Printing Technologies from DRUPA 2008	
Print and Image Quality con't.	
Commercial & Industrial Printing	
Industrial & Commercial Apps.	Materials & Substrates
OPEN	Conference Reception 6:30-9:30 pm

Interactive Session II (lunch provided)	Textile & Fabric Printing con't.	Plenary: Ambient Elect. & Dig. Fab.: Print Electronics Everywhere, Takao Someya (Univ.of Tokyo)	Farewell Reception 4:00-5:00 pm
	Print. Sys. Engin./Optim. con't.		
	Thermal Printing con't.		
	Materials & Substrates con't		

Print Events
Exhibit
Course
Monday 6:00-8:00 pm
Tuesday 6:30-9:30 pm
Wednesday 4:00-5:00 pm
Time is subject to change.

Short Course Program

This year's NIP/DF Short Course Program offers a wide range of introductory and advanced topics in the fields of nonimpact printing and digital fabrication given by internationally recognized experts dedicated to promoting the understanding and advancement of imaging science and technology. Attendees receive copies of the instructors' notes/slides to with course registration. We encourage you to sign up for short courses by the early registration deadline to ensure that a course runs.

Special Offer:
Sign up for three or more short courses and receive 20% off the member or non-member fee.

Students may take any short course for \$50. Additional discount does not apply.

Note: IS&T reserves the right to cancel short courses in the event of insufficient advance registration. Please indicate your interest early. Any prerequisites are noted in the description.

Sunday, September 20, 2009

SC01-S1: Introduction to Electrophotography

Sunday 8:00 am – 12:00 pm (4 hours)

Instructor: Marc Cousoulis, Lexmark International Inc.

Electrophotography is the underlying print engine technology that drives the multi-million dollar laser printer industry. This short course provides a review of the foundational science required to understand the functional and architectural decisions that define the design of a modern laser printer.

Benefits

This course enables an attendee to:

- Understand the history and evolution of electrophotography
- Identify and explain the six fundamental steps of electrophotography
- Comprehend the basic physics of toner charging, development, transfer, and fixation
- Describe the basic variations of laser printer technologies
- Compare the current technology choices utilized commercially

Intended Audience: imaging professionals in all disciplines seeking an overview of the science and application of electrophotography

Marc Cousoulis has more than 15 years of electrophotographic experience across three market segments, holding the positions of senior scientist at Moore Business Forms developing ultra high speed toner based imaging systems, senior electrophotographic engineer at Aetas Technology developing low end color laser printer technologies, and is currently electrophotographic technology team lead for high end color laser printers for Lexmark

International. He holds separate degrees in physics and imaging science from the Rochester Institute of Technology.

SC02-S1: Introduction to Image Processing for Electronic Printing

Sunday 8:00 – 10:00 am (2 hours)

Instructor: Robert Loce, Xerox Corp.

Image processing is a key element of electronic printing systems. Image processing prepares a digital image for the physics of the marking process to enable a true and aesthetically pleasing representation of digital information on a print. Issues addressed include resolution of input and output devices, line growth, color registration, and halftone related issues.

Benefits

This course enables an attendee to:

- Understand attributes of physical pixels, adjustment of line widths, corner sharpening, and ink traps
- Appreciate spatial resolution issues and enhancement of line art
- Learn about rendering tinted text, color image trapping, uniformity compensation, and electronic registration
- Comprehend rehalftoning

Intended Audience: anyone working in the field of digital printing.

Robert Loce is a principal scientist at the Xerox Research Center in Webster, New York. He joined Xerox in 1981 with an associate degree in optical engineering technology, then while working in the Optical and Imaging Technology and Research Departments at Xerox, he received a BS in photographic science from RIT (1985), an MS in

optical engineering from the Univ. of Rochester (1987), and a PhD in imaging science from RIT (1993). His current work involves development of image processing methods for color electronic printing. He has publications and many patents in the areas of halftoning, digital image rendering, optics, imaging systems, and digital image enhancement. His publications include book chapters on digital halftoning and digital document processing, and a book on enhancement and restoration of digital documents. He is a Fellow of SPIE, a Senior Member of IEEE, an associate editor for the Journal of Electronic Imaging, and has been an associate editor for Real-Time Imaging and IEEE Transactions on Image Processing.

SC03-S1: Papermaking, Coating Fundamentals, and Media for Digital Printing

Sunday 8:00 am – 12:00 pm (4 hours)

Instructor: Sen Yang, Avon Products

This short course includes an introduction to papermaking and coating technologies, and a discussion on media requirements for digital printing with an emphasis on electrophotographic and ink jet printing applications. Paper attributes that are important for color electrophotographic and ink jet printing are discussed. A review of recent developments of ColorLok™ Technology and “better paper for better printing” is included.

Benefits

This course enables an attendee to:

- Describe the basics of papermaking and paper coating processes
- Understand paper property and testing methods
- Comprehend key media properties for achieving good color printing performance for electrophotographic and ink jet printing

Intended Audience: anyone seeking an introduction to papermaking and paper coating fundamentals, and who wants a better understanding of the relationship of media properties, performance for electrophotographic, and ink jet printing. No working knowledge of papermaking or coating techniques is presumed or required.

Sen Yang is currently a senior manager for Product Innovation with Avon Products. He spent 17 years with International Paper, Champion International, and Océ-Arkwright managing digital printing media R&D and new product development projects. He received his PhD in polymer science from Brown University (1990). Yang has led and contributed to a number of new-to-the-industry and commercially successful digital printing media launches for both private label and OEM brands. He has more than 10 patents in the area of coated ink jet, EP papers, and specialty media.

SC04-S1: Introduction to Toner Technology

Sunday 8:00 am – 12:00 pm (4 hours)

Instructor: George Marshall, Lexmark Int'l., Inc.

This course includes an introduction to electronic printing technologies and defines the place of electrophotography in its various embodiments. One common element—toner—is discussed in terms of architecture, formulation, and implementation in each of these embodiments. Also discussed are various toner design criteria and performance requirements. Analytical and measurement techniques are surveyed including size, shape, charge, and rheological attributes. Recent product introductions and future trends in toner technology are reviewed and presented. A glossary and bibliography for future reference are provided.

Benefits

This course enables an attendee 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 electrophotographic 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: anyone seeking an introduction to electrophotography, electrophotographic printing, supplies technology, or related development activities; an interest in toner or carrier is helpful, but no working knowledge of electrophotography is presumed nor required.

George P. Marshall is a member of senior technical staff at Lexmark International's Boulder, Colorado facility. He has been involved in many aspects of printer and copier development, including development of toner formulations for IBM and Lexmark printers, and is a recognized figure in the area of electrophotography and supplies-related disciplines. Marshall received a PhD in organic chemistry from the University of Arizona (1978), and worked for IBM's Office Products Division from 1978 until 1991, at which time a divisional sale created Lexmark. He has worked in the toner development group since 1978. Marshall has served on the IS&T Board of Directors, edited several IS&T books, and is a member of the Particulate Science and Technology: An International Journal Editorial Review Board. In 1996, he received Lexmark's highest employee honor: Customer for Life Award.

SC05-S1: Charging Systems and Dependent Processes in Electrophotography

Sunday 8:00 am – 12:00 pm (4 hours)

Instructor: Kenneth Pietrowski, Xerox Corp. (retired)

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 in the xerographic process. The system type, functional requirements, and operational modes can be quite different in delivering performance for each process step. This course addresses the applied principles of operation necessary to meet the process requirements including the associated critical parameters. Devices employed since the invention of xerography are reviewed and include biased charging and transfer rolls as well as interesting novel charging system concepts that have yet to be implemented in products. The application dependent requirements and supporting analysis in the form of examples will be discussed with a stronger focus on photoreceptor charging and the practical aspects of dealing with toner transfer challenges.

Benefits

This course enables an attendee 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 and failure modes governing performance in black and white and color xerographic engines
- 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
- Understand the issues and compensation measures employed in the toner transfer process that are dependent on toner characteristics, and transfer media electrical and dimensional properties

Intended Audience: 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 used in xerography.

Kenneth Pietrowski was a principal technology manager/specialist in the Wilson Center for Research and Technology at Xerox Corp. He joined Xerox in 1963 and worked in both R&D and product engineering environments addressing electro-optic image devices, thin film technology, and xerographic processes. He spent much of his last 29 years as a principal contributor in the development of charging and toner transfer systems appearing in many of today's xerographic marking engines. Pietrowski holds several patents in these disciplines. Before retiring in 2006, he managed a team of technologists and engineers focused on processes for future xerographic products and became a certified Green Belt in Design for Lean Six Sigma (DFLSS) practices. He was a member of IS&T, past member of the NIP Technical Council, and served as a session and publications chair at prior NIP conferences. Short courses on this topic and electrophotography were also presented at previous NIPs. He received a BS in electrical engineering from RIT.

SC06-S1: Organic Photoreceptors in Electrophotography

Sunday 8:00 am – 12:00 pm (4 hours)

Instructor: David Weiss, Eastman Kodak Co. (retired)

Organic photoreceptors are large-area photoelectric devices that are at the heart of today's digital electrophotographic printers. This short course provides the attendee with a comprehensive understanding of organic photoreceptors in this important technology. Topics include the history of OPCs, the electrophotographic process, OPC functions in copying and digital printing, device architecture and materials, characterization and testing, chemistry and physics, manufacturing, failure modes, current trends, and outlook.

Benefits

This course enables an attendee to:

- Understand the design and function of organic photoreceptors in an electrophotographic printer
- Be aware of photoreceptor interaction issues in the design of an electrophotographic system
- Appreciate the interplay between photoreceptor architecture and electrophotographic function
- Understand the relationship between chemical makeup and the function of the various layers in an organic photoreceptor

- Describe the technologies involved in the manufacturing and testing of organic photoreceptors
- Describe how organic photoreceptors are studied and characterized
- Understand the mechanisms of charge generation and transport in organic photoreceptors
- Identify photoreceptor failure modes and diagnose problems

Intended Audience: those interested in understanding the essential role of organic photoreceptors in modern digital electrophotographic printers will benefit from this course. It is anticipated that attendees will include students, sales and marketing personnel, technicians, engineers, and scientists. A general background in chemistry, physics, and the electrophotographic process will be helpful but not essential.

David S. Weiss recently retired as a Scientist Fellow at the Eastman Kodak Company. He received his PhD in chemistry from Columbia University (1969). His research focused on electrophotographic technologies with emphasis on organic photoreceptors. He holds 17 US patents and has authored more than 90 publications. He is co-author of Organic Photoreceptors for Imaging Systems (Marcel Dekker, Inc., 1993), Organic Photoreceptors for Xerography (Marcel Dekker, Inc., 1998) and he is co-editor of the Handbook of Imaging Materials, Second Edition (Marcel Dekker, Inc., 2002). He was an associate editor of the Journal of Imaging Science and Technology (1988–2008) and has served as General Chair of NIP17 and in many other NIP committee assignments. He is the sponsorship chair of NIP25/Digital Fabrication 2009. In 1999, he received the Chester F. Carlson Award, in 2004 he was named an IS&T Senior Member, and in 2008 he was awarded IS&T Fellowship. From 2006–2008 he served on the IS&T Board as a vice-president and since 2008 as Treasurer.

SC07-S2: HD Photo/JPEG XR in the Context of Modern Image Compression

Sunday 10:15 am – 12:15 pm (2 hours)
Instructor: Ilya Pollak, Purdue University

The first part of this short course is a general introduction to image compression. It describes a basic structure of an image encoder and discusses its desirable properties. It describes various transforms that have led to an assortment of image compression algorithms such as JPEG, JPEG2000 and HD Photo/JPEG XR. The second part is a more in-depth look at the HD Photo compression algorithm (also known as Windows Media Photo and JPEG XR) developed by Microsoft Corporation. It explains various aspects of the algorithm and, whenever possible,

discusses its modules in the context of the corresponding modules of the JPEG compression standard. The course concludes by presenting a comparative performance analysis of HD Photo, JPEG2000, SPIHT and JPEG, using both PSNR and the perceptual SSIM index as distortion metrics. A test image set of 300 and 600 DPI scanned, gamma-corrected images is included.

Benefits

This course enables an attendee to:

- Understand the basic structure of an image encoder and decoder
- Identify main classes of transforms used in image compression (DCT, wavelets, and lapped transforms)
- Understand the overall structure and various modules of HD Photo
- Learn about the performance of HD Photo, as compared to other image compression techniques

Intended Audience: scientists and engineers working in image processing or image quality evaluation for printers.

Ilya Pollak received his BS, MEng (1995), and PhD (1999) degrees in electrical engineering from MIT. From 1999–2000, he was a post-doctoral researcher in the Division of Applied Mathematics at Brown University. Since 2000, he has been with Purdue University, where he is currently associate professor of electrical and computer engineering. He has held short-term visiting positions with GE Global Research; BAE Systems Advanced Information Technologies (formerly Alphatech, Inc.); French National Institute for Research in Computer Science and Control (INRIA); Tampere University of Technology, Finland; and Jefferies, Inc. His current research interests include image and video compression, classification and segmentation; document image processing; and stochastic modeling of images, video, and time series. Pollak received an NSF CAREER award (2001), Eta Kappa Nu Outstanding Faculty Award (2002 and 2007), and a Chicago-Area Alumni Young Faculty Award (2003). He is an associate editor of IEEE Transactions on Image Processing and a co-chair of the SPIE/IS&T Conference on Computational Imaging.

SC08-S3: Electrostatics and Particle Adhesion in Electrophotography

Sunday 1:30 – 5:30 pm (4 hours)
Instructor: Dan A. Hays, consultant

Electrophotography is widely used in digital copiers and printers to produce high-quality documents for office and production markets. Over the years, continual advances in the technology have enabled high-speed printing and excellent image quality for both mono- and full-color printing. This

short course provides a foundation for understanding various electrostatics phenomena that are exploited in the electrophotographic process. The course serves as an introduction to electrostatics topics covered in other related short courses on electrophotography.

Benefits

This course enables an attendee to:

- Understand basic concepts regarding electrostatic forces, electric fields, electrostatic potential, and energy
- Comprehend the role of electrostatics in the electrophotographic process
- Describe different methods for charging or neutralizing an insulative layer
- Identify different methods for charging powder (toner)
- Describe techniques for measuring the charge on an insulative layer and powder
- Appreciate how the maximum electric field for air breakdown depends on the air gap and particle size
- Describe the importance of charged particle adhesion in electrophotography
- Explain model descriptions of charged particle adhesion due to Van der Waals and electrostatics forces for both uniformly, and nonuniformly charged particles
- Understand adhesion and electric field detachment measurement methods and results for triboelectric and ion charged particles

Intended Audience: technicians, engineers, scientists and managers involved in electrophotographic research and engineering. Familiarity with college-level physics is a recommended prerequisite.

Dan A. Hays is presently a Torrey Pines Research Fellow. He retired from the Xerox Corporation Wilson Center for Research & Technology in 2006 as a Senior Fellow. His contributions to the field of electrophotography have spanned the areas of triboelectricity, charged particle adhesion, and xerographic development systems. He has published 57 scientific papers and holds 72 US Patents. Prior to joining Xerox in 1968, he received a BS from Iowa State University and a PhD in physics from Rutgers University.

SC09-53: Advanced Digital Halftoning

Sunday 1:30 – 5:30 pm (4 hours)

Instructor: Jan P. Allebach, Purdue University

Digital halftoning, which creates the impression of continuous-tone, using marking processes that have finite spatial and amplitude resolution, is a fundamental step for virtually all printing technologies, ranging from small inkjet photo-printers

through office laser electrophotographic printers; to high-speed, digital dry- and liquid-toner presses, large-format, and industrial inkjet systems. The design of an effective halftoning algorithm is strongly impacted by the performance requirements, the available computational resources, the specific characteristics of the marking process, and the characteristics of the human visual system.

This course describes the basic principles of digital halftoning and the three major classes of halftoning methods: screening, error diffusion, and search-based. It discusses the impact of the human visual system on design of digital halftoning algorithms, how models for the marking process may be incorporated within this design, and the extension of halftoning algorithm design to color. The course shows how training-based strategies can leverage the quality of computationally intensive search-based methods into the design of much simpler algorithms that yield nearly the same level of image quality. The latter part of the course focuses on blue-noise masks and error diffusion algorithms that are widely used in inkjet products; periodic, clustered-dot supercell halftones that are widely used in laser electrophotographic products, and green-noise masks, which have potential applications with a range of printing technologies.

Benefits

This course enables an attendee to:

- Understand the basic concepts of digital halftoning
- Appreciate factors that influence the design of digital halftoning algorithms
- Characterize marking processes in order to parameterize models that can be used in the algorithm design
- Learn how to design blue-noise and green-noise masks; modern color error diffusion algorithms that are free from the artifacts commonly seen in error diffusion generated halftone textures; and clustered dot, periodic supercell halftone screens using rotated screens or non-orthogonal lattices to suppress moiré in color printing

Intended Audience: for individuals who want to learn the fundamentals of digital halftoning, and to become familiar with the current state of digital halftoning algorithm design. Attendees are presumed to have a basic knowledge of image processing and linear systems.

Jan P. Allebach is Hewlett-Packard Professor of Electrical

and Computer Engineering at Purdue University. His work on digital halftoning and image rendering algorithms has been licensed by major vendors in the printing industry and used in products, some of which have sold 100s of millions of units world-wide. Allebach is a Fellow of IEEE, IS&T, and SPIE. He has been Distinguished/Visiting Lecturer for the IEEE Signal Processing Society and IS&T, and has received four teaching awards while at Purdue. He received the Bowman Award from IS&T in 1998 and was named 2004 Electronic Imaging Scientist of the Year by IS&T and SPIE. In 2007, he was named Honorary Member of IS&T, the Society's highest honor. In 2008, he received the Purdue College of Engineering Mentoring Excellence Award and the Purdue Sigma Xi Faculty Research Award.

SC10-S3: The Top-Ten Myths of Digital Color Management

Sunday 1:30 – 5:30 pm (4 hours)

Instructor: Thomas E. Madden,
Eastman Kodak Company

Myths often evolve to explain what seems otherwise inexplicable and to support ideas people wish to believe. Color itself can seem quite inexplicable at times, and people strongly want to believe color images can be interchanged freely among systems. So it is not surprising that numerous myths have arisen regarding digital color management. While a few of these myths are relatively harmless, many have been detrimental to making real progress within the color imaging industry. Persistent myths have led to compromised systems and undesirable results that could have been avoided, and disagreements on relevant conceptual and technical issues have frequently derailed discussions on standards for color interchange.

This course examines and challenges a number of the more persistent and persuasive-sounding color-management myths. The intent is to set forth sound principles that can help avoid pitfalls and unnecessary complexity in color-imaging systems.

Benefits

This course enables an attendee to:

- Explain the difference between colorimetry and color appearance
- Describe the colorimetric relationships between original-scenes and reproduced color images
- List and describe the physical, psychological, and psychophysical effects that must be accounted for in color-managed systems
- Compare visual adaptation transformations with standard colorimetric calculations

- Relate the distinctions between perfect whites, whiter-than-whites, adaptive whites, and media whites in color-managed systems
- List and describe the factors that must be considered when selecting an appropriate color-encoding specification
- Understand the capabilities and limitations of device-independent and device-dependent color encodings

Intended Audience: scientists, engineers, and others interested in and involved with color imaging or color management products, devices, or systems will benefit from this class. Participants should have some familiarity with basic colorimetry and color imaging systems.

Tom Madden is a senior principal scientist in the Image Science Platform Center at Eastman Kodak Company. The holder of numerous color imaging patents, he is co-author of Digital Color Management: Encoding Solutions, now in its second edition, and a contributing author to several other textbooks in the field. Madden is an award-winning instructor in color and image science at Kodak, and has been an adjunct instructor at RIT. He is a contributor to numerous publications, and a frequent lecturer at technical symposia, universities, and industries in the US, Canada, and Europe.

SC11-S3: Chemical Toner

Sunday 1:30 – 5:30 pm (4 hours)

Instructor: Grazyna Kmiecik-Lawryniewicz,
Xerox Corporation

This short course on chemically prepared toners (CPT) enables participants to understand the nature of chemical toner technology in comparison with conventional grinding processes for making xerographic toners. It covers different chemical processes and raw materials used for preparation of chemical toners, as well as the history of CPT development. The course discusses current products with chemically prepared toners that are on the market and points out the advantages and disadvantages of chemical toners compared with pulverized toners in their performance and interaction with the xerographic systems.

Benefits

This course enables an attendee to:

- Understand the nature of the chemical toner process in comparison with the conventional grinding process
- Distinguish chemically prepared toners from pulverized toners
- 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 chemically prepared toner on the market and its potential future applications

Intended Audience: anyone seeking an understanding of the nature of chemically prepared toner (CPT) and its potential xerographic application. Some knowledge of xerography and chemistry is helpful, but not essential.

Grazyna Kmieciak-Lawrynowicz is a principal scientist for Xerox Corporation in Webster, New York. Her field is materials and process technology, where she is responsible for design and delivery of chemical toners for color printers and the design of polymeric carrier coatings. She received her MS in chemistry and chemical engineering from Warsaw Technical University and her PhD in chemistry from Rutgers University (1987). After completing post-doctoral studies at the University of Toronto, Kmieciak-Lawrynowicz joined Xerox Research Center of Canada (XRCC) in 1988. During her years at XRCC, she worked on a variety of projects related to chemical toners. In 1992, she pioneered work on emulsion aggregation (EA) toner for future color xerographic applications. In 1996, Kmieciak-Lawrynowicz transferred to Supplies Development & Manufacturing in Webster, where she worked on development of EA toner and the start-up of the manufacturing facility for commercial production of EA toners. She has authored 90 publications, including 73 US patents; is a recipient of three Xerox Eagle Awards for the highest number of patents (1994, 1997, and 1998); is a member of the American Chemical Society; and a Fellow of IS&T.

SC12-S3: Fusing Technologies and Toner Materials Relationships

Sunday 1:30 – 5:30 pm (4 hours)

Instructors: David Thompson, Xerox Corporation, and Dinesh Tyagi, Eastman Kodak Company

Most conventional electrophotographic printing systems require a fusing subsystem that takes the discrete toner particles and both fuses (coalesces) them together and fixes them to the media. This process is required to produce an attractive, durable image that is bonded tightly to the substrate. The first part of this course reviews the fundamental functions of fusing and details past and current fusing technology trends in the electrophotographic industry. The physics of each technology is discussed, with a specific focus on each technology's strengths and weaknesses. In the second part, the influence of toner components on fusing performance is described, including the underlying polymer architecture and viscoelasticity concepts that govern resin binder. Effect of pigments and other toner

additives is explained. In the last part of the course, the two to three most-common fusing technologies are discussed, covering the critical parameters and failure modes that govern each technology's operation, and the scientific and engineering challenges faced during both the technology and product-development cycles of a fuser.

Benefits

This course enables an attendee to:

- Identify and comprehend advantages and disadvantages of different fusing technologies that have been developed and used throughout the industry
- Understand the polymeric concepts that influence fusing and various considerations necessary in toner formulations
- Analyze the critical parameters that define the fusing process and latitude for common fusing technologies
- Determine the critical failure modes, and the critical parameters that govern them, for conventional fusers

Intended Audience: scientists and engineers in toner design as well as the selection, analysis, and evaluation of the numerous fusing technologies used in today's electrophotographic engines. A basic understanding of the electrophotographic process will be assumed; familiarity with the basics of heat transfer, and mechanics will be beneficial, but is not required.

David Thompson is currently the manager of the Print Process Integration and Fusing Systems group within the Xerox Research Center Webster. He joined Xerox in 1981 and has worked in all areas of toner based printing systems. He managed the development of the fusing systems on the 9700, 4850, 4890, 6180, and iGen3 product families. Thompson received an MS in product development from RIT and has degrees in mechanical engineering from the University of Rochester and the University of Cincinnati.

Dinesh Tyagi received his PhD from Virginia Tech (1985) from the Department of Chemical Engineering with a thesis titled "Structure-Property Relationships in Segmented Polymers." After a one-year post-doctoral position there, he joined Eastman Kodak Company as a research scientist where he has continued to work in the area of toner formulations and electrophotography. He was inducted into Kodak's Distinguished Inventors Gallery in 1994. In 1999, he joined NexPress Solutions, which was later absorbed back into Kodak. Tyagi has more than 80 patents worldwide.

SC13-S3: An Introduction to Digital Fabrication: Methods, Materials, and Applications

Sunday 1:30 – 3:30 pm (2 hours)

Instructor: James W. Stasiak,
Hewlett-Packard Company

During the past decade, there has been a remarkable convergence of two disparate technologies: digital printing of text and images and the fabrication of physical objects. This convergence, a blending of traditional printing methods with recent advances in materials science and with established manufacturing methods, has brought about the foundation of a new technology: digital fabrication. Already, digital fabrication approaches are enabling new discoveries at the laboratory bench and are beginning to provide new efficiencies and unprecedented product customization on the manufacturing floor. In the near future, digital fabrication methods—along with the development of “functional inks”—will make it possible to print complete electronic circuits, optical devices, mechanical structures, and even new biological materials. The objective of this short course is to provide an introduction to the rapidly emerging science and technology of digital fabrication. The course includes an up-to-date overview of the methods, materials, and processes that are reshaping manufacturing and enabling new commercial applications in electronics, MEMS, and the life sciences. Finally, the class examines factors that are moving digital fabrication from a niche technology toward a new manufacturing paradigm.

Benefits

This course enables an attendee to:

- Develop an understanding of different digital fabrication methods and materials
- List and compare different applications that range from printed electronics to the life sciences
- Evaluate the technological issues and challenges of digital fabrication
- Develop an understanding of the technology landscape, key players, and practitioners
- Recognize the market opportunities addressed by this emerging technology

Intended Audience: this is a survey course for engineers, scientists, and technical marketing professionals who are working or are interested in digital fabrication and printed electronics.

James Stasiak is currently a principal scientist in Hewlett-Packard's Technology Development Laboratory in Corvallis, Oregon. He is actively involved in developing new digital fabrication methods and applications. In a career spanning more than 30 years, he has made contributions in the fields of device physics, molecular electronics, non-impact printing technologies, and, more recently, the emerging fields of flexible electronics and digital fabrication. In 2005 and 2006, he served as the General Chair for the Digital Fabrication Conference and now serves on the Digital Fabrication Conference Advisory Committee. He holds more than 14 issued US patents and is the author or editor of numerous technical articles and proceedings.

SC14-S4: Fabrication Materials and Processes of Ink Jet Printheads

Sunday 3:45 – 5:45 pm (2 hours)

Instructor: Hue Le, Picojet, Inc.

In recent years, enormous progress has been made in the design, fabrication, and commercialization of ink jet printing systems. This course describes the materials and processes that have been used to produce various ink jet printheads, which are the core component of the printing systems. 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 discussed. The course concludes with a review of the current status of MEMS technology in the ink jet printheads from various manufacturers.

Benefits

This course enables an attendee to:

- 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
- Evaluate insights into the potentials and limitations of different types of printheads

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

Hue Le is the CEO/President of PicoJet, Inc. (Hillsboro, Oregon), which designs and fabricates fluid jetting devices for industrial printing applications. He has more than 28 years of experience in developing and commercializing ink jet printing systems. Le holds 20 US patents in the field of ink jet printing technology. Prior to

forming Picojet, Inc. in 1997, Le held the position of director of technology development for Tektronix, Inc.'s Printing and Imaging Division. He received his BS in chemistry from the University of Iowa (1979) and MS in chemistry from New Mexico State University (1981).

Monday, September 21, 2009

SC15-M1: Industrial Inkjet Technology for Printing and Fabrication

Monday 8:30 am – 12:30 pm (4 hours)

Instructor: Alan Hodgson,

3M Security Printing & Systems Limited

This course bridges the NIP and Digital Fabrication conferences and therefore examines ink jet technology for both traditional printing and emerging fabrication applications. It achieves this by summarizing how the key elements of industrial ink jet technology (printers, heads, inks, and media) have developed, showing how this knowledge can be used in fabrication applications. Using case studies, it considers the commercial and technical drivers and their contribution to the future direction of application development. It also compares and contrasts the developments in printing and fabrication areas, but shows the interdependence between them.

Benefits

- List and explain the commercial and technical drivers for industrial ink jet in both printing and digital fabrication application areas
- Gain awareness of how printers, heads, fluids and substrates interact to make an ink jet printing system
- Gain an overview of current and future applications of industrial ink jet technology
- Summarize the technology of ink jet printing and how this can be leveraged to best effect in the future
- Be aware how new technology is affecting both fabrication and “traditional” printing applications
- Identify the shows and conferences to attend to gain further awareness

Intended Audience: engineers, scientists and students. It is suitable for those working in organizations considering accessing new opportunities in industrial ink jet either as a supplier or a user. It is particularly appropriate for participants who are considering the further potential of ink jet and would like an overview of the relevant ink

jet technologies in both traditional printing and fabrication applications. As such it aims to be equally accessible to the target audiences of the NIP and Digital Fabrication conferences.

Alan Hodgson has 27 years experience in printed hard-copy and a background in radio frequency electronics and image science. With a combined marketing and technical background he can give technical issues a commercial perspective. He previously managed R&D and Technical Services groups active in industrial ink jet application development. For the last four years he worked on ink jet consultancy projects in both traditional printing and fabrication applications. In November 2008, he joined the Technology & Innovations group of 3M Security Printing & Systems Limited and continues to be a regular conference speaker and instructor. Hodgson has a BSc in colorant chemistry and a PhD in instrumentation, both from the University of Manchester. He is a Fellow of the Royal Photographic Society (RPS) as an Accredited Senior Imaging Scientist. In addition to IS&T, he is active in the RPS and Institute of Physics as a speaker and session chair. He is also a member of the NIP25 conference committee.

SC16-M2: Liquid Toner Printing: Technology and Applications

Monday 9:30 – 11:30 am (2 hours)

Instructor: George Gibson, Xerox Corporation

Liquid toner technologies have long been held as versatile methods for imaging in a variety of applications. Known for high image quality, especially high-quality color, liquid toners are undergoing a renaissance. Applications of current import include not only document printing, but a number of industrial printing, display, and fabrication applications. This course covers 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 employed. The course includes an analysis of improvements of liquid toner systems found in recent technical literature and patents. Much of this material is new and has not been included in previous versions of this course.

Benefits

This course enables an attendee 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

- Identify the major market applications where liquid toners are used today
- Learn about recent innovations in liquid toner technology

Intended Audience: technical professionals who want to become more knowledgeable about liquid toner printing technology.

George A. Gibson is the program manager for New PII Platforms in the Xerox Research Center Webster of the Xerox Innovation Group. He has led research, development, and manufacturing organizations involved in non-impact printing for more than 20 years. Originally trained as a chemist, he did his undergraduate and graduate work at Binghamton University. He also holds an MBA from the University of Rochester's Simon Graduate School of Business. Gibson has 52 US patents and has written more than 20 published papers in imaging and colloid science and the management of research and development. He is a frequent lecturer in imaging technology, R&D productivity, portfolio management, and technology valuation. Recent invited lectures include "Good, Fast Cheap in New Product Development: Don't Settle for Just Two," and "Creative Destruction: Portfolio Renewal Rate and Returns Optimization." He is the author of a forthcoming book Finding the Golden Eggs: An R&D Professional's Guide to Managing New Product Development Through Valuation.

SC17-M3: Electrostatic Toner Transfer

Monday 1:30 – 5:30 pm (4 hours)

Instructor: Mark Zaretsky, Eastman Kodak Company

An important and potentially quality-limiting step in all electrophotographic machines is the transfer of toner from photoconductor to receiver. Achieving high-quality toner transfer via electrostatic forces requires an understanding of toner design (to produce optimally charged toner and to minimize surface adhesion forces), and electrostatic field generation (to maximize electrostatic forces at the appropriate location and to minimize unwanted ionization). Commercial implementation of this technology may be found in a wide variety of configurations. 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, explanations and models of the key mechanisms affecting dry-toner transfer provide a foundation for understanding transfer subsystem design and performance, its interactions with other subsystems, and the importance of various noise factors. Throughout the course, examples are drawn from many practical transfer subsystems.

Benefits

This course enables an attendee to:

- Understand basic electrostatic concepts related to transfer
- Comprehend the operation of various electrostatic transfer technologies
- Explain the important mechanisms governing electrostatic toner transfer
- Identify noise factors and material properties that affect electrostatic 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: engineers, scientists, and managers involved or interested in electrophotographic research, development, or commercialization. Familiarity with the electrophotographic process and college-level physics are recommended.

Mark C. Zaretsky, senior electrophotographic engineer at Eastman Kodak Company, received his BS (1980), MS (1982), and PhD (1988) in electrical engineering from MIT. He has worked in the area of electrostatic technology at Kodak since 1982. At present his work focuses on electrophotography, including toner transfer and corona charger technology. He also has considerable experience in the design and manufacture of photographic and non-photographic products from an electrostatic perspective, involving material composition, coating and conveyance technology, and customer usage. He holds 20 US patents and has authored 10 peer-reviewed papers. He received the IS&T Charles Ives Award in 1995 as a co-author. He has been the newsletter editor for the Electrostatics Society of America since 2003.

SC18-M3: Aging of Developers and OPCs in Electrophotographic Systems-Causes and Cures

Monday 1:30 – 5:30 pm (4 hours)

Instructors: David Weiss, Eastman Kodak Company (retired), and Robert Nash, Xerox Corporation (retired)

In the electrophotographic process, an image is produced on the organic photoreceptor (OPC) in the form of a surface charge pattern and this pattern is visualized by attracting charged marking particles (toner) to either the charged or uncharged areas of the OPC. The performance of electrophotographic systems depends upon the rate of deterioration of these key system components. This is especially important for full-color digital xerographic imaging, where individual C, M, Y, and K marking modules may each have a unique aging profile.

The first hour of the course features discussions of the OPC aging phenomena. Topics include descriptions of how and why the OPC ages and approaches, which have been used to minimize aging. The remaining three hours are devoted to a discussion of aging phenomena of dry xerographic developers. Experimental approaches for characterizing and understanding developer and toner life are discussed in terms of the many relevant factors: process dynamics, modes of development (TCD, SCD, etc), developer formulation (carrier coatings, toner CCAs, external additives, etc.), humidity, toner throughput, toner flow, etc.

Benefits

This course enables an attendee to:

- Understand the key factors that influence aging in developers, toners and OPCs
- Evaluate strategies for the minimization of the rate of aging
- Appreciate the evaluation methodologies for electrophotographic developers and OPCs
- Learn how aging of developers, toners and OPCs affects the entire electrophotographic process

Intended Audience: those interested in obtaining an in-depth understanding of aging phenomena in electrophotographic developers and OPCs will benefit from this course. Students, sales and marketing personnel, technicians, engineers, and scientists may also benefit. A general knowledge of the electrophotographic process is assumed; some background in chemistry and physics is helpful, but not essential.

David S. Weiss, see bio under SC06-S1.

Robert Nash received his PhD 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 to 2000, he was at Fuji Xerox in Takematsu, Japan, as the senior manager resident for the Xerox Supplies Development, Manufacturing, and Supply Chain Operations organization. Nash retired from Xerox in early 2002, and currently consults on a variety of subjects, ranging from xerographic materials to cross-cultural interactions with Japan. Starting with NIP 4 (1988), he has presented the results of his studies yearly. In 1990, he served as publication chair for NIP6; in 1992 he was chair of the IS&T Honors & Awards Committee. Nash is an IS&T Fellow. He received the Chester F. Carlson Award (2002) with his long-time colleague, J. T. Bickmore.

SC19-M3: Introduction to Biofabrication

Monday 1:30 – 5:30 pm (4 hours)

Instructor: Thomas Boland, Clemson University

Digital and non-impact printing has found new applications in non traditional disciplines, such as MEMS and bioengineering. By exploiting non-impact printing approaches and new materials, it has become possible to pattern two- and three-dimensional structures that are biologically active. This course provides an introduction to the emerging science of biofabrication. It covers established and new digital fabrication methods, new materials, and processes that enable fabrication and manufacture a broad range of biologically active devices, systems, and structures.

Benefits

This course enables an attendee to:

- Identify different digital fabrication methods and biomaterials
- List and compare different digital fabrication methods with application in the life sciences
- Evaluate the technological issues and challenges of digital fabrication processes and materials
- Understand the technology landscape, key players, and practitioners

Intended Audience: engineers and scientists working in or interested in entering the interface of printing and life sciences.

Thomas Boland is an associate professor in the Department of Bioengineering at Clemson University. He received his BS in chemical engineering from the Ecole Nationale Supérieure d'Ingénieurs de Genie Chimique in Toulouse (1990), and his PhD in chemical engineering from the University of Washington (1995). Following his PhD, Boland was a Postdoctoral Fellow at Pennsylvania State University and then at the Naval Research Laboratory. In 1999, he joined Clemson University as assistant professor, where he received tenure in 2005. Boland is an adjunct associate professor at the Medical University of South Carolina's College of Graduate Studies and is the director of a NSF/NIH-funded Bioengineering and Bioinformatics Summer Institute. His research interests are applying engineering principles to automate, predict, and build three-dimensional structures that show biological function. He is the author of more than 45 publications; a member of AVS, MRS, IS&T, and the Tissue Engineering and Regenerative Medicine International Society.

Tuesday, September 22, 2009

SC20-T1: Improving Your New Product Success Rate

Tuesday 9:30 – 11:30 am (2 hours)

Instructor: George Gibson, Xerox Corporation

Studies of new technology ventures and new produce success rate show alarmingly poor performance whether they come from new companies or established industry leaders. If the criteria of success includes a new offering that lives up to or exceeds its revenue projections or is judged by the continuing existence of a new technology venture three or five years from inception, success rates are as low as 10%. Whether you are in a large or small company, the question of which products or services to develop and bring to market is critical to success. This course explores what is known about the causals for this dismal track record and suggests a path that can lead to improved results.

The course includes techniques, procedures, and guidelines that allow one to select the new offerings for development that are most likely to be successful, as well as offers techniques for ensuring that new products or services under development stay on track.

Each participant will receive a copy of Gibson's forthcoming book *Finding the Golden Eggs: An R&D Professional's Guide to Valuation*.

Benefits

This course enables an attendee to:

- Recognize the critical warning signals of impending new product development failure and success
- Structure an analytical and operational process, which allows improved targeting of continuing oversight of your new product development projects, to make sure they are headed for success
- Choose among the bewildering array of market investigation techniques to help understand, which is most appropriate for your new product development project
- Go beyond just talking about the customer's current wants and needs to being able to understand those latent, unarticulated needs that are so often the source of real blockbusters
- Understand how to use the metrics of finance to communicate the value of your new product development efforts and to use that insight to help shape your work

Intended Audience: technical professionals and managers who want to improve the success rate of their new product development efforts.

See bio under SC16-M2.

SC21-T1: Desktop Ink Jet Products Performance Study

Tuesday 9:30 – 11:30 am (2 hours)

Instructor: Rob Beeson, Hewlett-Packard Co.

This short course examines products from HP, Canon, Epson, Lexmark, Brother, Kodak, and Ricoh. Print head performance parameters and ink/media interactions are discussed with appropriate reverse engineering data from the HP labs. A few examples of how ink jet compares with competing technologies, such as dye diffusion thermal transfer, laser, and ZINK are

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discussed. The latest Memjet public information is included.

Benefits

This course enables an attendee to:

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

Intended Audience: for those somewhat familiar with ink jet printing technology who 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 Company. He has held several management and engineering positions in thermal ink jet technology since 1985, and is currently the R&D Competitive Intelligence Team Leader. He holds 12 ink jet patents. He has a BS/MS in mechanical engineering from Colorado State University and has worked with several divisions in HP since 1966.

SC22-T1: Security in Documents and Packaging

Tuesday 9:30 – 11:30 am (2 hours)

Instructor: Annette Jaffe, consultant

This short course covers a wide range of security devices, the technologies they encompass—ranging from optical security features to classic features such as watermarks—and how they protect documents. The class explores how digital technology has changed the problems and solutions for documents and packaging.

Benefits

This course enables an attendee to:

- Learn the basic security devices and how they are used
- Explore the advantages/disadvantages of security devices
- Learn how digital reproduction technologies such as ink jet and electrophotography can/cannot reproduce them and how security is affected
- Evaluate packaging materials and how they operate with security devices
- Speculate on the future of security for printed materials

Intended Audience: anyone who would like to get comprehensive information on security devices, how they work, and how they are used.

Annette Jaffe has been working in the fields of imaging, non-impact printing, and anti-counterfeiting for more than 30 years. She has worked for IBM Research, Apple Computer, and Texas Instruments. Jaffe was appointed to the National Academy of Sciences committee on Next Generation Currency Design, which resulted in the newly designed, difficult-to-counterfeit big-head and colored banknotes. She received her BA from Douglass College and her MPhil and PhD from Yale University. Currently, she is a consultant in the field of digital anti-counterfeiting, digital color imaging, and security printing for clients that include the US Bureau of Engraving and Printing (BEP), the US Secret Service, and the US Federal Reserve Bank. She is based in San Jose, CA.

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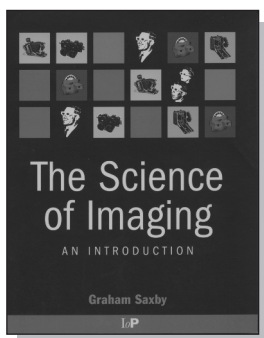
Booklet containing abstracts of all the papers from both conferences, with the full technical papers on CD.

One of the above is included in your registration fee, but you must indicate the format you prefer. Those who do not indicate a preference will be given the Abstract book with CD. Additional copies of both formats are available for advance/onsite purchase at a special price.

We will also offer single CDs at a special price for those who choose the hardcopy book and want a CD as well. See the registration form on page 36 for details.



Special Offers

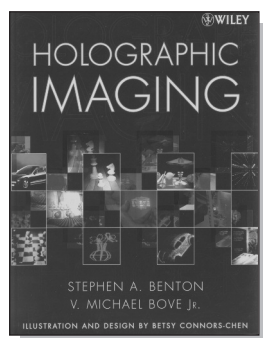


The Science of Imaging: An Introduction

by Graham Saxby
(list price: \$60)
ON SALE for \$45

Holographic Imaging

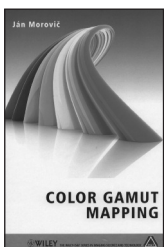
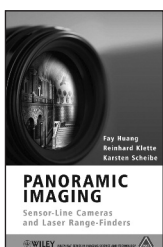
by Stephen A. Benton and
Michael Bove, Jr.
(List Price \$106)
ON SALE for \$80



To get these prices you must call or fax
your order to imaging.org.

CHOOSE ANY ONE OF THESE IS&T/WILEY SERIES TITLES FOR \$90

RECENTLY RELEASED!



Color Appearance Models, 2nd Edition

by Mark D. Fairchild
list price \$150

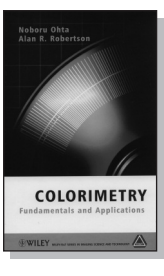
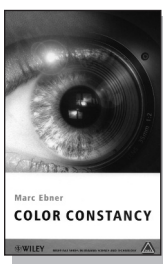
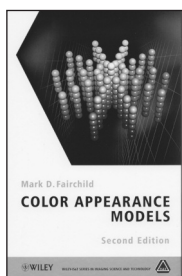
Color Constancy

by Marc Ebner
list price \$150

Colorimetry: Fundamentals and Applications

by Noburu Ohta and Alan Robertson
list price \$130

MORE ON COLOR



Color Gamut Mapping

by Jan Morovic
list price \$130

Digital Color Management: Encoding Solutions

Edward J. Giorgianni and Thomas E. Madden
list price \$140

Panoramic Imaging: Sensor-Line Cameras and Laser Range-Finders

Fay Huang, Reinhard Klette, and Karsten
Scheibe
list price \$150

To get these prices you must call or fax your order to imaging.org.

The Venue: Louisville, Kentucky

NIP25/Digital Fabrication 2009 will take place at the Galt House Hotel and Suites in downtown Louisville, Kentucky. For information on how to reserve your room at the Galt House, see the registration form on page 35.

Set on the banks of the Ohio River and recently rated one of the top 20 US cities in which to live in, Louisville is home to the world famous Kentucky Derby and Louisville Slugger baseball bats, as well as the Muhammad Ali Center, the Kentucky Museum of Art and Craft, and the Frazier International History Museum. The downtown area offers a delightful mix of street art, original 19th Century cast iron building facades, contemporary architecture, a waterfront park, and great restaurants—all within easy walking distance of the Galt House. For more information on the city, and help planning your trip, visit www.gotolouisville.com.

Beyond Louisville, the horse farms of Lexington and the bourbon distilleries of the surrounding countryside make good side trips.

Louisville is located 1.5 hours from Cincinnati via car and 2 hours from Indianapolis. There are non-stop flights from numerous US cities to Louisville International Airport (SDF) in-

cluding from Atlanta (ATL), Baltimore (BWI), Charlotte (CLT), Chicago (MDW and ORD), Dallas (DFW), Detroit (DTW), Houston (IAH), Las Vegas (LAS), Minneapolis (MSP), Newark (EWR), Philadelphia (PHL), Phoenix (PHX), and Washington, DC (DCA). Flight information can be found at www.flylouisville.com and a very good interactive map of routes within the US can be accessed at <http://louintlairport.innosked.com>. The airport is located just 7 miles from downtown.

Louisville's average daytime temperature in September is 70°F/21°C.

Transportation Notes

See the bottom of the hotel reservation page for information on taxis and shuttle services. Trolley: A trolley runs every 12-20 minutes from 7:10 am to 10:15 pm (except Sunday) along 4th Street, the location of the Galt House. There are other trolley routes as well, that can be found on the trolley kiosk, located outside the Galt House. The cost is \$0.50/trip.

Parking

Parking is available at the hotel for \$12/night self-park and \$18/night valet, both with in/out privileges.

NIP 25/Digital Fabrication 2009 Exhibitors*

The exhibit hall will be open on Tuesday, September 22th from 10:00 am to 6:30 pm and Wednesday, September 23rd from 9:30 am to 4:00 pm. Please visit these exhibitors:

7-SIGMA, Inc.
 Baker Hughes
 Cabot Corporation
 Ciba Corporation
 Clariant Corporation
 Diamond Dispersions Ltd.
 Digital Print CIC
 Epping GmbH
 Esprix Technologies
 Evonik Industries
 Fenner Precision
 FUJIFILM Dimatix, Inc.
 Fuji Silysia Chemical, Ltd.
 Grace Davison
 Hodogaya Chemical (U.S.A.) Inc.
 Hosokawa Micron Powder Systems
 Huntsman Corporation
 ImageXpert
 imaging Technology international
 Corporation (iTl)

Integration Technology , Ltd.
 Membrana
 Orient Chemical Industries
 Pall Corporation
 Powdertech International Corp.
 Quality Engineering Associates
 (QEA), Inc.
 Roger's Hill Associates, Inc.
 Sensient Technologies
 TAYCA CORPORATION
 TREK, INC./TREK JAPAN KK
 TSI Incorporated
 UniJet Co., Ltd.
 Wacker Chemie AG

For further information about exhibiting contact
 Donna Smith at dsmith@imaging.org or
 703/642-9090 x107

*as of June 9, 2009

NIP25/DF 2009 Hotel Registration

A special block of rooms at a discounted rate is being held at the **Galt House Hotel and Suites** for the nights of September 18-25, 2009. The discounted rate is available for 3 days prior to and 3 days after these dates, based on availability. Early reservations are assigned on a priority basis to conference attendees provided they are received by **August 28, 2009**. To guarantee a room, a credit card number or deposit equal to one night's housing must accompany the reservation request.

Reservations may be made by calling the hotel at 1-800-843-4258 or +502/589-5200 and telling them you are with the Society for Imaging Science and Technology Group or IS&T NIP25/DF09, or by faxing this form to +502/585-9029.

For on-line reservations, visit

<https://reservations.ajshotels.com/redirect.do?groupNumber=973696&cid=71407001>.

Important notes: The online reservation system does not work with Macs. If you are registering online from outside the US, please use Internet Explorer and set the language to English.

We apologize for this inconvenience.

Reservations Deadline: August 28, 2009

Galt House Hotel and Suites

www.galthouse.com

140 North 4th Street • Louisville, KY 40202

502/589-5200; 502-585-9029 fax

First/Given Name _____ Family Name _____

Title/Position _____ Company _____

Mailing Address _____

Telephone _____ Fax _____ Email _____

Arrival Date and Time _____ Departure Date _____

Single (\$155) Double (\$165) Quad (\$175)

I would prefer: King-size bed Two Queen-size beds (bed configuration is not guaranteed)

—Rates are per room and include WIRELESS Internet access; the current tax on rooms is 15.01%—

—Each room is comprised of a living room space with desk, wet bar, fridge, and coffee maker; a hallway with bath; and a bedroom; most living rooms have pullout beds; call for details—

Check in is 3:00 pm. Check out is 11:00 am.

There is no charge for children under 16 years of age when sharing a room with a parent with the existing bed configuration.

List any special needs: _____

Deposits can be made by a major credit card.

Payment Method: AMEX MC VISA Discover

Card#: _____ Exp. Date: _____

Name as it appears on card: _____

Authorization Signature: _____

Early Departure Fee In the event a guest checks out prior to the guest's reserved checkout date, the hotel will add an early checkout fee of \$25.00 to the guest's account. Guests wishing to avoid this fee should advise the hotel at or before check-in of any change in planned length of stay.

Notice of Cancellation must be given to the hotel 48 hours in advance of arrival date to receive a full refund of deposit.

To/From Louisville International-Standiford Field Airport (SDF)

Information on flights in/out of SDF can be accessed via the airport's Website at www.flylouisville.com.

Transportation Notes: The taxi waiting area is located on the traffic island to the left of the taxi stand (follow signs to ground transportation within the airport). Cost is approx. \$18 + tip/one way. Sandollar Limousine provides pre-arranged shuttle service to the hotel for \$25/roundtrip or \$15/one-way between 7:00 am – 8:00 pm. Please visit their website at www.sandollarlimo.com or call 1+502-561-4022 to make arrangements.

NIP25/DF 2009 Technical Registration

First/Given Name _____

Last/Family Name _____

Title/Position _____

Company _____

Mailing Address _____

Telephone _____ Fax _____

Email _____

Conference registration includes:

admission to all technical sessions for both conferences; a choice of conference proceedings; entrance to the exhibit hall; coffee breaks; the Welcome, Conference, and Farewell Receptions; and lunch on Thursday. **Separate registration fees are required for short courses.**

Guest/spouse registration includes:

breakfast on Monday, and the Welcome, Conference, and Farewell Receptions

To help ensure adequate space in session rooms indicate the days you plan to attend:

Mon Tues Wed Thurs

Please circle the session you plan to attend most:

NIP Track 1 NIP Track 2 NIP Track 3 Digital Fabrication

Print Sample Gallery Reservation: Are you bringing sample prints to display? If so, please indicate area needed: 2' x 4' or 4' x 4'

Conference Registration (CHECK ONE)	until 8/23	after 8/23	TOTAL
<input type="checkbox"/> IS&T/ISJ Member	\$650	\$750	\$ _____
<input type="checkbox"/> Non-member	\$750	\$850	\$ _____
<input type="checkbox"/> IS&T/ISJ Speaker/Session Chair Member	\$550	\$650	\$ _____
<input type="checkbox"/> Speaker/Session Chair Non-member	\$650	\$750	\$ _____
<input type="checkbox"/> IS&T/ISJ Student (ID required) Member	\$175	\$225	\$ _____
<input type="checkbox"/> Student (ID required) Non-member	\$200	\$250	\$ _____
<input type="checkbox"/> One-day	\$390	\$440	\$ _____

Proceedings Choice (one copy comes with your registration; check the version you'd like)

- NIP/DF Abstract Book with CD (see page 32 for details) NC
- NIP/DF Hardcopy book (see page 32 for details) NC

Extra proceedings; Advance and onsite copies only \$120/each \$ _____

(indicate number of each and multiple by special advance purchase/onsite price)

NIP/DF Hardcopy book NIP/DF abstract book with CD

Extra CD (without abstract book; only available as addition to Hardcopy selection/purchase)

Copy of NIP/DF CD \$80/each \$ _____

Page Subtotal \$ _____

continued on next page

Contact Donna Smith (dsmith@imaging.org) for Exhibitor Registration and Information

NIP24/DF 2008 Registration page 2

Short Course Registration

(multiply number of classes by per course fee; students may register for \$50/class (multiple class 20% discount does not apply))

	Member	Non-member	
2-hour (add \$35/class after 8/10)	\$155	\$190	\$ ____
Check all that apply: <input type="checkbox"/> SC02-S1 <input type="checkbox"/> SC07-S2 <input type="checkbox"/> SC13-S3 <input type="checkbox"/> SC14-S4			
<input type="checkbox"/> SC16-M2 <input type="checkbox"/> SC20-T1 <input type="checkbox"/> SC21-T1 <input type="checkbox"/> SC22-T1			

4-hour (per class; add \$20/class after 8/10)	\$230	\$265	\$ ____
Check all that apply: <input type="checkbox"/> SC01-S1 <input type="checkbox"/> SC03-S1 <input type="checkbox"/> SC04-S1 <input type="checkbox"/> SC05-S1			
<input type="checkbox"/> SC06-S1 <input type="checkbox"/> SC08-S3 <input type="checkbox"/> SC09-S3 <input type="checkbox"/> SC10-S3 <input type="checkbox"/> SC11-S3 <input type="checkbox"/> SC12-S3			
<input type="checkbox"/> SC15-M1 <input type="checkbox"/> SC17-M3 <input type="checkbox"/> SC18-M3 <input type="checkbox"/> SC19-M3			

OR

Take three or more and receive 20% off the total price

(enter three or more short course numbers, fill in member or non-member price next to each, add together, and multiply by .80 to get your price; add additional lines if needed)

SC ____ \$ ____ + SC ____ \$ ____ + SC ____ \$ ____ = \$ ____ x .80 = \$ ____

Membership	US address	Non-US Address	
__ IS&T half-year membership (<i>new members only; expires 12/09</i>)	\$47.50	\$52.50	\$ ____
__ IS&T 18-month membership (expires 12/31/10):	\$142.50	\$157.50	\$ ____
__ IS&T membership renewal (expires 12/31/10):	\$95	\$105	
__ Student membership (expires Sept. 30, 2010)	\$25	\$25	\$ ____

join now and calculate fees based on member rates

Other		
__ Guest/spouse registration (Name: _____)	\$100	\$ ____
__ Extra Welcome Reception Ticket	\$40	\$ ____
__ Extra Conference Reception Ticket	\$55	\$ ____
__ Extra Farewell Reception Ticket	\$15	\$ ____

Subtotal from previous page \$ ____

GRAND TOTAL \$ ____

Payment Method: Check (Check # _____) AMEX MC VISA Discover

(to arrange for a bank transfer, contact registration@imaging.org)

Card#: _____ Exp. Date: _____

Name as it appears on card: _____

Authorization Signature: _____

Return this form with signed credit card authorization or check payable in US dollars to

IS&T, 7003 Kilworth Lane, Springfield, VA 22151

fax to 703/642-9094

or register online at www.imaging.org/conferences/nip25 or /df2009

Please note: To cover bank charges and processing fees, there is a cancellation fee of \$75 until September 15, 2009. After that date, the cancellation fee is 50% of the total plus \$75.

All requests for a refund must be made in writing. No refunds will be given without a written request after October 15, 2009.

Digital Fabrication 2009/NIP25



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7003 Kilworth Lane
Springfield, VA 22151 USA
703/642-9090; 703/642-9094 (fax)

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Join us in Louisville
September 20-24, 2009!