

Digital Fabrication 2008



REVISED PRELIMINARY PROGRAM

**September 6-11, 2008
Pittsburgh, Pennsylvania**



NIP24

**24th International Conference on
Digital Printing Technologies**



Sponsored by the
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Please note: This is a revised edition of the preliminary program. The previously released version incurred some errors during the printing process. Please discard that copy and keep this one. Also, please note that the following individuals have confirmed their participation in the Digital Printing Panel Discussion scheduled for Thursday afternoon:

- Steve Simske, Principal Scientist in Security Printing and Imaging, Hewlett-Packard Labs
- J. Page Crouch, Alumni Professor Emeritus of Graphic Communications, Clemson University, and President, Print Education & Training, LLC
- Maynard Benjamin, President and CEO, Envelope Manufacturers Association (will also present a paper in the session)
- Hugh Allen, Sunjet
- Shiriram Revankar, Xerox Fellow leading research in Digital Production Applications, Xerox Corporation

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Join us in Pittsburgh for NIP24 and Digital Fabrication 2008!

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 advances in technology and/or to expand your professional network, NIP24 and Digital Fabrication 2008 are the conferences to attend!

We've made some changes to the program this year; please take a moment to read this notice to find out what is new.

Two days of short courses followed by four FULL days of technical sessions and networking events: The quality and breadth of the technical papers remains the same, but this year we've decided to end the conference on Thursday—a stimulating and engaging content-packed day that includes:

- Four tracks of technical sessions;
- The Interactive Paper Session with lunch provided;
- A special panel discussion on Digital Packaging;
- An exciting afternoon plenary; and
- A Farewell Reception for one last round of networking opportunities.

See details of the whole week beginning on page 3.

Exhibit Social Hour: Tuesday evening join colleagues for beer and chips on the exhibit hall floor.

Special pre-conference Short Course on Digital Packaging: Learn about packaging workflow and production, including package design processes, software usage, basic manufacturing processes, equipment requirements of packagers, customization and variable data printing needs, and what packaging buyers are looking for in new and useful features. See page 21 for details.

In addition to the new features, this year will continue the great traditions of

- a rich array of informative short courses with a *25% discount given to those who take three courses or more and \$50 course fees for students*
- high-quality exhibits
- five timely keynotes
- informative technical papers grouped into four daily tracks
- an interactive panel on the Environmental and Reliability Challenges of Electrophotographic and Ink Jet Printing
- the annual Intellectual Property panel
- the Welcome Reception at the Westin Hotel and the Conference Reception at the Heinz History Center
- the Print Gallery
- a single fee that gives you access to the full conference program (separate fee required for short courses)

We look forward to seeing you in Pittsburgh!

—Detlef Schulze-Hagenest, General Chair NIP24
Ross Mills, General Chair DF2008

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Technical and Social Program

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

SPECIAL EVENT

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

NIP/DF Welcome Reception
Sunday, September 7
5:30–7:00 pm

Monday September 8, 2008

PLENARY SESSION

Session Chair: Dettel Schulze-Hagenest,
Kodak Graphic Communications GmbH

8:30 - 9:30 AM

Evolution and Regulatory Impact of External Additives in Toners, presented by Paul Brandl based on a paper by Y. Amano,¹ A. Inoue,¹ M. Kaneeda,¹ M. Maier,² M. Moerters,² M. Nargiello,³ S. Hasenzahl,³ and P. Brandl¹; ¹Nippon Aerosil Co. (Japan), ²Evonik Degussa GmbH (Germany), ³Evonik Degussa Corp. (USA)

Abstract: This presentation will address the evolution of external toner additives over the last two decades to meet the demands of a more complex toner industry. Market trends driving this evolution and increasing additive diversity are the use of color in high speed office printers and commercial digital presses while on the other hand toner based low priced printers are making also their inroad in household use. Additionally, eco-friendly printers with reduced energy consumption and zero emissions require the development of toner with low T_g based on environmentally safe raw materials.

Novel mixed fumed silicon / titanium oxides offer the positive tribo charging benefits of titanium dioxide combined with the surface properties of a silica shell. Acting as effective spacers and to prevent re-agglomeration of low T_g toner, fumed sub-micron particles based on both silica and titania have distinct advantages over precipitated materials. These include; lower moisture, higher purity, and the complete absence of internal porosity. For improved dispersibility and optimized toner surface coverage, de-agglomerated, chemical and mechanical structured modified fumed metal oxides have been developed and will be discussed. Other applications of this kind of organic materials in digital printing will be covered as well.

Lastly, the paper will also explore the impact of the ongoing EH&S (environmental, health & safety) discussion on external additives and development trends towards safe additives. (Speaker bio found on page 16.)

NIP TRACK 1 TONER-BASED PRINTING MATERIALS

Session Chairs: Samir Kumar, Xerox Corporation;
Lutz Englisch, TU Chemnitz; and Yoshihiro Hattori,
Konica Minolta Business Technologies, Inc.

9:40 AM - 6:20 PM

The Effect of Toner Resin on Triboelectric Aging, Robert J. Nash, John T. Bickmore, Michael L. Grande, Thomas Vasta, and Richard N. Muller, Xerox Corp. (USA)

Functionalized Inorganic Polymer Salts as Charge Control Agents, Ulrike Rohr and Kristin Richter, Clariant Produkte GmbH (Germany)

A Bidirectional Acid-Base Charging Model for Triboelectrification: Experimental Verification by Inverse Gas Chromatography and Xerographic Charging (Focal), Rick Veregin, Maria McDougall, Mike Hawkins, Cuong Vong, and Vlad Skorokhod, Xerox Research Centre of Canada; and Henry Schreiber, Universite de Montréal (Canada)

Thermal Stability of Tetra-alkyl Ammonium Salts Used Charge-Control Agents as Viewed From Their Crystal Structures (Interactive), Kazuya Uta, Yohei Sato, and Jin Mizuguchi, Yokohama National University (Japan)

Crystal Structure of an Azo Cr-complex Used as a Charge-Control Agent and Its Electrical Properties (Interactive), Shinpei Ito, Yohei Sato, and Jin Mizuguchi, Yokohama National University (Japan)

Molecular Structures of Colored Forms of Leuco Dye Colored by Phenolic Developers and the Correlation with Decolorable Toner Properties., Yumiko Sekiguchi, Satoshi Takayama, Takeshi Gotanda, and Kenji Sano, Toshiba Corp. (Japan)

Crystal Structure of a Salicylic Acid Derivative Al-complex Used as a Charge-Control Agent and Its Electrical Properties (Interactive), Yuya Kamei and Jin Mizuguchi, Yokohama National University (Japan)

The Role of Cations in Thermal Stability of Azo Fe-complexes Used as Charge-Control Agents as Viewed From the Crystal Structure, Yohei Sato, Kazuya Uta, and Jin Mizuguchi, Yokohama National University (Japan)

Charge Impartation Capability of CCA Nanoparticles Deposited on the Surface of Core-Shell Type Chemical Toner, Takashi Jimura,^{1,2} Osami Abe,¹ Atsushi Suka,² and Toshihiko Oguchi²; ¹Ibaraki University and ²Morimura Chemicals, Ltd. (Japan)

Treated Metal Oxides Additives for Toner Tribocharge Control, Dmitry Fomitchev,

Joachim K. Floess, Hairuo Tu, Jinsong Liu, and William Williams, Cabot Corporation (USA)

Chemically Produced Toner Containing A Binary Resin Binder (Interactive),

Ming-Huei Liu, Jiun-Hsien Tsai, and Chen-Jen Yang, Sinonar Corp. (Taiwan)

The Effect of Branching Agent for Toner Binder Resins (Interactive),

Ui Gab Joung, Hyung Jin Roh, Sun Mi Kim, Yun Ju Chang, Sung Hwan Cho, and Doe Kim, Samyang Corp. (South Korea)

Designing Pigments for Optimal Performance in Chemical Toner Systems,

Anne Shim and Angelos Kyrlidis, Cabot Corp. (USA)

Improved Fusing Properties and Characteristics of Polyester Toners Prepared by Chemical Milling,

Kyung-Rak Lee, Eui-Jun Choi, and Hyun-Nam Yoon, DPI Solutions, Inc. (South Korea)

Low Energy Fusing Toner by Controlling Nano Dispersion of Crystalline Polyester,

Norihito Fukuri, Eiji Shirai, Shigeto Inoue, Masayuki Okamoto, and Katsutoshi Aoki, Kao Corp. (Japan)

Development of the 2nd Generation Full-Color PxP Toner (Focal),

Osamu Uchinokura, Masahide Yamada, Junichi Awamura, Akinori Saitoh, and Naohito Shimota, Ricoh Co., Ltd. (Japan)

Fusion of Particles in an Emulsion Aggregation Process,

Suresh Ahuja, Xerox Corp. (USA)

Distributed 3D Aspect Ratios of Toner, Kevin Lofftus, Eastman Kodak Co. (USA)

Texture Characterization of Chemically Prepared Toners,

Kevin Lofftus, Eastman Kodak Co. (USA)

Blend Tool Design Using CFD,

Jing Li, Samir Kumar, and Paul Casalmir, Xerox Corp. (USA)

Effect of Reactive Coalescence Agent in Toner Particle Shape Factor Control (Focal),

Zhen Jerry Lai and Chieh-Min Cheng, Xerox Corp. (USA)

NIP TRACK 2

INKJET PRINTING PROCESSES

Session Chairs: Kathleen Vaeth, Eastman Kodak Co.; Werner Zapka, XaarJet AB; Wolfgang Voit, Xaar; and Mineo Kaneko, Canon, Inc.

9:45 AM - 3:30 PM

An Analysis of Recent Advances in Solid Ink Printer Performance from a Printhead Perspective (Focal),

Steve Korol, Xerox Corp. (USA)

Novel Inkjet Print Head for Manufacturing Processes,

Ty Chen, Trident - ITW(USA)

New Advances in Piezoelectric Carbon Printhead Technology,

Marlene McDonald, FUJIFILM Dimatix Inc. (USA)

Advances in Technologies for Wide Web Single Pass Printing with Piezoelectric Inkjet (Focal),

Julian Bane, Xaar PLC (UK)

Optimization of a DoD Print Head Signal for

SPECIAL EVENT

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

To participate, see information on page 8.

Ink-Jetting of Conductive Circuits,

Dominik Cibis and Klaus Krüger, Helmut-Schmidt-University/University of the German Armed Forces (Germany)

A Novel Method for the Evaluation of Jettability,

L. Lin and W. He, University of Leeds (UK)

Links Between Fluid Rheology and Drop-on-Demand Jetting and Printability (Focal),

Stephen D. Hoath, Graham D. Martin, Ian M. Hutchings, Tri R. Tuladhar, and Malcolm R. Mackley, University of Cambridge (UK)

Inkjet Status Monitoring Using Meniscus Measurement,

Kye-Si Kwon, Soonchunhyang University (South Korea)

The Characteristics of Thin Film Heater Having a High Resistance,

Junwoo Suh, Samsung Advanced Institute of Technology (South Korea)

Inkjet Single Pass Printing with UV Curable Ink,

Shin Ishikura, Kyocera Corp. (Japan)

ELECTRONIC PAPER AND PAPER-LIKE DISPLAYS

Session Chairs: Jeff Mabeck, Hewlett-Packard Co.; and Makoto Omodani, Tokai University

4:00 - 5:20 PM

NanoChromics Enabled Functional Media (Focal),

Alain Briancon and Michael Ryan, NTERA (USA)

Novel Color Electrophoretic Imaging Display Based on Movement of Particles Using Two Driving Electrodes,

Masahiro Masuzawa, Masahiro Yanagisawa, and Yoshihisa Naijoh, Ricoh, Co., Ltd.; and Takashi Kitamura, Chiba University (Japan)

Materials for Printed Organic Thin Film Transistors,

Hadi Mahabadi, Yiliang Wu, Paul F Smith, Yuning Li, and Ping Liu, Xerox Research Centre of Canada (Canada)

Color Electrophoretic Image Display Based on Movement of Particles Using Two Driving Electrodes (Interactive),

Hiroshi Endo,¹ Masahiro Masuzawa,² Sakiko Nakamura,¹ Nobukazu Miyagawa,^{1,2} and Takashi Kitamura^{1,2}; ¹Chiba University and ²Ricoh Co. Ltd. (Japan)

Evaluation of Eye Fatigue at an Electronic Paper (Interactive),

Makoto Omodani, Mitsuru Sakamoto, and Junko Imai, Tokai University (Japan)

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

NIP TRACK 3 PHOTOELECTRONIC IMAGING MATERIALS AND DEVICES

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

9:40 AM - 2:40 PM

Charge Injection Dynamics at Discrete Versus Intermixed Interfaces Between Hole Transport Molecule Doped Polymer Films (Focal), Richard A. Klenkler, Xerox Research Centre of Canada (Canada)

Crystal and Electronic Structure of a Sodium Salt of Methyl Orange (Interactive), Hiroki Shibata, Kazuyuki Sato, and Jin Mizuguchi, Yokohama National University (Japan)

Toner Photoreceptor Adhesion and Crosslinked Polyamide Material (Interactive), Suresh Ahuja, Xerox Corp. (USA)

An Analysis on Both Voltage Sensitivity and High Spatial Resolution with a New Electrostatic Voltmeter Having Extremely High Input Impedance, T. Uehara, Trek, Inc. and Trek Japan KK; J. Higashio, Trek Japan KK; and Y. Kogiso, T. Maruyama, Y. Ashizawa, K Nakagawa, and A. Itoh, Nihon University (Japan)

The Source of the Charge Transport Activation Energy in Molecularly Doped Polymers, Lawrence Schein, consultant (USA), and Andrey Tyutnev, Moscow State Institute of Electronics and Mathematics (Russia)

Electron-Transporting Polyamides for Organic Photoreceptors (Focal), Wayne T. Ferrar, David S. Weiss, Michel F. Molaire, Xin Jin, and Louis J. Sorriero, Eastman Kodak Co. (USA)

Charge Generation in a Bisazo-Based Layered Photoreceptor, Saburo Yokota, Samsung Electronics Co., Ltd. (South Korea)

Cross-Linked Naphthalene Bisimide "E-Barrier" Layer Compositions Using Blocked Isocyanate Chemistry, Michel F. Molaire, Wayne T. Ferrar, Randy G. Galipo, Michael Sykes, and Theodore Zubil, Eastman Kodak Co. (USA)

A New Class of High Mobility Hole Transport Materials, Wolfgang Witt, Olaf Gelsen, and Mirko Tschunarjew, Sensient Imaging Technologies GmbH (Germany)

Polymorph and Electronic Structure of Methyl Orange, Kazuyuki Sato, Hiroki Shibata, and Jin Mizuguchi, Yokohama National University (Japan)

PRINTING SYSTEMS ENGINEERING/ OPTIMIZATION

Session Chairs: George T.-C. Chiu, Purdue University; Jordi Sender, Hewlett-Packard Co.; and Teruaki Mitsuya, Ricoh Printing Systems, Ltd.

2:50 - 5:50 PM

Toner Dispense and Inter Document Zone Printing Strategy for Image Quality and Cost Optimization (Focal), Eric Gross and Palghat Ramesh, Xerox Corp. (USA)

A Method to Perform Printhead Alignment by Means of Colorimetric Patches (Interactive), Sergio Puigardeu, Jordi Sender, and Ramon Vega, Hewlett-Packard Española (Spain)

Pre-installation Assessment of Doctor Blade Quality in Electrophotographic Printers (Interactive), Ahmed Eid, Edward Rippetoe, and Brian Cooper, Lexmark International Inc. (USA)

High Image Uniformity and Increased Reliability with Inline Linear Array Sensing (Focal), Jim Calamita, Brian Conrow, Claude Fillion, Jack LeStrange, Ken Mihalyov, Howard Mizes, Peter Paul, Doug Taylor, Shawn Updegraf, and Enrique Viturro, Xerox Corp. (USA)

Dynamic Management of Toner Cartridge Supply for a Fleet of Printer Systems, Marcos Esterman, Michael Kuhl, and Rong Yan, Rochester Institute of Technology (USA)

Multi-Beam Scanning Optical System with 20-Channel Edge Emitting Laser Diode Array for Production Printing Applications, Takeshi Mochizuki, Yasuyuki Shibayama, Kazuhiro Akatsu, and Junshin Sakamoto, Ricoh Printing Systems, Ltd. (Japan)

Simulating Resolution of Gradient Index Array Using Illumination Analysis, Akihiro Yamamura, Oki Data Corp. (Japan)

**NIP TRACK 4
IMAGE PERMANENCE**

Session Chairs: Franziska Frey, RIT;
Jürg Reber, IIFORD Imaging Switzerland GmbH;
and Yoshihiko Shibahara, FUJIFILM Corporation
9:40 AM - 12:40 PM

Evaluating the Potential Impact of an Illuminant Change on Indoor: In-home Print Longevity Estimates, Kali Campbell, Hewlett-Packard Co. (USA)

Effect of Dry Time on Rate of Image Change in Xenon, Ozone, and Humidity Tests, Matthew Comstock, Lexmark International, Inc. (USA)

The Influence of Relative Humidity on the Light Fading of Inkjet Prints Made with Pigmented Inks, Henry Wilhelm, Kabenla Armah, Dmitriy Shklyarov, and Barbara Stahl, Wilhelm Imaging Research, Inc. (USA)

Stain Resistance as Part of Image Permanence for Consumer Digital Inkjet and Thermal Imaging Systems-Part 2, Kristine B. Lawrence, Deborah L. Cigna, Wendell J. Brattlie, Kevin O'Connor, Joseph E. LaBarca, and David Erdtmann, Eastman Kodak Co. (USA)

Accuracy in Photo Print Life Predictions (Focal), Peter Mason, Torrey Pines Research (USA)

Abrasion Test Methods for Digital Reflection Prints, Eugene Salesin, Andrea Venosa, Peter Adelstein, Douglas Nishimura, James Reilly, and Daniel Burge, Image Permanence Institute at Rochester Institute of Technology (USA)

Effect of Ozone on Rate of Paper Yellowing in Dark Storage Test Conditions (Interactive), Matthew Comstock, Lexmark International, Inc. (USA)

Effect of Temperature and Humidity on Rate of Image Fading in Ozone (Interactive), Matthew Comstock, Lexmark International, Inc. (USA)

**DIGITAL FABRICATION
NOVEL DIGITAL FABRICATION
APPLICATIONS**

Session Chair: Doug Chrisey, Rensselaer Polytechnic Institute; Werner Zapka, XaarJet AB; and Masaaki Oda, ULVAC
2:00 - 4:50 PM

Printing and Patterning of Quantum Dots Using Thermal Inkjet Techniques (Focal), James Stasiak, Garry Hinch, Tom Etheridge, Tim Streckler, and Steven Simske, Hewlett-Packard Co. (USA)

Inkjet Method for Direct Patterned Etching of Silicon Dioxide, Alison J. Lennon, Anita Ho-Baillie, and Stuart R. Wenham, University of New South Wales (Australia)

Inkjet Printing for Patterning Engineering Surfaces, Henara L. Costa, Federal University of Uberlândia (Brazil), and Ian M. Hutchings, University of Cambridge (UK)

Suitability of Gravure Printing for High Volume Fabrication of Electronics (Interactive), Erika Hrehorova, Alexandra Pekarovicova, Paul D. Fleming, and Marian Rebros, Western Michigan University (USA)

SERS Active Texture by Direct Patterning of Gold and Silver Colloids with Ink Jet (Interactive), L. Engisch and P. Fredericks, Queensland University of Technology (Australia)

Electrostatic Deflection of Charged Droplets with Asymmetrical Injection: Unexpected Optimal Design (Interactive), Michael Retsky, Electon Optics Development Co., LLC (USA)

Drop-on-Demand Ink-Jet Printing of Functional Materials: Case Studies of SU-8 and NCs-embedded Polymer Nanocomposites, J. Y. Kim,¹ V. Fakhfouri,¹ C. Ingrosso,² M. Striccoli,² M. Lucia Curri,² and J. Brugger¹; ¹École Polytechnique Fédérale de Lausanne (Switzerland) and ²Università di Bari (Italy)

Digital Mold Texturing Methods, Materials, and Substrates (Interactive), Alexander Gybin and Jeremy Peterson, IKONICS Corp. (USA)

3D DIGITAL FABRICATION

Session Chair: Doug Chrisey, Rensselaer Polytechnic Institute; Jali Heilmann, VTT Information Technology; and Norio Nagayama, Ricoh Co., Ltd
4:50 - 5:30 PM

Three-Dimensional Fabrication of Smart Actuators: Design Applications, Peter James Walters, University of the West of England (UK)

3D Printing of Bespoke Ceramic Artworks, David Huson, University of the West of England (UK)

**ELECTROSTATIC INKJET
PHENOMENA**

Session Chair: Gregory Herman, Sharp Labs of America, Inc.; Jali Heilmann, VTT Information Technology; and Shinri Sakai, Seiko Epson
5:30 - 6:10 PM

New Micro Fabrication Techniques Utilizing Electrostatic Inkjet Phenomena, Shinjiro Umezu, Kazutoshi Katahira, and Hitoshi Ohmori, RIKEN (Japan)

Stability Analysis of a Drop Generation from a Nozzle in an Electric Field, Kazuyuki Tada and Hiroyuki Kawamoto, Waseda University (Japan)

Tuesday September 9, 2008

PLENARY SESSION I

Session Chair: Ross Mills,
imaging Technologies international Corp.

8:15 - 9:15 AM

Inkjet Printing Technology for Regenerative Medicine, James Yoo, Wake Forest Institute for Regenerative Medicine

Abstract: Tissue engineering and regenerative medicine has emerged as an innovative scientific field that focuses on development of new approaches to repairing cells, tissues and organs for clinical applications. While the therapeutic paradigm that utilizes the combinations of biomaterial scaffolds and cells has shown to be effective, only a limited number of these technologies have been successfully translated to patients. This is due to various challenges encountered in the tissue building process. Recent advances in novel biomaterials, new sources of cells, and scaffold fabrication strategies are being applied to address these challenges.

One of the challenges that hamper rapid clinical translation is inefficient cell delivery methods. Living tissues maintain inherent multi-cellular heterogeneous structures, and rebuilding of such complex structures requires subtle arrangements of different cell types and extracellular matrices at their specific anatomical target sites. Inkjet printing technology has been proposed as a tool to address this endeavor. In this session a novel and versatile method of building complex tissue structures will be discussed using inkjet printing technology. *(Speaker bio found on page 17.)*

PLENARY SESSION II

Session Chair: Detlef Schulze-Hagenest,
Kodak Graphic Communications GmbH

2:00 - 2:55 PM

Numerical Simulations of Electrophotography Processes, Hiroyuki Kawamoto, Waseda University (Japan)

Abstract: This paper describes an overview on the recent progress of simulation technology in Japan for the development of electrophotography processes; charge, expose, develop, transfer, fuse, clean, and paper handling. Simulation technology has been substantially progressed with the utilization of highly efficient and convenient hardwares and softwares. Because phenomena in charge, expose, and fuse processes are based on mechanics of continuous media, these are formulated as a set of multi-components, nonstationary, and nonlinear partial differential equations and numerically calculated by the finite element method or finite differential method. On the other hand, discrete element method is the useful tool to clarify the

SPECIAL EVENT

The 2008 NIP/DF Exhibit
opens Tuesday at 10 AM

Please visit our exhibitors

Tuesday (10 AM – 7:15 PM) and
Wednesday (9 AM – 4 PM)

**Beer and chips will be served in the
NIP/DF Exhibit Hall on
Tuesday evening from
5:30 - 7:15 PM**

toner dynamics in the development, transfer, and cleaning processes. The direct observation technique with a high-speed microscope camera and the particle tracking velocimetry are utilized to refine and confirm the numerical calculation. Electrophotography processes are no longer a black box. *(Speaker bio found on page 17.)*

NIP TRACK 1

TONER-BASED PRINTING PROCESSES

Session Chairs: Larry Schein, consultant;
Volkhard Maess, Océ Printing Systems; and
Hitoshi Nakai, Brother Industries, Ltd.

9:20 AM - 12:30 PM and
3:00 - 5:30 PM

The Study of Difference of Toner-Motion Among Several Development Systems (Focal), Masao Nakano, Canon Inc. (Japan)

Attraction and Adhesion of a Charged Insulative Toner Particle, Joseph M. Crowley, Electrostatic Applications (USA)

Electrical Characterization of Rolls and Belts for High Speed Electrophotography, Ming-Kai Tse and Inan Chen, Quality Engineering Associates, Inc. (USA)

Bead-Carry-Out Phenomenon in Two-Component Development System of Electrophotography, Hiroyuki Kawamoto, Waseda University (Japan)

Observation of Surface Change of Corona Discharge Wire (Interactive), Song Jiang, Jing-chen Huang, and Yasushi Hoshino, Nippon Institute of Technology (Japan)

Toner Charge Distribution Change on Toner Mixing Time (Interactive), Disna Jayampathi Karunanayake, Osamu Hoshino, Tetsuya Onoda, and Yasushi Hoshino, Nippon Institute of Technology (Japan)

Size Dependence on Toner Charge in Two-Component Developer, Youichi Nakamura, Yutaka Terao, Shigeru Kitakubo, and Yasushi Hoshino, Nippon Institute of Technology (Japan)

Direct Observation and Numerical Study on Dynamics of Toner Particles in Magnetic

Single- Component Development System of Electrophotography, Hiroyuki Kawamoto, Waseda University (Japan)

Ricoh SD-Development Technology and Pre-mix System for Image Quality, Yuki Oshikawa, Kohichi Utsunomiya, Satoru Yoshida, Yutaka Takahashi, Emi Kita, Kiyonori Tsuda, Junichi Terai, Kohichi Kato, and Tomoji Ishikawa, Ricoh Co., Ltd. (Japan)

Challenges in Components Design for Transfer Subsystem in Electrophotographic Marking (Focal), Santokh Badesha, Xerox Corp. (USA)

Study on Second Transfer Process Using Numerical Simulation I, Toyoshige Sasaki, Takuma Onishi, Asako Sugiyama, Yasuo Yoda, and Takeshi Tomizawa, Canon, Inc. (Japan)

Study on Second Transfer Process Using Numerical Simulation II (Interactive), Toyoshige Sasaki, Kousuke Yamamoto, Takuma Onishi, Asako Sugiyama, Takeshi Tomizawa, and Yasuo Yoda, Canon Inc. (Japan)

An Observation of Toner Scatterings Behavior in the Transfer Process, Haruo Imura and Masami Kadonaga, Ricoh Co., Ltd. (Japan)

Rotating Effect of Rollers and Photoconductive Drums on Electric Properties, J. Yoo, J. Sur, and J.M. Eun, Samsung Electronics Co. Ltd. (South Korea)

Airflow, Electric Fields, and Contamination Transport, Parsa Zamankhan, Goodarz Ahmadi, Clarkson University, and Fa-Gung Fan, Xerox Corp. (USA)

Image Quality and Surface Tension of Digital UV Curable Inks (Focal), Sudhakar

Madhusoodhanan, Stephen Sung, Erik Delp, Matthew Ellison, Devdatt Nagvekar, and Daniel Wilson, Hexion Specialty Chemicals (USA)

Advanced High Molecular Weight Dispersing Agents for Inkjet Applications, Shaun Tranter, Ciba Specialty Chemicals (The Netherlands)

Properties and Application of a Radiation Curable, Inkjet Receptive Polymer, David K. Hood and Surya Kamin, ISP (USA)

Control of the Dot Height of Pigmented Ink for Good Clarity, Isao Tsuru, Yusuke Shimizu, Takehiro Tsutsumi, Toshiya Hagihara, and Tomohiro Onda, Kao Corp. (Japan)

Synthesis of Novel Encapsulated Pigment Dispersion (Interactive), Jaeyoon Jung, Jong In Lee, Seung Min Ryu, Hyekyung Han, Sanghyun Hong, and Sang Eun Shim, Samsung Electronics Co., Ltd. (South Korea)

A Novel Coating Formulation for Silica Inkjet Layer Coatings (Focal), M. Patricia Wild, Eka

Chemicals, Inc. (USA); and Ylva M. Wildlock and Kjell R. Andersson, Eka Chemicals AB (Sweden)

Individually Dispersed Nanoparticles Formed by Gas Evaporation Method and Their Applications, Masaaki Oda, Shigeo Hayashi, Yoshiaki Hayashi, Kyuko Tei, and Masato Osawa, ULVAC Corporate Center (Japan)

Temperature-Dependent Reliability of Inkjet-Printed Silver Structures in Constant Humidity Environment, Umur Caglar and Pauliina

Mansikkamäki, Tampere University of Technology (Finland)

NIP TRACK 2

INKJET PRINTING MATERIALS

Session Chairs: Doug Bugner, Eastman Kodak Co.; Stephen Yeates, Manchester University; and Hiroyuki Onishi, Seiko Epson Corporation

9:20 AM - 12:35 PM and

3:00 - 4:10 PM

Evaluation of Inkjet Printhead Materials Using Electrochemical Impedance Spectroscopy,

James M. Mrvos, Lexmark International (USA)

Product Selection for Harsh Environment Applications in Ink Jet Print Head Assembly (Interactive), D. M. Umbarger, S. Cooper,

R. Frimanson, S. Krawiec, K. Jalbert, and D. Tudryn, Emerson & Cuming (USA)

Effects of Dispersing Agents on the Quality of Water Based Ink-Jets Using Pigment

Colorant (Interactive), Surachai Khankaew and Jantira Komatatitaya, King Mongkut's University of Technology (Thailand)

Polymeric Dye Ink Jet Colorants with High Water Fastness, Mihaela Madaras, Donald Diehl, Steven Link, Shari Eiff, Wanda Swartz, and John DiCillo, Eastman Kodak Co. (USA)

Bottom Up Assembly of Polymer Stabilised, Jonathan Wilson and Stephen Yeates, University of Manchester; and Tom Annable, FUJIFILM Imaging Colorants Ltd. (UK)

ADVANCED AND NOVEL IMAGING SYSTEMS

Session Chairs: Ken Lindblom, Hewlett-Packard Co.; Daniel Hall, Inkski, Ltd.; and

Yasushi Hoshino, Nippon Institute of Technology

4:40 - 6:00 PM

Océ Gemini Instant Duplex Technology (Focal), Staszek Lenczowski and Marcel Slot, Océ Technologies B.V. (The Netherlands)

Laser Marking Solutions for Paper and Packaging, Kathie Hoekstra,¹ Véronique Hall-Goulle,² Sébastien Villeneuve,² Jonathan Campbell,³ and Doelf Kaesser³; Ciba (¹USA, ²Switzerland, and ³Germany)

Variable Data Cylinder Printing (Focal), Daniel Hall, Inkski Ltd. (UK)

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NIP TRACK 3

PRINT AND IMAGE QUALITY

Session Chairs: Susan Farnand, RIT;

Udi Chatow, Hewlett-Packard Co.; and

Shigeru Kitakubo, Nippon Institute of Technology

9:20 AM - 12:30 PM and

3:00 - 6:10 PM

Model-Based Memory-Efficient Algorithm for Compensation of Toner Overdevelopment in Electrophotographic Printers, *Edgar Bernal, Xerox Corporation; Jan P. Allenbach, Purdue University; and Jeff Trask, Hewlett-Packard Co. (USA)*

Object Dependence of Optimum Edge Enhancement Condition (Interactive), *Cheng Hong Mei, Phichit Kajondecha, Lin Chunwei, and Hoshino Yasushi, Nippon Institute of Technology (Japan)*

Method to Optimize Minimum Line Width and Edge Quality Without Sacrificing Maximum Area Fill Optical Density (Interactive), *Ana Cardells and Angel Martinez, Hewlett-Packard Española (Spain), and Steve Steinfeld, Hewlett-Packard Co. (USA)*

An Evaluation Model for Character Quality on Scanned Image, *Seul Ki Jang and Choon-woo Kim, Inha University; and You sun Bang, Heui-Keun Choh, and Sang Ho Kim, Samsung Electronics Co., Ltd. (South Korea)*

Measurements, Simulation, and Reconstruction of 3D Gonio Spectral Reflectance in Electrophotography, *Jun Hirabayashi and Megumi Itoh, Canon, Inc. (Japan)*

Faithful Printing of a Digital Source (Focal), *Dror Kella, Ayelet Pnueli, Ron Maurer, Mani Fischer, Doron Shaked, Gidi Amir, Amiran Lavon, and Eyal Shelef, Hewlett Packard Co. (Israel)*

Study on Printing Sharpness Difference of Glossy Ink-Jet Paper, *Xiao-Nao Liu,¹ Qiang Wang,² Zhong Liu,¹ Yin-Li Liu,¹ and Li-Ming Chen³; ¹Tianjin University of Science and Technology; ²Wuhan University; and ³Shanghai Ziyang Graphic Technologies Co., Ltd. (China)*

Analysis of Specular Reflections from Printed Images and the Characterization of Gloss Bronzing, *C.G. Smith, J.S. Arney, S.P. Farnand, C. MacDonald, and B. Stroka, Rochester Institute of Technology (USA)*

The Physical Characteristics of Ink Jet Papers and Their Gloss Performance (Interactive), *Masaru Kato, Masao Inui, and Yoshihiko Azuma, Tokyo Polytechnic University (Japan)*

Microscopic Analysis of Color Toner Gloss and a Comparison of Optical Gloss Level (Interactive), *Tad Kaneko, Media Sciences International (USA)*

Texture Difference Perception Between Different Halftone Algorithms (Interactive), *Phichit Kajondecha, Hongmei Cheng, and*

SPECIAL EVENT

Intellectual Property Panel

Please join us for this annual panel and audience discussion on issues related to intellectual property.

This year's topic is the role of intellectual property in value creation for companies and the industry as a whole.

Mike Butler, director, Licensing for Xerox Intellectual Property Operations, will moderate.

Panelists: TBA
(check online closer to the meeting)

**Tuesday, September 9
5:45–6:45 pm**

Yasushi Hoshino, Nippon Institute of Technology (Japan)

A Method for Classifying Halftone Patterns Based on Pattern Morphology (Interactive), *Fermin A. Colon-Lopez and Jonathan S. Arney, Rochester Institute of Technology (USA)*

Application of Raman Spectroscopy and Infrared Synchrotron Radiation for Digital Print Analysis (Focal), *L. Engisch, L. Rintoul, and P. Fredericks, Queensland University of Technology (Australia); J. Örtengren, Mid Sweden University; and M. Buschmann and S. Gepp, MoRe Research (Sweden)*

Image Quality and Cost Assessment of Print-On-Demand Books from Web-Based Vendors Offering One-Off Printing, *Jonathan B. Phillips, Rochester Institute of Technology and Eastman Kodak Co., and Mitchell R. Rosen, Rochester Institute of Technology (USA)*

Nonparametric Generic Substrate ICC Profile, *Chunhui Kuo, Hwai T. Tai, Yee Ng, Eric Zeise, and Di Lai, Eastman Kodak Co. (USA)*

The Influence of Image Content and Paper Grade on Quality Attributes Computed from Printed Natural Images (Focal), *Raisa H. Halonen and Pirkko T. Oittinen, Helsinki University of Technology (Finland)*

Measurement and Analysis of Banding Artifacts in Color Electrophotographic Printers, *Thanh H. Ha and Jan P. Allebach, Purdue University (USA), and Douksoon Cha, Samsung Electronics Co., Ltd. (South Korea)*

Image Noise in Dry-Powder Electrophotography, *John G. Shaw, John Knapp, Dale Mashtare, Paul Morehouse, and Michael Thompson, Xerox Research Center (USA)*

Tonejet: Delivering Digital Printing to the Mass Market, *Guy Newcomb, ToneJet Ltd. (UK)*

**DIGITAL FABRICATION
PRINTING BIOMATERIALS**

Session Chairs: James Stasiak, Hewlett-Packard Co.;
Jan Sumerel, FUJIFILM Dimatix, Inc.;
Stefan Guettler, Fraunhofer Institute IPA;
Makoto Nakamura, Toyama University; and
and Masaya Ishida, Seiko Epson

9:20 AM - 5:30 PM

An Efficient Manufacturing Process for Highly Complex Biochips Using Laser Printing Technique (Focal),

Frank Breitting, Ralf Bischoff, Volker Stadler, Thomas Felgenhauer, Klaus Leibe, and Simon Fernandez, German Cancer Research Center; and Stefan Güttler, Martin Gröning, Bernd Biesinger, and Peter Willems, Fraunhofer Institute Manufacturing Engineering and Automation (Germany)

Laser Direct Writing of Idealized Fibroblast Cellular Constructs: Structure-Function Relationships (Focal),

Nate Schien, David T. Corr, Erik Dorthe, Andrew Verge, Deanna M. Thompson, Lee Ligon, and Douglas B. Chrisey, Rensselaer Polytechnic Institute (USA)

Digital Fabrication of Bioactive Paper,

Robert Pelton, McMaster University (Canada)

Simultaneous Deposition of Human Microvascular Endothelial Cells and Biomaterials for Human Microvasculature Fabrication Using Inkjet Printing,

Thomas Boland and Xiaofeng Cui, Clemson University (USA)

Printing Light Harvesting Biological "Devices" and other Functional Materials Applicable to Organic Photovoltaics,

Jan Sumerel, FUJIFILM Dimatix, Inc. (USA)

Characterizing the Spatial Distribution of Horseradish Peroxidase Ink-Jet Printed on Paper,

Sabina Di Risio and Ning Yan, University of Toronto (Canada)

Inkjet Printing of Human Cells, Yeast and Biopolymers,

Skander Limem and Paul Calvert, University of Massachusetts Dartmouth, and David Kaplan, Tufts University (USA)

Biomimicry of PAM Microfabricated Hydrogel Scaffold,

Annalisa Tirella, Giovanni Vozzi, and Arti Ahluwalia, University of Pisa (Italy)

Alginate Gel Honeycomb Structures Fabricated With The Bio-Printer,

Koki Takiura and Akifumi Doi, Yamagata University; Kumiko Yamaguchi and Keiichi Akita, Tokyo Medical and Dental University; Yuichi Nishiyama and Chizuka Henmi, Kanagawa Academy of Science and Technology; and Makoto Nakamura, Tokyo Medical and Dental Univ. (Japan)

Piezoelectric Inkjet Printing of Biomimetic Inks for Reactive Surfaces,

Leila F. Deravi, Jan L. Sumerel, and David W. Wright, Vanderbilt University (USA)

Three-Dimensional Formation of Magnetic Micro Gel-Beads for Tissue Engineering,

Hiroyuki Kawamoto and Hiroki Inoue, Waseda University (Japan)

Wednesday September 10, 2008

PLENARY & AWARDS SESSION

Session Chair: Detlef Schulze-Hagenest,
Kodak Graphic Communications GmbH
8:30 - 9:50 AM

The Revolution of Print and Our Industry,
Steve Hoover, Xerox Corporation (USA)

Abstract: The paperless office, ballyhooed as the imminent future by Business Week in 1975 has been notable largely for its non-occurrence. In fact the entire concept has been redefined as we come to recognize that, in many markets, paper is not being used less so much as it is being used differently. I will talk about the trends in paper use both in terms of volume and in applications. Paper has gone from a static repository to take on more active roles at the on-ramp and off-ramps of the electronic web that connects us, the protection and security of our information as well as, increasingly a component of smart document systems. Through analysis of this data I will show how the technologies we are developing can and will materially change our relationship with print, information and document intensive work practices and services. *(Speaker bio found on page 17.)*

NIP TRACK 1

FUSING, CURING, AND DRYING

Session Chairs: David Thompson, Xerox Corporation;
Marcel Slot, Océ Technologies; and
Tatsuya Tada, Canon Inc.

10:00 AM - 3:30 PM

Simulation for Various Types of Low Energy Consumption Fuser (Focal),
Yasumasa Otsuka, Toshihiko Ochiai, Tetsuya Sano, and Yuuki Nishizawa, Canon, Inc. (Japan)

Energy Analysis for Backward Wrap-Nip Fuser for High-Speed Continuous Form Laser Printers (Focal),
Teruaki Mitsuya and Daisuke Ito, Ricoh Printing Systems, Ltd. (Japan)

Numerical Simulation of the Toner Melting Behavior in Fuser Nip Considering Toner Rheology,
Satoshi Hasebe, Fuji Xerox Co., Ltd. (Japan)

Effect of Medium (Substrate) on Toner Adhesion,
Suresh Ahuja, Xerox Corp. (USA)

Nano and Micro Dynamic Mechanical Analysis of Fusing Member Materials for Non-Impact Printing,
Wade Whorn, Dave Winters, and Boris Avrushchenko, 7-SIGMA, Inc. (USA)

Development of a Cationic UV Curable Inkjet Ink—Formulation Effect on Curing Behavior (Focal),
Toshiyuki Takabayashi, Nobumasa Sasa, Atsushi Nakajima, Atsushi Tomotake, and Shuji Kida, Konica Minolta IJ Technologies, Inc. (Japan)

Application of the Operating Window Concept to Improve Fuser Reliability: A Case Study on Failure Modes of Hot & Cold Offset,

Marcos Esterman, Sourabh Dargan, Brian Thorn, and Jonathan Arney, Rochester Institute of Technology (USA)

UV LED Curing in Inkjet Printing Applications, Guomao Yang, Sheng Peng, Andrew Ridyard, and John Kuta, EXFO LSI Division (Canada)

TEXTILE AND FABRIC PRINTING

Session Chairs: Hitoshi Ujiiie, Philadelphia University; Kasper Nossent, Ten Cate Advanced Textiles; and Takao Abe, Shinshu University

4:00 - 5:55 PM

The Absorption and Spreading of Aqueous Finishing Fluids Onto Textile Fiber Surfaces (Focal), Kees Heil, Ten Cate Digital Finishing Laboratory (The Netherlands); Veronica Sanchez-Romaguera and Stephen G. Yeates, University of Manchester (UK); and Marijn M.C.G. Warmoeskerken, University of Twente (The Netherlands)

Digital Textile Pigment Printing: Achieving Superior Optical Density (Focal), Mickael Mheidle, Sawgrass Technologies (Switzerland), and Mark Trimble, Sawgrass Technologies (USA)

The Technological Impact of the Introduction of Digital Inkjet Technology Into the Textile Value Chain (Focal), Kasper J. Nossent and Gerrit A. Koele, TenCate Advanced Textiles (The Netherlands)

The Absorption Mechanism of Aqueous and Solvent Inks into Synthetic Nonwoven Fabrics, Hitomi Hamada,^{1,2} Douglas Bousfield,¹ and Wing Tak Luu¹; ¹National Printing Bureau of Japan (Japan) and ²University of Maine (USA)

Chemistry of Inkjet Inks for Textiles (Interactive), M. Karim Ali, Xennia Technology Ltd. (UK)

NIP TRACK 2

ENVIRONMENTAL ISSUES: REGULATIONS, GREEN LABELING, RECYCLING, REMANUFACTURING

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

10:00 AM - 4:10 PM

Electrostatic Separation of Color Toner Particles for Material Recovery and Reuse (Focal), Anahita Williamson, Xerox Corporation, and Susan Powers, Clarkson University (USA)

Print with the Environment in Mind, Nils Miller, Hewlett-Packard Co. (USA)

Investigations on Deinkability and Ink-Paper Interactions (Focal), Axel Fischer, International

SPECIAL EVENT

Join us for an Interactive Panel discussing the

Environmental and Reliability Challenges for Electrophotographic and Ink Jet Printing

**Wednesday, September 10
4:30-6:00 pm**

Moderator:

George T.-C. Chiu, Purdue University

Panelists (as of 6/13/08):

Marcos Esterman, RIT
Stephen Hoover, Xerox Corp.
Teruaki Mitsuya, Ricoh Printing Systems
Chris Saunders, Lexmark International, Inc.
Marcel Slot, Océ-Technologies BV

Association of the Deinking Industry (INGEDE) (Germany)

Biodegradability and Recyclability as Factors when Selecting Material, Carolyn A. Burns, DuPont Nonwovens (USA)

Use of Enzymes to De-ink Electrostatic Printed Papers, Nuray Inog, University of Istanbul (Turkey), and John Cameron, Western Michigan University (USA)

Fixation of Powdered TiO₂ onto Metallic Substrates by Electrophoretic Deposition and Its Use for Complete Decomposition of Volatile Organic Compounds,

Toru Ebara, Shigeru Suzuki, and Jin Mizuguchi, Yokohama National University (Japan)

Fixation of Powdered TiO₂ onto Ni-Cr Heat Elements by Electrophoretic Deposition and Its Use for Complete Decomposition of Volatile Organic Compounds (Interactive), Atsushi Maki, Ryo Iwamoto, Toru Ebara, and Jin Mizuguchi, Yokohama National University (Japan)

Integrated Oil Recycling System for the HP Indigo Liquid Electrophotographic Printing Press, John A. Thompson, Hewlett Packard Co. (USA)

Developments in Environmental Supplies Standards, Lynette Mischkot, Hewlett-Packard Co.; Paul Swoveland, Lexmark International; and Paul Jeran, Hewlett-Packard Co. (USA)

Review of Patented Electric Field Technology, Jeff Hsieh, Georgia Institute of Technology (USA)

WITHDRAWN

WITHDRAWN

NIP TRACK 3

DIGITAL PRINTING/QUALITY CONTROL INSTRUMENTATION

Session Chairs: Behnam Bastani, Hewlett-Packard Co., and Toshio Uehara, TREK Japan K.K.
10:00 - 11:00 AM

Ink Density Profile on Indigo Developer Roller, *Thomas C. Anthony, Michael H. Lee, and Manoj K. Bhattacharyya, Hewlett-Packard Laboratories (USA)*

Image Quality Dynamic Diagnostic Plot, *Marc Parpal, Alvaro Andion, Lara Rodriguez, and Alex Andrea, Hewlett-Packard Española (Spain)*

Use of Digital Modelling of the Print for the Estimation of Quality of a Press (Interactive), *Sergey Dydyshko, The Belarus State Technological University (Belarus)*

COLOR SCIENCE/ IMAGE PROCESSING

Session Chairs: Chai Wah Wu, IBM; Pere Canti, Hewlett-Packard Co.; and Shinjiro Umezu, The Institute of Physical and Chemical Research
11:30 AM - 6:15 PM

An Automated Image Prescreening Tool for a Printer Qualification Process (Focal), *Du-Yong Ng, Lexmark International, Inc., and Jan P. Allebach, Purdue University (USA)*

Characterization of High-Fidelity Color Printing Devices Using Illuminant-Independent Approaches for Color Imaging Application, *Mei-Chun Lo, Shih Hsin University, and Chang-Lang Chen and Tsung-Hsien Hsieh, National Taiwan University of Arts (Taiwan)*

G7 Method for Indigo Press Calibration and Proofing, *Xiaoying Rong, California Polytechnic State University (USA)*

Sparse Color Sampling for Inter-Substrate Color Prediction (Focal), *Pau Soler and Marti Maria Saguer, Hewlett-Packard Española (Spain)*

Color Calibration Optimization, *David Craig and Shen-ge Wang, Xerox Corp. (USA)*

Subjective Evaluation of Required Color Gamut for Preferred Color Reproduction Using Pseudo Ultra Wide Gamut Display, *Masashi Kanai,¹ Toru Kitano,² Hideki Kashahara,¹ Kenji Fukasawa,¹ and Takao Abe²; ¹Seiko Epson Corp. and ²Shinshu University (Japan)*

Spectral Modeling of an n-Ink Printer Via Thin Plate Spline Interpolation, *Behnam Bastani, Hewlett-Packard Co. (USA), and Brian Funt, Simon Fraser University (Canada)*

Color Measurements of Three-Dimensional Ink-Jet Prints (Interactive), *Maja Stanic and Branka Lozo, University of Zagreb (Croatia); Tadeja Muck, University of Ljubljana (Slovenia); and Sonja Jamnicki, University of Zagreb (Croatia)*

SPECIAL EVENT

This year's conference reception will take place at the Heinz History Center. Arrangements have been made to have galleries open so you can learn about the history of the region while networking with colleagues. Special exhibits highlight the glass and packaging industries.

**NIP24/
 Digital Fabrication 2008
 Conference Reception**

**Wednesday, September 10
 6:45-10:00 pm**

Challenges of Embedding a Spectrophotometer Inside a Printer (Interactive), *Oscar Martínez, Hewlett-Packard Española (Spain)*

Prelinearization Stages on Color-Management Application-Specific Integrated Circuits (ASICs) (Interactive), *Marti Maria Saguer, Hewlett-Packard Espanola (Spain)*

A Study on Measuring Auto Flash Efficiency on a Digital Camera (Interactive), *Kwang Yeol Park, Dong Hwan Har, and Hyung Ju Park, Chung-Ang University (South Korea)*

A Method of Resolution Enhancement Technique Using a Weighted Values According to Locations of Reference Pixels (Interactive), *Hoke Un Lee, Samsung Electronics; Sangyoon Shin, Korea Aerospace Research Institute; and Sangho Kim and Donchul Choi, Samsung Electronics Co., Ltd. (South Korea)*

Projection-Based Scanned Image Enhancement (Interactive), *Mohamed Nooman Ahmed, Lexmark International (USA)*

A Study on the Relationship Between Digital Camera Parameters and Visual Noise, *Hyung Ju Park, Dong Hwan Har, and Kwang Yeol Park, Chung-Ang University (South Korea)*

User-Friendly Interactive Image-Enhancement for Desktop Printing of Digital Photographs, *Rodney Shaw, White Rose Digital (USA)*

Consideration on Crispening Phenomenon Based on Maximum Color Separation Model, *Nobuhiro Matsushiro, OKI Data Corp. (Japan)*

Extraction of Lung Cancer Area in Digital CT Images (Interactive), *Fei Chen and Shigeru Kitakubo, Nippon Institute of Technology (Japan)*

Recognition of Cracks of the Concrete Surface in Digital Images (Interactive), *Xin Du and Shigeru Kitakubo, Nippon Institute of Technology (Japan)*

A Study on the Measurement of LCD Grayscale Linearity by Luminance Control (Interactive), *Hyung Ju Park, Dong Hwan Har, and Kwang Yeol Park, Chung-Ang University (South Korea)*

A Voronoi Based Framework for Multilevel AM Screen Design (Interactive),

Stefaan Lippens and Wilfried Philips, Ghent University (Belgium)

Thin and Flexible Integral Photography Using High-Resolution Printer Output,

Kazuhiro Yanaka, Hideo Kasuga, and Hiromitsu Nishimura, Kanagawa Institute of Technology (Japan)

Experimental Results on Human Visual Sensitivity for Spatial Frequency of Digital Halftone Images (II) (Interactive),

Shigeru Kitakubo and Yasushi Hoshino, Nippon Institute of Technology (Japan)

DIGITAL FABRICATION MATERIALS AND SUBSTRATES

Session Chair: Tom Etheridge, Hewlett-Packard Co.;

Patrick Smith, University of Freiburg;

Taroh Terashi, Ricoh; and Akira Suzuki, Ricoh

10:00 AM - 4:30 PM

Ink Drop Deposition and Spreading in Inkjet Based Printed Circuit Board Fabrication (Focal),

Wen-Kai Hsiao, Graham Martin, Stephen Hoath, and Ian Hutchings, University of Cambridge (UK)

UV Curable Jet-Inks for Etch Resist Applications (Focal), *Alexander Grant, Sun Chemical (UK)*

Paper Substrates for Device Manufacture—A Technical Roadmap (Focal), *Alan Hodgson, Alan Hodgson Consulting (UK)*

Inkjet Printing of Phase-Change Materials, *Werner Zapka, XaarJet AB (Sweden); Tom Sutter, Rohm and Haas Electronic Materials, L.L.C., (USA); and Wolfgang Voit, XaarJet AB (Sweden)*

Structuring of Flexible Substrates by the Use of an Aqueous Solution Based Silver Ink, *Stephan F. Jahn and Alexander Jakob, Chemnitz Institute of Technology (Germany); Ingo Reinhold, University of Technology Eindhoven (The Netherlands); Lutz Engisch, Queensland University of Technology (Australia); and Heinrich Lang, Chemnitz University of Technology (Germany)*

Inkjet Printing Silver-Containing Inks, *Patrick J. Smith, Dario Mager, Ute Löffelmann, and Jan G. Korvink, University of Freiburg (Germany)*

Nanosilver Ink Jet Inks for Printed Electronics (Interactive), *O. K. Prasad, N. Desai, M. Marcz, and B. Singh, Cookson Electronics (USA)*

Direct Patterning by NanoPaste® and Its Application (Interactive), *Nobuto Terada, Harima Chemicals, Inc. (Japan)*

Inkjet Printing of Conductive Silver Tracks in High Resolution and the Alternative Sintering Thereof, *Jolke Perelaer, Thijs H.J. van Osch, Chris E. Hendriks, Ingo Reinhold, Rebecca*

Eckardt, and Ulrich S. Schubert, Eindhoven University of Technology (The Netherlands)

Particle Inks for Inkjet Printing of Electronic Components, *Ulrike Currel, Marcel Wassmer, and Klaus Krueger, Helmut Schmidt University (Germany)*

Liquid Nanoparticle Masterbatches for the Deposition of Solid Inorganic Materials, *Steffen Pilotek, Buhler Inc. (USA); Samuel Schaer, Klaus Steingroever, and Frank Tabellion, Buhler PARTEC GmbH (Germany)*

The Challenges of Printing Functional Materials on Cellulose Based Substrates, *Marian Rebro, Margaret Joyce, and Erika Hrehorova, Western Michigan University (USA)*

INDUSTRIAL AND COMMERCIAL APPLICATIONS

Session Chair: Conor Madigan, TJet Technologies;

Alexander Knobloch, PolyC GmbH & Co.;

and Kevin Cheng, ITRI

4:30 - 6:10 PM

Studies Towards the Inkjet Printed Electronics Prototype Series (Focal), *Ville Pekkanen, Katja Laine, Kimmo Kaija, Matti Mäntysalo, and Pauliina Mansikkamäki, Tampere University of Technology (Finland)*

Study on the Roll-to-Roll Ink-Jet Printing System (Interactive), *Chen-Chu Tsai, Wei-Hsun Huang, Kuo-Hua Wu, Kuo-Chiang Shang, and Chien-Kai Chang, ITRI (Taiwan)*

Correction of the Color Registration Error Through Adjustment of Installation Phases of Gears with Runout (Interactive), *Sooyong Kim and Munbo Shim, Samsung Electronics Co., Ltd. (South Korea)*

Positional Accuracy for Ink Jet Deposition in Digital Fabrication, *Ross N. Mills, imaging Technology international (iTi) Corporation, and Mike Connaughton and Graham Vlcek, In-Position Technologies (USA)*

Inkjet Printing of Swathe-Free Displays, *Mark Crankshaw, Simon Goddard, Mark Dowling, Barry Wild, Jonathan Isaac, Colin Creighton, and Edward Burton, Cambridge Display Technology (UK)*

Laser machining of thin films on top of flexible substrate carriers, *J. Hänel, T. Petsch, B. Keiper, K. Bleul, 3D-Micromac AG (Germany)*

Program continues on next page

Thursday September 11, 2008

PLENARY SESSION

Session Chair: Ross Mills,
imaging Technologies international Corp.
4:40 - 5:40 PM

Printing Methods for Printed Electronics,
Bruce E. Kahn, Printed Electronics Consulting (USA)

Abstract: Printing is certainly one of, if not the fastest, least expensive, and highest volume manufacturing technique. Its use for the deposition of functional materials offers enormous advantages for the preparation of devices over large areas, on virtually any substrate, and potentially inexpensively. Although printing processes have existed for thousands of years, it has only been relatively recently that the materials have become available for printing functional, particularly electronic devices.

A wide variety of different printing processes can be used for printed electronics. Digital Fabrication of electronic devices can incorporate either high volume printing processes – those that use a physical master (printing plate or cylinder), archaically known as “analog” printing, or techniques that don’t use a physical master (also known as “digital” printing processes). Impact as well as non-impact printing processes are important. For device fabrication, the printing process flow depends on many factors, some of which are dictated by material properties, others are determined by printing related factors such as resolution, registration, and economic considerations.

This talk will focus on the printing processes used for printed electronics, giving specific examples, as well as trends, challenges, needs, and future opportunities. *(Speaker bio found on page 17.)*

NIP TRACK 1

MEDIA FOR DIGITAL PRINTING

Session Chairs: John Stoffel, Hewlett-Packard Co.; Johann Weigert, Kodak Graphic Communications GmbH; and Toshiharu Enomae, University of Tokyo
8:30 - 11:00 AM

Paper-Related Innovations and the Impact on Digital Production Printing (Focal),
Johann Weigert, Kodak Graphic Communications GmbH (Germany)

Influence of Media on the Color Balance of Inkjet Printing, *Kimiko Imura, Masato Yamaguchi, Yujiroh Fukuda, and Takeshi Jimori, Nippon Paper Industries Co., Ltd. (Japan)*

Ink Jet Paper Prepared by Using Surface-Modified Calcium Carbonate, *Kei Matsubara, Shiraishi Central Laboratories Co, Ltd.; Toshiharu Enomae and Akira Isogai, University*

THURSDAY SPECIAL EVENTS

Thursday promises
to be an exciting day!

Please join us for the following
special events:

**Interactive Papers Session
and Lunch**
Thursday, September 11
12:00–2:30 PM

**Panel Discussion:
Digital Packaging**
3:30-4:30 PM

**Final Plenary
Printing Methods for
Printed Electronics,**
*Bruce E. Kahn,
Printed Electronics Consulting (USA)*
4:40 - 5:40 PM

Farewell Reception
End the conference with a final
networking event.
5:40 - 7:00 PM

of Tokyo; and Masahiko Tajika, Shiraishi Central Laboratories Co., Ltd. (Japan)
Coating Formulations for Digital Printing; Applications of Phase-Change Inks, *Hemant Bohra, Paul D. Fleming III, Margaret K. Joyce, and Do Ik Lee, Western Michigan University (USA)*
Preparation of Vaterite Type Calcium Carbonate by Using Ultrasound and Application to Ink-jet Paper (Interactive), *Yohta Mori, Mina Karasudani, Toshiharu Enomae, and Akira Isogai, The University of Tokyo (Japan)*
Advanced Toner Receptive Media Coating (Interactive), *Andrew Naisby, Ciba (USA)*
Uncoated Paper for Continuous Ink-Jet Printers (Focal), *Daniel F. Varnell, Hercules Incorporated (USA)*

SECURITY AND FORENSIC PRINTING

Session Chairs: Steven Simske, Hewlett-Packard Co.; Alan Hodgson, Alan Hodgson Consulting; and Kenji Ueda, Dai Nippon Printing Co.
11:00 AM - 12:00 PM and 2:30 - 4:40 PM
Interactive Papers Session and Lunch:
12:00 - 2:30 PM

Evaluation of Conductive Inks for Anti-Counterfeiting Deterrents, *Jason S. Aronoff and Steven J. Simske, Hewlett-Packard Labs (USA)*

Use of Clear Toner in Electrophotography, Dinesh Tyagi, Mark Zaretski, Tom Tombs, and Pat Lambert, Eastman Kodak Co. (USA)

Forensic Analysis and Databasing of Toners and Inkjet Inks Used in the Production of Fraudulent Documents, Douglas K. Shaffer and Joel A. Zlotnick, Department of Homeland Security (USA)

Status Quo of Security Printing—A Panoramic View at DRUPA (Focal), Long Lin, University of Leeds (UK)

Optimized Encoding and Decoding of Extrinsic Signatures for Electrophotographic Halftone Images, Pei-Ju Chiang, George T.-C. Chiu, Edward J. Delp, and Jan P. Allebach, Purdue University (USA)

Application of High Capacity Data Hiding in Halftone Images, Orhan Bulan and Gaurav Sharma, University of Rochester, and Vishal Monga, Xerox Research Center (USA)

Spectral Pre-Compensation and Security Print Deterrent Authentication, Steven J. Simske, Margaret Sturgill, Jason S. Aronoff, and Juan C. Villa, Hewlett-Packard Labs (USA)

Copy Detectable Images for Cryptographically Secure Counterfeit Detection (Focal), Justin Picard, Picard Media Security Consulting (Switzerland)

Afternoon Plenary followed by the Farewell Reception

NIP TRACK 2 PRODUCTION DIGITAL PRINTING AND WORKFLOW

Session Chairs: Omer Gila, Hewlett-Packard Co.; Jorge Castaño, Hewlett-Packard Co.; and Masahiko Itaya, Samsung Electronics Co. Ltd.

8:30 - 11:30 AM

Ink Development in HP Indigo Digital Presses (Focal), Tagansky Boaz, Hewlett-Packard Co. (Israel)

Image Quality and Productivity of the New Xeikon Digital Presses Using “True 1200 dpi” Multilevel Print Head Technology, Frank Deschuytere and Dirk Broddin, Punch Graphix (Belgium)

Architecture of a High Performance Multi-level LED Print Head Platform, Wolfgang Schullerus, Océ Printing Systems GmbH (Germany)

New Concept for Image Quality Control in B/W and Full Color Production Printing, Manfred Münz, Océ Printing Systems GmbH (Germany)

Challenges and Opportunities in Web-To-Print Workflow for Production Digital Printing (Focal), Chuck Gehman, Mimeo (USA)

A New Generation of Variable Data Publish-

ing Solutions Helps Marketers Meet Today’s Communications Challenges (Focal), James Lockman, Working Words and Graphics (USA)

THERMAL PRINTING

Session Chairs: Wendell Brattlie, Eastman Kodak Co., Ian Stephenson, ICI; and Hirotooshi Terao, Alps Electric Co., Ltd.

11:30 AM - 4:40 PM

**Interactive Papers Session and Lunch:
12:00 - 2:30 PM**

The Role of the Thermal Dye Receiver in Thermal Dye Transfer Printing—A Modeling Approach (Focal), Po-Jen Shih, Narasimharao Dontula, and Teh-Ming Kung, Eastman Kodak Co. (USA)

Conductive Microwire Patterning Using Laser Thermal Transfer Method (LT2M) (Interactive), Katsuhiko Yoshida, General Co., Ltd. (Japan)

Modifications of Color Formers for Placement in Different Layers in a Single-Sheet Thermal Imaging System (Focal), Fariza B. Hasan and Stephen J. Telfer, Zink Imaging, Inc. (USA)

Development of High Speed True Edge Printhead for Card Printer, Hidekazu Amatatsu, Naoto Matsukubo, Daisaku Kato, and Takashi Aso, Kyocera Corp. (Japan)

New Erase Head for Kanban Card Size Thermal Rewritable Media, Hideo Taniguchi, HIT Devices, Ltd. (Japan), and Jiro Oi, HIT Devices, Ltd. (USA)

Development of a Thermal Print Head by 3D Thermal Analysis, Hirotooshi Terao, Alps Electric Co., Ltd. (Japan)

Printing System for Industrial Use, Tetsuya Matsuyama, Dai Nippon Printing Co., Ltd. (Japan)

Development of Dual-Line Wide-Format 1200-dpi Thermal Print Head, Takeshi Toyosawa and JC Wang, OYO Geospace (USA)

Afternoon Plenary followed by the Farewell Reception

NIP TRACK 3 COMMERCIAL AND INDUSTRIAL PRINTING

Session Chairs: Eric Stelter, Eastman Kodak Co.; Rafi Bronstein, HP Scitex; and Yasuji Fukase, Fuji Xerox Co., Ltd.

8:30 - 11:00 AM

Greener Ink Technology for Wide and Super-Wide Inkjet Printing (Focal), Howard Doumaux, Philip Cagle, and Jorge Castaño Aspas, Hewlett-Packard Co. (USA)

Pigmentation of Inks for Emerging Ink Jet Applications on Glass, Ceramics and Metals, Hugh Allen, SunJet (UK)

Technical Considerations When Designing and Building an Industrial Ink Jet Printer, Terence R. O'Keefe, FUJIFILM Dimatix (The Netherlands)

Retail Printing, Industry Trend and Technical Challenges, Behnam Bastani and Anton Tabar, Hewlett-Packard Co. (USA)

Improved Reliability in Industrial Inkjet Printing (Focal), Werner Zapka, Xaarjet AB (Sweden)

DIGITAL PACKAGING

Session Chair: Shiriram Revankar,
Xerox Innovation Group

2:30 - 4:30 PM

**Interactive Papers Session and Lunch:
12:00 - 2:30 PM**

Digital Production of Personalized 3D Displays or Simple Folding Cartons (Focal), Barry Gombert, John Walker, and Shiriram Revankar, Xerox Innovation Group (USA)

Managing Pile-Height Through Image-Based Compensation in Digital Flexible Package Printing (Focal), Shiriram Revankar, Xerox Innovation Group (USA)

Panel Discussion: Digital Packaging

Afternoon Plenary followed by the Farewell Reception

DIGITAL FABRICATION INDUSTRIAL AND COMMERCIAL APPLICATIONS (CONTINUED)

Session Chair: Conor Madigan, Eastman Kodak Co.; Alexander Knobloch, PolyC GmbH & Co.; and Masahiko Fujii, Fuji Xerox

8:40 - 9:20 AM

Techniques of Optimizing the UV Curing Process for Ink Jet Deposition of "Opaque" Materials, R.W. Stowe, Fusion UV Systems, Inc. (USA)

Selective Mask Sintering for Rapid Production of Parts, Implemented by Digital Printing of Optical Toner Masks, David S. Hermann and Thomas Nilsson, Sintermask Technologies AB (Sweden)

PRINTED ELECTRONICS & DEVICES

Session Chairs: Gregory Herman, Sharp Labs of America, Inc.; Mark Crankshaw, Cambridge Display Technology; Masaaki Oda, ULVAC; and Takao Someya, Tokyo University

9:20 AM - 4:20 PM

**Interactive Papers Session and Lunch:
12:00 - 2:30 PM**

Printed RFID Based On Low Cost Polymer Electronics (Focal), Alexander Knobloch, PolyC GmbH & Co. KG (Germany)

Printed MRI Coils on Flexible Substrates

(Interactive), Dario Mager, Ute Loeffelmann, Patrick J. Smith, and Jan G. Korvink, University of Freiburg (Germany)

Electrostatic Self Assembly of Carbon Nanotubes (Interactive), Robert H. Detig, Electrox Corp. (USA)

Ink Jet Printing of PZT Thin Films For MEMS Applications (Focal), Stephen Bathurst, Jessie Jeon, Hyungwoo Lee, and Sang-Gook Kim, Massachusetts Institute of Technology (USA)

Use of Direct Write Methods for Reduced Cost Photovoltaics (Focal), M.F.A.M. van Hest,¹ A. Miedaner,¹ C.J. Curtis,¹ J. Leisch,¹ P. Hersh,¹ K. Steirer,² R. Pasquarelli,² J.A. Nekuda,² R. O'Hayre,² and D.S. Ginley¹; ¹National Renewable Energy Laboratory and ²Colorado School of Mines (USA)

Active-Matrix Backplane with Inkjet Printed Organic Thin-Film Transistors (OTFTs) for QR-LPD (Focal), Hironori Kobayashi, Masanao Matsuoka, Mitsutaka Nagae, Hiroyuki Honda, Tomomi Suzuki, Kenichi Ogawa, and Hiroki Maeda, Dai Nippon Printing Co., Ltd. (Japan)

Chemical Post-Treatment of Inkjet Printed Nano-Particle Silver Inks, Werner Zapka and Christian Loderer, Xaarjet AB (Sweden)

Using Hotmelt-Inkjet as a Structuring Method for Higher Efficiency Industrial Silicon Solar Cells, J. Specht, D. Biro, M. Aleman, U. Belledin, R. Efinger, D. Erath, L. Gautero, A. Lemke, N. Mingirulli, D. Stüwe, J. Rentsch, and R. Preu, Fraunhofer ISE (Germany)

M3D Aerosol-Jet® Printing for Improved Crystalline Photovoltaic Cell Efficiencies, Stephen M. Barnes, Bruce H. King, Michael O'Reilly, David Ramahi, and Steven Woolfson, Optomec Inc. (USA)

Solution-Based Hybrid Printing Process for Tiny Channel Length of Organic Transistors, Chao-Feng Sung, Chen-Chun Hsu, Kuo-Hua Wu, and Yuh-Zheng Lee, DTC/Industrial Technology Research Institute (Taiwan)

Ink Jet Printable Organic Semiconducting Materials and Formulations—Combining Printability, High Performance and Air Stability, Mark James, Merck Chemicals Ltd. (UK)

Afternoon Plenary followed by the Farewell Reception

PLENARY SPEAKER BIOS

Paul Brandl, PhD, has been Director of R&D for Nippon Aerosil Company (NAC) in Yokkaichi, Japan for the past eight years. Brandl directs all external additive development and regulatory support for external additives based on fumed metallic oxides in toners globally. NAC is part of the Evonik Degussa GmbH family of companies. Brandl has been with Evonik Degussa for more than 20 years, involved in various aspects of R&D and technical service.

NIP 24/Digital Fabrication 2008 Exhibitors*

The exhibit hall will be open on Tuesday, September 9th from 10:00 am to 7:15 pm and Wednesday, September 10th from 9:00 am to 4:00 pm. Please visit these exhibitors:

7-SIGMA, Inc.

Baker Petrolite

Buhler, Inc.

Cabot Corporation

Ciba Corporation

Clariant Corporation

Diamond Dispersions Ltd.

Digital Print CIC

Epping GmbH

Esprit Technologies

Evonik Industries AG

Fenner Precision

FUJIFILM Dimatix, Inc.

Fuji Silysia Chemical, Ltd.

Grace Davison

Hodogaya Chemical (U.S.A.) Inc.

Hosokawa Micron Powder Systems

Huntsman Corporation

ImageXpert, Inc.

Integration Technology Ltd.

iTi - imaging Technology international Corp.

Kyocera Industrial Ceramics Corpo-

ration

Membrana

Orient Chemical Industries, Ltd.

Pall Corporation

Powdertech International Corp.

Quality Engineering Associates (QEA), Inc.

Roger's Hill Associates, Inc.

Saint-Gobain Performance Plastics

Sartomer Company, Inc.

Schlegel Systems, Inc.

Sensient Technologies

SunJet

TAYCA CORPORATION

TREK, INC./TREK JAPAN KK

Trident Industrial Inkjet - An ITW Company

TSI Incorporated

Wacker Chemie AG

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

*as of June 11, 2007

Steve Hoover, vice president and center manager of the Xerox Research Center Webster, is responsible for research and technology in software, solutions, imaging, cross-media technologies, and marking processes and hardware. Prior to this, Hoover led the incubation of multiple new office and production product releases, as well as the development of several new marking platform architecture and web services based remote service strategies and technologies. He was a key contributor to xerographic process development and systems engineering for the early Xerox iGen3 Production Systems prototypes, to mechatronics systems development for electronic registration, and to smart media handling technologies. He holds multiple patents.

Bruce E. Kahn is a consultant specializing in the multidisciplinary fields of printed electronics, nanotechnology, Radio Frequency Identification (RFID), and smart packaging. Previously, he was a professor at the Rochester Institute of Technology, where he started the Printed Electronics research program. Kahn has a PhD in Chemistry from the University of Nebraska, and a BS in Chemistry from the University of Chicago. He is the author of more than 75 publications, including *Developments in Printable Organic Transistors, Printed and Thin Film Photovoltaics and Batteries, and Printed Displays*.

Hiroyuki Kawamoto holds a BS in Electrical Engineering from Hiroshima University (1972) and a PhD in Mechanical Engineering from Tokyo Institute of Technology (1983). From 1972 to 1991, he was a senior engineer at the Nuclear Division of Hitachi Ltd. In 1991, he moved to Fuji Xerox, and had been engaged in the research of electrophotography as a research fellow. In 1999, he left Fuji Xerox and is now a professor at Waseda University. He is an IS&T Fellow (1999) and was awarded the Chester F. Carlson Award in 2007.

James Yoo, MD, PhD, is assistant director and associate professor of the Wake Forest Institute for Regenerative Medicine. He heads the Tissue Engineering and Clinical Translation Program at the institute. His expertise lies in cell-based therapies, tissue engineering and clinical translation. His extensive experience in cell biology and medical background has facilitated the transfer of many cell-based technologies from the bench-top to the bedside. Yoo has been involved in engineering various tissues and organs, including the bladder, blood vessels, heart valve, kidney, cartilage, bone, muscle, vagina and urethra for clinical translation. He has performed many preclinical studies under GLP guidelines and has conducted several clinical trials in a GMP facility.

NIP24/Digital Fabrication 2008 Week

	8	9	10	11	12	13
SAT		Special Tutorial: Packaging for Digital Pr				
SUN		T01 / T02 / T03 / T04 / T05				
MONDAY		Plenary: Evolution and Regulatory Impact of External Additives in Toners Paul Brandl, Nippon Aerosil Co. (Japan)	T13 / T14 / T15 Toner-based Printing Materials Ink Jet Printing Processes Photo-electronic Materials and Devices Image Permanence			Print Gallery opens at
TUESDAY		Plenary: Inkjet Printing Technology for Regenerative Medicine James Yoo, Wake Forest Institute for Regenerative Medicine (USA)	T18 / T19 (8:00-10:00) / T20 Toner-based Printing Processes Ink Jet Printing Materials Print and Image Quality Biomaterial Fabrication			EXHIBIT OPEN
WEDNESDAY		Plenary & Awards Presentations: The Revolution of Print and Our Industry Steve Hoover, Xerox Corp. (USA)	Fusing, Curing, and Drying Enviromental Issues Digi. Print/QC Color Sci. & Image Pro. Materials & Substrates			EXHIBIT OPEN
THURS.		Media for Digital Printing Prod. Dig. Print. & Workflow Commercial & Industrial Printing Ind. & Comm. Apps. Con't	Sec. & Forensic Print. Thermal Print. Printed Electronics & Devices		Inter (Lun	

LEGEND

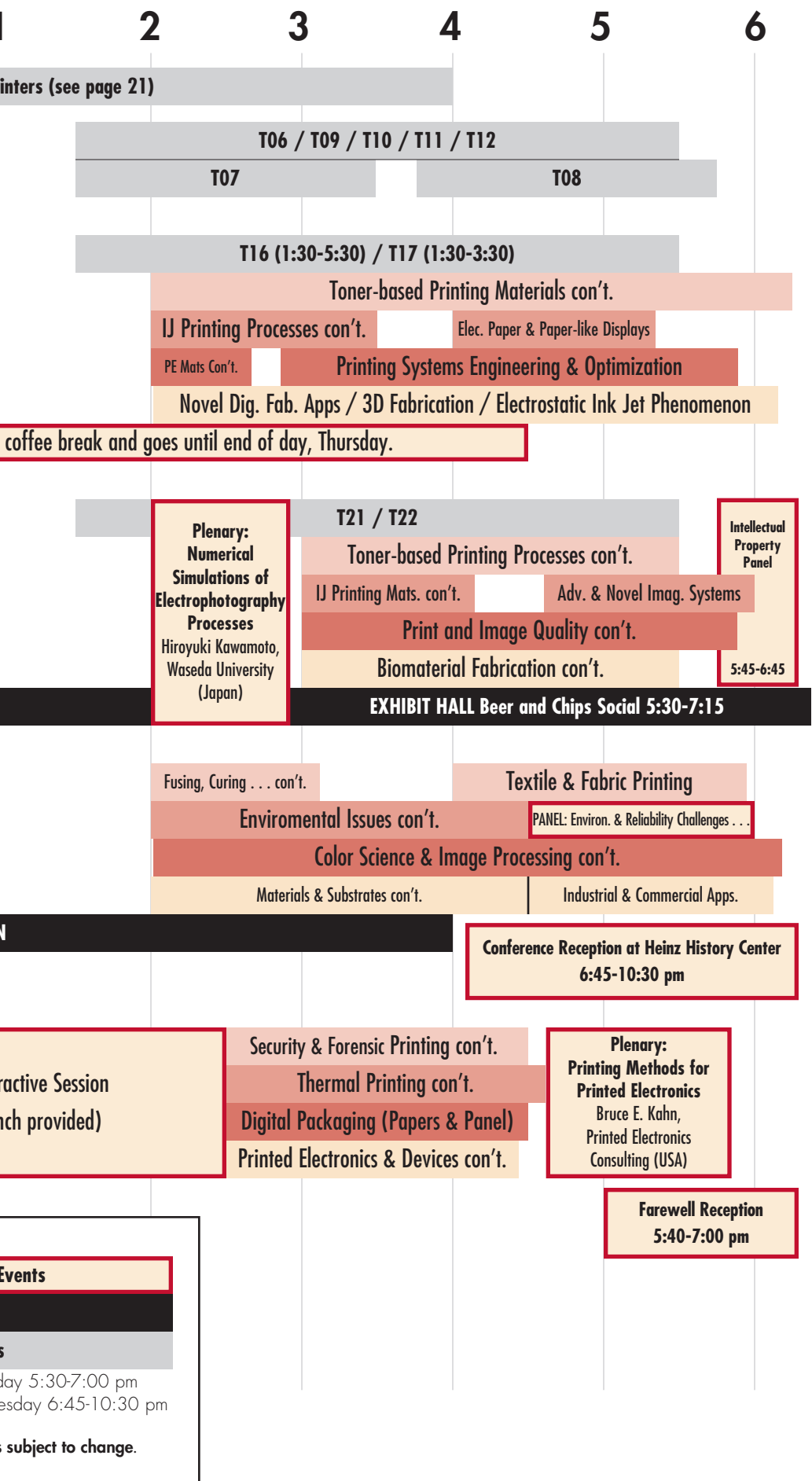
NIP Track 1
NIP Track 2
NIP Track 3
Digital Fabricaton

Special Joint I
Exhibit
Tutorials

Welcome Reception: Sun
 Conference Reception: Wedne

Please note: Coffee breaks that occur in the middle of sessions are not shown. Schedule is

Week At-a-Glance



Short Course Program

This year's NIP/DF Tutorial Program offers a wide range of introductory and advanced topics in the fields of nonimpact printing and digital fabrication. Most of the tutorial instructors are internationally recognized experts in their field and are dedicated to promoting the understanding and advancement of imaging science and technology. In addition to being able to ask questions during the oral presentation, every attendee will receive a copy of the instructors' notes/slides to take home. IS&T members and non-members are encouraged to sign up in advance to ensure that courses run.

Special Offer:
Sign up for three or more tutorials and receive 25% off the total member or non-member fee.

Students may take any tutorial for \$50. Additional 25% 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 7, 2008

T01: Introduction to Electrophotography

Sunday 8:00 am to 12:00 noon (4 hours)

Instructor: Lawrence B. Schein, Consultant

Electrophotography, the technology in copiers and laser printers, continues to evolve. In this tutorial, the basis of the technology—from the basic six steps to the underlying physics of the process—is discussed, as is the physics of development and transfer, current understanding of toner charging, and challenges of color electrophotography.

Benefits

This course enables an attendee to:

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

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

Independent consultant Lawrence B. Schein received his PhD in solid state experimental physics from the University of Illinois (1970). He worked at Xerox Corporation

from 1970 to 1983, and at IBM Corporation from 1983 to 1994. Schein has helped implement development systems in IBM laser printers, proposed theories of most of the known electrophotographic development systems, and contributed to the understanding of toner charging, toner adhesion, and charge transport mechanisms in photoreceptors. He is the author of Electrophotography and Development Physics, a Fellow of IS&T and the American Physical Society, recipient of the Carlson Memorial Award (1993), a Senior Member of IEEE, and a member of the Electrostatics Society of America.

T02: Introduction to Biofabrication

Sunday 8:00 am to 12:00 pm (4 hours)

Instructor: Thomas Boland, Clemson University

Digital and non-impact printing has found new applications in non traditional disciplines, such as MEMS or 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 tutorial 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

SPECIAL SATURDAY TUTORIAL

PACKAGING FOR DIGITAL PRINTERS



Saturday, Sept. 6, 2008

9 AM to 4 PM

lunch with fellow attendees and the instructor is included in the fee for this course

***Be a partner with potential packaging customers—
learn their practices and technologies.***

WHAT YOU WILL LEARN

Packaging's strong emphasis on decorating grows to deliver more and more impact at the point of sale. Be part of that expansion by learning what is important in packaging:

- Packaging's roles, particularly as the silent salesperson
- The packaging development process and how decorating fits in
- Decorating options that answer needs
- Major packaging types—what materials are involved, how they fit their role
- Paperboard, folding cartons, corrugated boxes; Plastics and flexible packaging
- Labels and labeling techniques
- Laws and Regulations
- Packaging workflow and the role of printing in packaging
- Opportunities for digital printing in packaging; customization

This special tutorial is being taught by instructors of the Institute of Packaging Professionals (IoPP), the professional educational organization of the packaging community. Each year, IoPP teaches more than 200 packaging professionals through its educational programs. This condensed, focused tutorial brings digital printers what they need to understand in an industry with its own jargon and priorities.



**Institute of
Packaging
Professionals**

WHO SHOULD ATTEND:

- Printing industry professionals looking at opportunities for value addition in packaging
- Engineers and scientists interested in learning the characteristics of materials, media, and workflow in packaging
- Managers who want a better understanding of packaging

For details on the curriculum and speaker go to www.imaging.org/conferences/nip24.

Special \$425 member/non-member fee; includes lunch

Register via the NIP24/DF2008 conference website or using the form on page 36.

**We will make a decision on August 1,
whether or not to run this tutorial, so please register early.**

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 Dept. of Bioengineering at Clemson University. He received his BS in Chemical Engineering from the Ecole Nationale Supérieure d'Ingénieurs de Génie 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.

T03: Color Management for Digital Printing Systems

Sunday 8:00 am – 12:00 pm (4 hours)

Instructor: Eli Saber,
Rochester Institute of Technology

This course provides an overview of a generic digital printing system and an in depth discussion on color management and device characterization/calibration techniques for input and output devices. In particular, it describes the functionalities performed by the workstation(s) with special emphasis on color management and image processing applications, the digital front end where we illustrate the overall generic raster image processing (RIP) architecture and focus on the color management, image processing, and “ripping” applications; the image path where we describe the role of device calibration, halftoning, and the use of image tags; and the marker.

Benefits

This course enables an attendee to:

- Identify the major components and modules of a digital printing system and describe their main functionality
- Describe the processing steps (click to clunk) that are imposed on an electronic document in the workstation, the digital front end, the image path and the marking system
- Describe the main functionalities of the following modules: color management/characterization, color calibration, image processing, and halftoning
- Develop an understanding of the color fundamentals for digital printing (human visual system, colorimetry, color differences, color spaces, reflectance and reflectance spectra, relationships between XYZ, $L^*a^*b^*$, luminance-chrominance spaces, etc.)
- Develop a working knowledge for input/output device color calibration, characterization, and management techniques and algorithms

Intended Audience: product/technical managers, engineers, and digital printing software developers seeking a broad overview of digital printing and color engineering; engineers and scientists seeking to develop an in-depth understanding of color characterization/calibration techniques for input and output devices.

Eli Saber is an associate professor in the Electrical Engineering Dept. at the Rochester Institute of Technology. He was employed by Xerox Corp. from 1988-2004 working in the areas of imaging, printing, and color science

on a number of color and highlight color products including iGen3. He received his BS in Electrical and Computer Engineering from the University of Buffalo (1988), and his MS and PhD in the same discipline from the University of Rochester (1992 and 1996). From 1997-2004, Saber was an adjunct faculty member at RIT and the Univ. of Rochester. He is a member of IS&T and a senior member of IEEE; an associate editor for IEEE Transaction on Image Processing and the Journal of Electronic Imaging; and guest editor for the special issue on Color Image Processing for IEEE Signal Processing. He is the past chair of the IEEE TC on Industry DSP Technology and a member of the Image and Multi-dimensional Digital Signal Processing TC.

T04: Industrial Inkjet Technology for Printing and Fabrication

Sunday 8:00 am – 12:00 pm (4 hours)

Instructor: Alan Hodgson, consultant

This course bridges the NIP and Digital Fabrication conferences and therefore examines inkjet technology for both traditional printing and emerging fabrication applications. It achieves this by summarizing the key elements of current industrial inkjet technology (printers, heads, inks and media), 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. The course compares and contrasts the developments in printing and fabrication areas but shows the interdependence between them. It also illustrates where the two application areas may yet converge in the longer term.

Benefits

This course enables an attendee to:

- List and explain the commercial and technical drivers for industrial inkjet in both printing and digital fabrication application areas
- Gain awareness of how printers, heads, fluids, and substrates interact to make an inkjet printing system
- Gain an overview of current and future applications of industrial inkjet technology
- Summarize the technology of inkjet 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 inkjet either as a supplier or a user. It is particularly appropriate for participants who are considering the further potential of inkjet and would like an overview of the relevant inkjet technologies in both traditional printing and fabrication applications.

Alan Hodgson is an independent consultant with 26 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 inkjet application development. He is currently working on inkjet consultancy projects in both traditional printing and fabrication applications and is a regular conference speaker and tutor. Hodgson has a BS in colorant chemistry and a PhD in instrumentation, both from the Department of Chemistry at the University of Manchester. He is a Fellow of the Royal Photographic Society as an Accredited Senior Imaging Scientist. In addition to IS&T, he is active in the Royal Photographic Society and Institute of Physics as a lecturer and session chair. He is also a member of the NIP 24 Conference Committee.

T05: Introduction to Toner Technology

Sunday 8:00 am – 12:00 pm (4 hours)

Instructor: George Marshall,
Lexmark International, Inc.

This tutorial 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.

T06: Chemical Toner

Sunday 1:30 pm–5:30 pm (4 hours)

Instructor: Grazyna Kmiecik-Lawrynowicz,
Xerox Corp.

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 Kmiecik-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 in Poland and her PhD in chemistry from Rutgers University (1987). After completing postdoctoral studies at the University of Toronto, Kmiecik-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, Kmiecik-Lawrynowicz transferred with EA toner technology 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.

T07: Desktop Ink Jet Products Performance Study

Sunday 1:30 pm to 3:30 pm (2 hours)
Instructor: Rob Beeson, Hewlett-Packard Company

This short course examines products from HP, Canon, Epson, Lexmark, Brother, Kodak, Ricoh, and Memjet announcements. 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 technology, such as dye diffusion thermal transfer and ZINK, is also addressed.

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 print head performance characteristics
- Look at some patents for future direction

Intended Audience: for those somewhat familiar with ink jet printing technology that want a better understanding on the differences in the print head output parameters from popular manufacturers.

Rob Beeson is a senior member of the technical staff in the Ink Jet 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. Beeson 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. He has given many ink jet presentations at conferences worldwide since 1998.

T08: An Introduction to Digital Fabrication: Methods, Materials, and Applications

Sunday 3:30 pm – 5:30 pm (2 hours)

Instructor: James W. Stasiak,
Hewlett-Packard Company

Over 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 established 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 short course examines the factors that are moving digital fabrication from a niche technology towards 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, in 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.

T09: Advanced Digital Halftoning

Sunday 1:30 pm to 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.

The aim of this tutorial is to describe the basic principles of digital halftoning and the three major classes of halftoning methods: screening, error diffusion, and search-based. We then discuss 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 tutorial 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 is 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.

T10: Papermaking, Coating Fundamentals and Media for Digital Printing

Sunday 1:30 pm – 5:30 pm (4 hours)

Instructor: Sen Yang, Avon Products

This short course includes an introduction to papermaking and coating technologies, as well as 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 will be discussed. A review of recent developments of ColorLok™ Technology and “better paper for better printing” will be reviewed.

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. Prior to 2007, 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 inkjet, EP papers, and specialty media.

T11: Business in Japan and China

Sunday 1:30 pm – 5:30 pm (4 hours)

Instructors: Robert J. Nash, Hafren Associates, and
Graham Galliford,
Galliford Consulting & Marketing

The Far East is an important center for the digital printing industry. Many major OEM manufacturers of printers and supplies are based in Japan, with manufacturing plants being increasingly relocated to Special Economic Zones in China. These areas of China are also home to numerous third-party producers of print cartridges, printer components, etc. As a result, many digital printing technologists and businessmen must travel frequently to Japan and China, and for Westerners these visits can create significant cross-cultural challenges. Accordingly, this tutorial has been designed to facilitate East/West interactions, based on the personal experiences of the presenters in Japan and China.

The first two hours of the tutorial are a

discussion of the underlying factors of business life in Japan from a cultural and linguistic perspective. For the frequent traveler to Japan, an understanding of the underlying social rules can greatly improve business relationships. The second two hours focus on the logistics of doing business and different options of how to enter into business in China are discussed with reference to the objectives of doing so. The course includes detailed discussions of how to do business in China and the cultural aspects of conducting business there.

Benefits

This course enables an attendee to:

- Learn about Japanese life through the experiences of a resident foreigner living and working daily in a Japanese-only environment
- Seek answers to puzzling questions about Japan from a fellow-Westerner
- Identify and interpret the “hidden” rules that govern life in Japan and develop appropriate responses
- Recognize key Japanese verbal expressions
- Develop interpersonal traits (e.g. patience, modesty, etc.) that are compatible with the Japanese lifestyle
- Learn about getting started and conducting business in China
- Understand the special needs for getting into business, including how to make decisions on structuring, developing, managing, and controlling a business in China as a foreign concern

Intended Audience: travelers to Japan who still feel confused and uncomfortable even after repeated visits. Japanese nationals seeking an insight into the “problems” that foreigners experience in Japan. Non-Chinese managers and specialists without experience working in foreign business environments destined to work in China either as visitors or on an expatriate basis.

Robert Nash served an expatriate assignment at Fuji Xerox, Takematsu, Japan, as the Senior Manager, Resident for the Xerox Supplies Development, Manufacturing, and Supply Chain Operations organization from 1998-2000. In Japan, he and his wife lived in a close-knit Japanese neighborhood. Through the kind help of their neighbors, they experienced many non-tourist aspects of everyday life in Japan: weddings, funerals, daily shopping, car ownership, local festivals, mountain hikes, onsen hot baths, arts and crafts, traditional foods, etc. Nash retired from Xerox in early 2002, and currently provides a consulting service on a variety of subjects, ranging from xerographic materials to cross-cultural interactions with Japan.

Graham Galliford founded Galliford Consulting & Marketing, a techno-commercial consulting business concerning toner-based digital printing in May 1994. GCM operates from a unique facility for R&D into digital printing materials and has created new printing materials and assisted in design, testing, and qualification of raw materials for printing. Apart from his R&D initiatives, Galliford is a regular speaker at conferences worldwide on the toner business from technology to marketing to manufacturing, and has recently focused upon development of Chemically Prepared Toners (CPT) as well as the global shifts in business from Western Markets to Asia, in particular the shift to the Peoples Republic of China.

T12: 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 course provides a foundation for understanding various electrostatics phenomena that are exploited in the electrophotographic process. The tutorial serves as an introduction to electrostatics topics covered in other related tutorials 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 non-uniformly 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 as a Senior Fellow from Xerox's Wilson Center for Research & Technology in 2006. His research and technology contributions in 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 67 US Patents. Prior to joining Xerox in 1968, he received a BS from Iowa State University and a PhD in physics from Rutgers University.

Monday, September 8, 2008

T13: Color Imaging System Optimization

Monday 8:00 am – 12:00 pm (4 hours)

Instructors: Raja Bala, Xerox Corp. and Gaurav Sharma, University of Rochester

This tutorial underscores the system aspect of color imaging by providing insight into the common interactions among different functions within a digital imaging system. It begins with a brief overview of the basic color processing functions, including color halftoning, device calibration, characterization, gamut-mapping, quantization, and compression. The course then highlights common system interactions among these functions and illustrates, through specific case studies, how knowledge of these interactions may be beneficially exploited for improving overall system performance, and/or image quality.

Benefits

This course enables an attendee to:

- List basic processing functions in a digital color imaging system, and schematically represent a system from input to output
- Describe unintended interactions between input and output characterization profiles and ways to mitigate these
- Comprehend and exploit the interactions between color and spatial dimensions in optimizing a color imaging system
- Explain how media characteristics influence the performance of color imaging devices
- Understand the interactions between halftones and color in output devices and some techniques for co-optimization of these
- Appreciate how system design and

optimization can surmount problems that are not resolvable in individual components

Intended Audience: for engineers, scientists, students, and managers interested in acquiring a broad- system wide view of digital color imaging systems. Practitioners and experts who are familiar with specific components also stand to gain a better perspective for the remainder of the system. Case studies on system optimization presented in this course will be of interest to technologists looking for ways to improve their digital color imaging systems, and will hopefully serve as inspiration for additional research in this area. Attendees are expected to be familiar with basic image processing, and colorimetry.

Raja Bala is a principal color scientist at Xerox's Imaging and Services Technology Center, where he has performed research and development in color imaging for the last 13 years. He is also an adjunct faculty member in the School of Electrical Engineering at the Rochester Institute of Technology.

Gaurav Sharma is an associate professor in the Electrical and Computer Engineering Dept. at the University of Rochester, where he has been since Fall 2003. Prior to that he was with the Xerox Innovation Group. He has worked on research in color imaging for the past 15 years and is editor of the Digital Color Imaging Handbook published by CRC press in 2003.

T14: Fusing Technologies and Toner Materials Relationships

Monday 8:00 am – 12:00 pm (4 hours)

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

Most conventional electrophotographic printing systems require a fusing sub-system 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 Rochester Institute of Technology 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 one year of a 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.

TI5: Direct-Write Technologies for Rapid Prototyping Applications: Sensors, Electronics, and Power Sources

Monday 8:00 am – 12:00 pm (4 hours)

Instructor: Douglas B. Chrisey,
Rensselaer Polytechnic Institute

Direct writing describes any technique or process capable of depositing, dispensing, or processing (including removing) different types of materials over various surfaces following a preset computer-generated pattern or layout. Direct writing allows designers and manufacturers to bypass the traditional staged assembly process and/or part specific tooling and “grow prototypes,” that will operate as a final product. There is a strong need in the electronics industry to reduce product design and development times and to adaptively produce small lots at a competitive cost. Conventional thick film techniques like screen printing and low resolution lithography often require several iterations of the development cycle—circuit design, mask fabrication, prototype manufacture, testing and evaluation, iterate design, repeat—before a new electronic device or subsystem can go to market. Direct write offers an alternative to this.

The materials, processes, and systems for direct write are at various stages of maturity with some off-the-shelf, fully integrated systems available, but in many cases further development is required before implementation in a production line. This course gives an overview of direct-write technology with examples of its benefits and barriers, especially in terms of how it is affecting the world of electronics, sensors, and power sources.

Benefits

This course enables an attendee to:

- Understand attributes of different direct-write techniques
- Compare direct-write materials and substrates
- Gain an overview of the technological issues and challenges of direct writing
- Recognize market issues in electronic direct writing
- Learn about examples of direct writing electronics, sensors, power sources, and biomaterials

Intended Audience: engineers and scientists working or interested in entering the areas of direct-writing conformal electronics, sensors, and power sources.

Douglas B. Chrisey received a BS (Honors) in Physics

from SUNY at Binghamton (1983) and a PhD in Engineering Physics from the University of Virginia (1987). He joined the US Naval Research Laboratory as a staff member and became head of the Plasma Processing Section. In 2005, he served as Deputy Director of the Center for Nanoscale Science and Engineering at North Dakota State University before joining the Materials Science Department of Rensselaer Polytechnic Institute. His research interests have focused on novel methods for laser fabrication of thin films and coatings of advanced electronic, sensor, and biomaterials. More recently his research interests have focused on novel approaches, materials, and devices fabricated by direct-writing. He holds 18 patents, has edited or co-edited 10 books, written eight book chapters and more than 400 publications, and has been cited more than 5,000 times.

TI6: Organic Photoreceptors in Electrophotography

Monday 1:30 pm – 5:30 pm (4 hours)

Instructor: David S. Weiss,
Eastman Kodak Company

Organic photoreceptors are large-area photoelectric devices that are at the heart of today’s digital electrophotographic printers. This tutorial provides 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 make up and the function of the various layers in an organic photoreceptor
- Describe the technologies involved in the manufacturing and testing of organic photoreceptors
- Learn 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. Students, sales and marketing personnel, technicians, engineers, and scientists may also benefit. A general background in chemistry, physics, and the electrophotographic process will be helpful but is not essential.

David S. Weiss, scientist fellow at Eastman Kodak Company, received his PhD in chemistry from Columbia University (1969). His work focuses on electrophotographic technologies with an emphasis on organic photoreceptors. He holds 17 US patents and has authored more than 90 publications. Weiss is co-author of Organic Photoreceptors for Imaging Systems (Marcel Dekker, Inc., 1993) and Organic Photoreceptors for Xerography (Marcel Dekker, Inc., 1998), and is co-editor of the Handbook of Imaging Materials, Second Edition (Marcel Dekker, Inc., 2002). He has been an Associate Editor of the Journal of Imaging Science and Technology since 1988 and has served as General Chair of NIP17 and in many other NIP committee assignments. In 1999, Weiss received the Carlson Memorial Award; in 2004 he was named an IS&T Senior Member; and in 2006, he was elected to the IS&T board as a vice president and in 2008 as treasurer.

T17: Fabrication Materials and Processes of Ink Jet Printheads

Monday 1:30 pm – 3:30 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 tutorial 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 reviewed. This tutorial 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 print-heads

Intended Audience: scientists, engineers, product managers, and others charged with the 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 27 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. Hue received his BS in Chemistry from the University of Iowa (1979) and MS in Chemistry from New Mexico State University (1981).

Tuesday, September 9, 2008

T18: Electrostatic Toner Transfer

Tuesday 8:00am – 12:00 pm (4 hours)

Instructors: Thomas N. Tombs and Mark C. 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 short 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.

Thomas N. Tombs, manager of Advanced Development Projects at Eastman Kodak Company directs the research and development of electrophotographic technologies in the Graphic Communication Group. He received a PhD in electrical engineering from the University of Rochester, specializing in the fields of electrostatics and particle electromechanics. His involvement with electrophotography began in the research labs of Kodak in 1992. He joined NexPress Solutions in 1998 to develop and commercialize the transfer technology in the first NexPress digital production press and continued to develop a range of electrophotographic subsystems and materials as chief engineer. Tombs has 50 US patents and has published articles on particle electromechanics, adhesion, and electrostatic toner transfer.

Mark C. Zaretsky, senior electrophotographic engineer at Eastman Kodak Company, received his PhD in electrical engineering from Massachusetts Institute of Technology (1988). He has worked in the area of electrostatic technology for 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, as well as 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.

T19: Introduction to Image Processing for Electronic Printing

Tuesday 8:00 am – 10:00 am (2 hours)
Instructor: Robert P. Loce, Xerox Corp

Image processing is a key element of electronic printing systems. This tutorial discusses image processing preparations for a digital image in order to enable a

true and aesthetically pleasing representation of the digital information on a print. Issues addressed include resolution of input and output devices, line growth, color registration, and halftone related considerations.

Benefits

This course enables an attendee to:

- Understand color image trapping
- Learn about 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 and 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 from Monroe Community College. While working in the Optical and Imaging Technology and Research departments at Xerox, he received his BS in photographic science from the Rochester Institute of Technology (1985), his MS in optical engineering from the University 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. Loce has publications and many patents in the areas of halftoning, digital image rendering, optics, imaging systems, and digital image enhancement. A fellow of SPIE and a member of IEEE, Loce is currently 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.

T20: Charging Systems and Dependent Processes in Electrophotography

Tuesday 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. The device requirements and their operational modes can be quite different for each function. This course addresses the applied principles of operation in meeting those requirements, including critical parameters and known failure modes. The application dependent requirements and supporting analysis, in the form of examples, are discussed with a stronger focus on photoreceptor charging and toner transfer processes. Novel charging system concepts are also reviewed.

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 governing electrical performance and impacting failure modes
- Relate current-voltage behavior to equivalent electrical circuits
- Derive and utilize a simplified model incorporating hardware and process parameters to estimate charging performance in various process steps such as photoreceptor charging and toner transfer

- Comprehend the impacts of photoreceptor electrical behavior on charging subsystem performance
- Define some of the issues associated with toner transfer

Intended Audience: scientists and engineers involved in the development of electrophotographic marking subsystems and systems employing corona devices and their variants. The attendee should have a basic understanding of electrophotographic processes, such as xerography.

Kenneth Pietrowski 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 the 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 electrophotographic 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 Chairman at prior NIP conferences. He received his BS in Electrical Engineering from Rochester Institute of Technology.

PLEASE READ!

SPECIAL NOTICE ABOUT PROCEEDINGS

WHEN YOU REGISTER, YOU MUST CHOOSE ONE OF THESE:

NIP24/Digital Fabrication 2008 Proceedings (hard copy book)
Stand-alone book containing all the technical papers from both conferences.

or

NIP24/Digital Fabrication 2008 Proceedings Abstract Book with CD
Booklet containing abstracts 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.

T21: Analysis of the Interdependency of Demand & Technology in Shaping the Inkjet Future

Tuesday 1:30 pm – 5:30 pm (4 hours)
Instructor: Mark Hanley, I.T. Strategies Inc.

This short course has the objective of providing a projection of ink jet's future in the areas of high volume solutions in pure graphics print (display, decorative, packaging, and document printing) as well as of ink jet's utilization as a deposition and manufacturing mode (printed electronics, materials deposition etc.). Our thesis is that where demand is perceived to exceed the current capabilities of ink jet technology, the technology can still satisfy some of the immediate needs, gain a commercial beachhead, and can evolve into a more complete solution. This leads to a development and maturing of markets that could not otherwise have been predicted by more traditional linear projection methods. Quantifications and models of the possible future are provided in a consistent and detailed fashion during the short course. An equal objective is to explain and illustrate the correct methods appropriate to this analysis in order to confer credibility on the analysis. These

methods require a close knowledge of user markets, ink jet technology itself, and the core technical and economic factors, which derive both from an independent point of departure through an increasing interdependence as the involvement of users with technologies goes forward over time. Such analysis is capable of credibility in predicting where technology and investment can and probably will be directed in the future.

Benefits

This course enables an attendee to:

- Understand all IJ's projected future markets where demand (including economic conditions) and technology capability meet now and prospectively over the next 5+ years
- Access a quantified model and rationale for specific market development
- Appreciate realistic goals for IJ technology development over the next 5 years
- Review the competitive positioning of available IJ technologies

Intended Audience: those who wish to gain an understanding of the status of competitive ink jet technology offerings as well as of the potential demand for available technology in new markets over the next 5 years, and the methodology which may be applied to gain this understanding.

Mark Hanley, president of I. T. Strategies Inc., founded I.T. Strategies in 1992 as a strategic consultancy specialized in industrial digital printing, inkjet technology, and early market development practices. The company, based in Boston and Tokyo, operates on a private partnership basis and is a confidential practice with no publishing function. Prior to this, Hanley worked for BIS Strategic Decisions and founded their operations in Europe before moving to Boston. Hanley came to consulting through the paper industry where he began his career in Germany, subsequently working in most of the major European continental countries. Hanley is fluent in German, French, and Italian. He received an honors degree in History from the University of Manchester, UK.

T22: Aging Issues in Electrophotographic Systems-Developers and OPCs

Tuesday, 1:30 pm – 5:30 pm (4 hours)

Instructors: David S. Weiss, Eastman Kodak Company, and Robert Nash, Hafren Associates

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.

In the first hour of this short course, the discussion features OPC aging phenomena. Subjects of discussion include testing and characterization methodologies, and the many factors that may contribute to OPC aging in terms of both electrical and physical performance. The remaining three hours of the course are devoted to a discussion of aging phenomena of dry xerographic developers. Experimental approaches for characterizing and understanding developer and toner life is 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 evaluation methodologies for electrophotographic developers and OPCs
- Recognize the key factors that influence aging in developers, toners and OPCs
- Understand strategies for the minimization of the rate of aging
- Appreciate 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, and some background in chemistry and physics is helpful but not essential.

Weiss: see bio under T16.

Robert Nash received his PhD in physical chemistry from the University of Bristol, England, before joining Xerox Corp. 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. Since 1988 (NIP4), he has presented the results of his studies at NIP conferences. In 1990, he served as Publication Chair for the NIP6, and in 1992 he was Chair of the IS&T Honors & Awards Committee. Nash is an IS&T Fellow (1999) and received the Chester Carlson Award (2002) with his long-time colleague, J.T. Bickmore. See also T11.

The Venue: Pittsburgh, Pennsylvania

As the host city of this year's conference, Pittsburgh has much to offer all who visit and we promise you will not be disappointed when you join us for what promises to be a stimulating and rewarding meeting. For information on the city, and help planning your trip, visit www.visitpittsburgh.com.

An official "Green City," Pittsburgh has a lot going for it. Marvelous museums, including the Andy Warhol Museum, the Heinz History Center—where we will hold the Conference Reception—the Frick Art and Historical Center, and the Carnegie Institute of Art, are easily accessible from the conference venue, as is the waterfront park and the historic Strip District. Still an area of active warehouses, the Strip houses fresh produce markets, delicious Asian and Italian food to go, and some of the city's trendiest restaurants and nightclubs. Pittsburgh is a vibrant and walkable city, so plan some time to enjoy its sights.

The official conference hotel for NIP24/DF2008 is The Westin Pittsburgh Convention Center. All of the technical program and most of the networking events will take place here and at the adjoining David L. Lawrence Convention Center, the world's largest green building and the first "green" convention center in the nation. For more information on housing, see the registration form on page 35.

Within 500 miles of more than half the US population, Pittsburgh is less than 90 minutes flying time from 20 US states, as well as much of Canada. Direct flights from many cities are served by the Pittsburgh International Airport (www.pitairport.com) and the airport is only 25 minutes from the center of town.

Given that the average daytime temperature for Pittsburgh in September is 76°F/24°C, September is a wonderful time to visit and explore the city.

YOU DO THE MATH!

\$735 = Non-member Conference Registration

OR

\$625 Member registration fee
+\$95* IS&T membership

\$720 = Conference Registration
+ ALL THE BENEFITS OF MEMBERSHIP

Become a member of the Society dedicated to promoting your profession and take advantage of member registration fees!

* based on one-year, US address membership rate; non-US address rate is \$105 for a total of \$705.

Transportation Notes

Taxi: Taxi service is available from the airport. It costs approximately \$35 and takes 25 minutes.

Bus: The 28X Airport flyer bus serves downtown Pittsburgh. It leaves the airport every 20 minutes, takes approximately 40 minutes, and costs \$2.60. Pick up the bus outside Door 6 on the Lower Level of the Airport. Disembark at 7th & Smithfield; walk toward 10th Street. 7th & Smithfield is 3-4 blocks from the Westin, which is located at 10th & Penn). The 28X schedule can be found at www.portauthority.org/PAAC/apps/pdfs/28X.pdf.

Shuttle service: Airport Express offers a shuttle to all downtown hotels at \$20/each way. Get the shuttle from the airport baggage area; the shuttle picks up from downtown hotels every 30-60 minutes depending on the time of day. The Westin pick up occurs each hour on the half hour (1:30, 2:30, etc.).

Driving Directions

From Pittsburgh International Airport
Take Route 60 toward Pittsburgh through the Fort Pitt Tunnel and exit at Liberty Avenue. Follow Liberty Avenue to 10th Street. Turn left; the hotel is on the right.

From East

Take the Pennsylvania Turnpike to Exit 57 to 376 West. Take 376 West to Exit 1C (Grant Street). Take Grant Street to 11th Street and turn left. Go 1 block to Pennsylvania Avenue. Turn left and go 1 block to 10th Street. Turn left on 10th Street; the hotel entrance is on the left.

From North

Take Interstate 79 South to Interstate 279 South. Follow signs to Interstate 579 South and cross the Veterans Bridge. Take the 7th Avenue Exit. Proceed to the second light and turn right. Pass the next light; the hotel is on the right.

From South

Take I-79 North to the Pittsburgh Exit. Take I-279 North across Fort Pitt Bridge into the city. Follow the signs to Liberty Avenue. Take Liberty Avenue to 10th Street and turn left; the hotel entrance is on the right.

Parking

Parking is available at the hotel:
\$20/self-park (no in/out privileges)
\$22/valet (includes in/out privileges)

NIP24/DF 2008 Hotel Registration

A special block of rooms at a discounted rate is being held at the **Westin Convention Center Pittsburgh** for IS&T attendees for the nights of September 5–13, 2008. 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 15, 2008**. 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 800/WESTIN1 or 412/281-3700 and telling them you are with the Society for Imaging Science & Technology Group or IS&T NIP24/D508 or by faxing this form to 412/560-6480.

For on-line reservations, visit <http://www.starwoodmeeting.com/Book/nip24df08>.

Reservations Deadline: August 15, 2008

Westin Convention Center Pittsburgh

www.westin.com/pittsburgh

1000 Penn Avenue

Pittsburgh, PA 15222

412/281-3700; 412/227-4500 fax

First/Given Name _____ Family Name _____

Title/Position _____ Company _____

Mailing Address _____

Telephone _____ Fax _____ Email _____

Arrival Date and Time _____ Departure Date _____

- Single (\$159) Double (\$159) Corner Suite (\$234) Extra Person (\$10)
 King-size bed Two double beds

—Rates are per and include WIRELESS Internet access*; the current tax on rooms is 14%—

Check in is 3:00 pm. Check out is noon.

There is no charge for children under 18 years 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 \$50.00 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 24 hours prior to arrival date to receive a full refund of deposit. Be sure to obtain a cancellation number.

To/From Pittsburgh International Airport (PIT)

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

Transportation Notes: Taxi service is available at the PIT terminals; the taxi waiting area is located curbside directly outside the main lobby of the airport. The typical minimum charge is \$35. Airport Express provides shuttle to all the downtown hotels (\$20 one way). You can get the shuttle from the baggage area of the airport. You may also take the 28X bus. See details for the bus or for driving on page 34.

*There is a charge of \$9.95/day for *wired* internet access.

NIP24/DF 2008 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 tutorials.

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 NIP Track(s)/DF session you plan to attend most:

NIP Track 1 NIP Track 2 NIP Track 3 Digital Fabrication

Are you bringing prints to display? If so, please indicate area needed:

___ 2' x 4' ___ 4' x 4' ___ 6' x 4' ___ 8' x 4'

Conference Registration (CHECK ONE)	until 8/10	after 8/10	TOTAL
___ IS&T/ISJ Member	\$625	\$675	\$ _____
___ Non-member	\$735	\$785	\$ _____
___ IS&T/ISJ Speaker/Session Chair Member	\$525	\$555	\$ _____
___ Speaker/Session Chair Non-member	\$635	\$685	\$ _____
___ IS&T/ISJ Student (ID required) Member	\$140	\$140	\$ _____
___ Student (ID required) Non-member	\$170	\$170	\$ _____
___ One-day	\$320	\$350	\$ _____

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 \$110/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 \$75/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; to get the student rate—25% discount does not apply—you must register via fax and provide a copy of your student ID)

	Member	Non-member	
Special One-day Short Course: Packaging for Digital Printers; lunch included please REGISTER BY AUGUST 1 (see page 21)	\$425	\$425	\$ _____

INDIVIDUAL CLASSES

2-hour (per class; add \$20/class after 8/10) **\$150** **\$180** \$ _____

Check all that apply: T07 T08 T17 T19

4-hour (per class; add \$20/class after 8/10) **\$225** **\$255** \$ _____

Check all that apply: T01 T02 T03 T04 T05 T06 T09 T10
 T11 T12 T13 T14 T15 T16 T18 T20 T21 T22

OR

Take three or more and receive 25% off the total price

(enter three tutorials, fill in member or non-member price next to each, add together, and multiply by .75 to get your price, representing 25% savings; add additional lines if needed)

T _____ \$ _____ + T _____ \$ _____ + T _____ \$ _____ = \$ _____ x .75 = \$ _____

Membership	US address	Non-US Address	
___ IS&T half-year membership (<i>new members only; expires 12/08</i>)	\$47.50	\$52.50	\$ _____
___ IS&T 18-month membership (expires 12/31/09):	\$142.50	\$157.50	\$ _____
___ IS&T membership renewal (expires 12/31/09):	\$95	\$105	
___ Student membership (expires Sept. 30, 2009)	\$25	\$25	\$ _____

join now and calculate fees based on member rates

Other		
___ Guest/spouse registration (Name: _____)	\$100	\$ _____
___ Extra Welcome Reception Ticket	\$35	\$ _____
___ Extra Conference Reception Ticket	\$50	\$ _____
___ Extra Farewell Reception Ticket	\$25	\$ _____

Subtotal from previous page \$ _____

GRAND TOTAL \$ _____

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

(to arrange for a bank transfer, contact info@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/nip24 or /df2008

Please note: To cover bank charges and processing fees, there is a cancellation fee of \$75 dollars until September 6, 2008. After that date, the cancellation fee is 50% of the total plus \$75. All requests for refund must be made in writing. No refunds will be given without a written request after October 7, 2008.

Digital Fabrication 2008/NIP24

Society for Imaging Science and Technology
7003 Kilworth Lane
Springfield, VA 22151 USA
703/642-9090; 703/642-9094 (fax)



imaging.org

Join us in Pittsburgh
September 6-11, 2008!

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