

23rd International Conference on Digital Printing Technologies 2007 (NIP 23)

Digital Fabrication

Technical Programs and Proceedings

**Anchorage, Alaska, USA
16-21 September 2007**

ISBN: 978-1-62276-617-8

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57 Morehouse Lane
Red Hook, NY 12571



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NIP23/Digital Fabrication 2007 Technical Papers Program: Schedule and Contents*

MONDAY, SEPTEMBER 17, 2007

La Perouse

Plenary Session

Session Chair: Ramon Borrell, Xaar plc
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- 8:30 **Managing Complexity on Digital Printing Technologies**, Anthony Federico, Xerox Corporation (USA) 1

NIP TRACK 1

La Perouse

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SPECIAL EVENT

Interactive Panel

Future and Limitations of Ink Jet Printing and Electrophotography

Monday, 5:00–6:00 pm
in Summit Hall 2/3

Moderated by
Sen Yang, International Paper

Panelists

Jeff Folkins, Xerox Corp.
James Chwalek, Eastman Kodak Co.
Marcel Slot, Océ Technologies BV
John Stoffel, Hewlett-Packard Co.

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Interactive Panel: Future and Limitations of Ink Jet Printing and Electrophotography

5:00-6:00 PM

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Summit Hall 2/3

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Session Chairs: Caroline Hayes, Cabot Corporation; Stephen Yeates, University of Manchester; and Hiroyuki Onishi, Seiko Epson Corporation

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What makes a digital printer environmentally friendly?

If every of its 40 plastic parts can be recycled to make new car bumpers?

If every of its 4,000 prints per hour can be recycled to make paper for tomorrow's news?



For answers: Friday 9:40 AM–12:30 PM
or www.ingede.com/digital



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**Interactive Panel:
Future and Limitations of Ink Jet Printing and Electrophotography**

5:00-6:00 PM

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Interactive Panel: Future and Limitations of Ink Jet Printing and Electrophotography

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La Perouse

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La Perouse

Toner Based Printing Materials

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sponsored by Océ Printing Systems GmbH

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Intellectual Property Panel

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SPECIAL EVENT

Interactive Panel

Intellectual Property

Tuesday, 5:30–6:30 pm
LaPerouse

Moderated by
Russell Barron
Rembrant IP Management LLC

Panelists
John C. Cooper III,
Foley & Lardner, Milwaukee, WI
Peter Crean,
Xerox Corporation, Webster, NY
Joseph E. Root,
*Haynes, Beffel & Wolfeld,
Half Moon Bay, CA*

NIP TRACK 2

Summit Hall 2/3

Ink Jet Printing Processes

Session Chairs: Paul Benning, Hewlett-Packard Company; Werner Zapka, XaarJet AB;
and Mineo Kaneko, Canon Inc.

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sponsored by Océ Printing Systems GmbH

Digital Art

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sponsored by TREK Inc./TREK Japan KK

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DIGITAL FABRICATION

Summit Hall 4/5

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Exhibit Hall (Cook/Arteaga)

sponsored by **TREK Inc./TREK Japan KK**

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- 12:20 **Guidelines and Requirements for Direct Write Electronics in the Aerospace Industry**, *Joseph A. Marshall, The Boeing Company (USA)* **N/A**

12:40–2:00 Session Break/Lunch on own

- 2:00 **Flexible Electrophoretic Display with Inkjet Printed Active Matrix Backplane (Focal)**, *Soichi Moriya, Tsutomu Miyamoto, Takehisa Saeki, Hideyuki Kawai, and Satoshi Nebashi, Seiko Epson Corporation (Japan)* **839**
- 2:30 **Digital Fabrication Using Electrophotography for Conductive Patterning**, *Daiki Minegishi, Yasuo Yamanaka, and Taro Terashi, Ricoh Corporation (Japan)* **843**
- 2:50 **Precision Deposition of Functional Layers for Microcantilever Sensor Generation**, *Nicholas Post and George T.-C. Chiu, Purdue University (USA)* **846**
- 3:10 **Mask-free Fabrication of Color Filter by an All Ink-Jet Printing Process**, *Fu-Kang Chen, Jhih-Ping Lu, Pei-Ju Su, Chao-Fu Sung, Yuh-Zheng Lee, Jyh-Wen Shiu, Kevin Cheng, Industrial Technology Research Institute, and Hong-Ye Lin and Li-Chung Chang, AGI Corporation (Taiwan)* **852**

3:30–4:00 PM Coffee and Dessert

Exhibit Hall (Cook/Arteaga)

sponsored by **Océ Printing Systems GmbH**

* Please note: All Digital Fabrication papers are grouped together after the NIP papers in the hardcopy proceedings, thus appearing out of order in this table of contents.

** Paper not available at time of publication.

4:00	Inkjet Patterning of UV Curable Etching Resist for Flexible Conductive Circuits and Electrodes (Interactive) , Chung-Wei Wang, Wen-Chun Cheng, Kevin Cheng, and Yuh-Zheng Lee, DTC/Industrial Technology Research Institute (Taiwan)	855
4:05	High-Viscosity Electronic Materials Printing Using Ultrasonic Inkjet System (Interactive) , Yuko Nomura, Isao Amemiya, Kenichi Mori, Isao Takasu, Keiji Sugi, and Shuichi Uchikoga, Toshiba Corporation (Japan)	859
4:10	Ink-Jet Printed Electrodes for Passive Fluid Based Display , Ming-Huan Yang, Wei-Yuan Cheng, Jyh-Wen Shiu, Chung-Wei Wang, Kuo-Tong Lin, Yuan-Chang Liao, Yuh-Zheng Lee, Wanda W. W. Chiu, and Kevin Cheng, Industrial Technology Research Institute (Taiwan)	863
4:30	Real-Time Image Compensation and Memory Arbitration , Chih-Hsuan Chiu, Chia-Ming Chang, Chih-Jian Lin, Wanda W. W. Chiu, Chieh-Yi Huang, and Kevin Cheng, Display Technology Center of Industrial Technology Research Institute (Taiwan)	867
4:50	Electrostatic Printing of Carbon Nano-tube Liquid Toners, etc. , Robert H. Detig and Dietmar C. Eberlein, ElectroX Corp. (USA)	874
5:10	Etch and Plating Resist Formation by Hot Melt Ink Jet (Interactive) , Nigel Caiger, Sun Chemical (UK)	876

Intellectual Property Panel
5:30–6:30 PM

LaPerouse; see details page xix

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as of 8/1/07

WEDNESDAY, SEPTEMBER 19, 2007

La Perouse

Plenary Session

Session Chair: Ramon Borrell, Xaar plc
8:30–9:30 AM

- 8:30 **Science and Technology of Dyes and Pigments for Imaging Applications: Various Colors Arising from Polymorphs in Organic Pigments**, *Jin Mizuguchi, Yokohama National University (Japan)* . . . **3***

NIP TRACK 1

La Perouse

Fusing Curing and Drying

Session Chairs: Lutz Engisch, Technische Universität Chemnitz; Shunji Nakamura, Canon Inc.; and Dave Thompson, Xerox Corporation
9:40 AM–3:00 PM

- 9:40 **Design and Operational Characteristics of a High-Speed Contactless Fuser (Focal)**, *Wolfgang Schullerus and Roland Wolf, Océ Printing Systems GmbH (Germany)* **448**

- 10:10 **Challenges in Fuser System Materials Design (Focal)**, *Santokh S. Badesha, Xerox Corporation (USA)* **454**

- 10:40 **Fusing Parameters Effect on Gloss**, *Brandon Chaffin, Boise State University; and Anthony Paris and Anthony Holden, Hewlett-Packard Company (USA)* **455**

11:00–11:30 AM Coffee Break
Exhibit Hall (Cook/Arteaga)

- 11:30 **Modeling of the Transient Heat Transfer in Xerographic Fusing Using a Discrete Element Approach (Focal)**, *Pooya Azadi, Ramin Farnood, and Ning Yan, University of Toronto (Canada)* **461**

- 12:00 **Viscoelasticity in Toner Fusing Process**, *Suresh Ahuja, retired (USA)* **466**

- 12:20 **Energy-saving Technology for Fusing Systems Using EDLC Power Assistance**, *Kazuhiro Kishi, Naoki Satoh, Yasuhisa Kato, and Masami Okamoto, Ricoh Co., Ltd. (Japan)* **469**

12:40–2:00 PM Session Break/Lunch on own

- 2:00 **Edgeline Inkjet Drying Technology (Focal)**, *Vance Stephens and Steve Rasmussen, Hewlett-Packard Company (USA)* **473**

- 2:30 **Drying of Paper: Theory and Practice (Focal)**, *Tim Patterson, Georgia Tech Institute of Paper Science (USA)* **474**

3:00–4:00 PM Exhibit Time and Coffee Break
Exhibit Hall (Cook/Arteaga)

* Please note: All plenary papers are grouped at the beginning of the Proceeding book, which is why their page numbers appear to be out of order.

SPECIAL EVENT

Conference Reception

The NIP23/DF2007 Conference Reception will take place Wednesday evening at the Anchorage Museum of History and Art

Wednesday, 7:00–10:00 pm

The Museum is located at 121 W 7th Ave. in Anchorage.

Production Digital Printing

Session Chairs: Eric Hanson, Hewlett-Packard Company; Marcel Slot, Océ Printing Systems GmbH; and Masahiko Itaya, Samsung

4:00–5:40 PM

sponsored by Xerox Corporation

- 4:00 **Expectations and Challenges of Consumer Package Customisation**, *Elina Rusko and Jali Heilmann, VTT Technical Research Centre of Finland (Finland)* 484
- 4:20 **Advances in NexPress Digital Printing Technology (Focal)**, *Yee S. Ng, Hwai Tai, Chung-hui Kuo, and Dmitri Gusev, Eastman Kodak Company (USA)*. 489
- 4:50 **The HP Indigo White Ink for Industrial Applications**, *Gal Victor, Galia Golodetz, Edna Mannheim, and Ehud Chatow, Hewlett-Packard (Israel)* 494
- 5:10 **Inkjet Printing Technology Solutions for the 21st Century (Focal)**, *James M. Chwalek, Eastman Kodak Company (USA)* 499

Conference Reception

7:00–10:00 PM

Anchorage Museum of History and Art; see details at left

NIP TRACK 2

Summit Hall 2/3

Textile & Industrial Printing

Session Chairs: Hitoshi Ujje, Philadelphia University; Rafi Bronstein, Hewlett-Packard Company; and Yasuji Fukase, Fuji Xerox Company, Ltd.

9:40 AM–12:35 PM

sponsored by Hewlett-Packard Large Format Printing Division

- 9:40 **Cationic Pretreatment for Improving Image Quality of Inkjet Printing on Polyester Fabrics**, *Chaoxia Wang, Guijun Wu, Kuanjun Fang, Anli Tian, Xia Zhang, Shaohai Fu, and Xue Jiang, Jiangnan University (China)*. 500
- 10:00 **Effect of Texture on Visual Perception of Color in Inkjet Printed Woven Textiles**, *JiHyun Bae and Traci May Lamar, North Carolina State University (USA)* 504
- 10:20 **Preparation of Waterborne Nanoscale Pigment Dispersions for Formulations of Inkjet Inks**, *Shaohai Fu, Kuanjun Fang, Xia Zhang, Xue Jiang, Anli Tian, and Chaoxia Wang, Jiangnan University (China)* 510
- 10:40 **Dynamics of Impaction and Post-impaction Behavior of Drop-on-Demand (DOD) Inkjet Drops on Textiles**, *Xi Wang, Wallace W. Carr, and David Bucknall, Georgia Institute of Technology; and Jeffrey F. Morris, City College of New York (USA)* 514
- 11:00–11:30 AM Coffee Break
Exhibit Hall (Cook/Arteaga)
- 11:30 **UV Curable Pretreatment of Polyester Fabrics for Inkjet Printing (Focal)**, *Hongxia Xue, Qinguo Fan, and Yong K. Kim, University of Massachusetts Dartmouth (USA)* 520
- 12:00 **Effect of Surface Treatment of Silk Fabrics with Plasma on Inkjet Printing**, *Kuanjun Fang, Chaoxia Wang, Anli Tian, Xia Zhang, Shaohai Fu, Xue Jiang, and Shaohua Wang, Jiangnan University (China)*. 526

12:20	Preparation and Properties of Cationic Pigment Dispersions with SMD Random Copolymers (Interactive) , <i>Xue Jiang, Kuanjun Fang, Xia Zhang, Shao Hai Fu, Chaoxia Wang, and Anli Tian, Jiangnan University (China)</i>	531
12:25	Color Properties of Disperse Dye Inks and Pigment Inks on Polyester Fabrics (Interactive) , <i>Anli Tian, Kuanjun Fang, Xia Zhang, Shaohai Fu, Chaoxia Wang, and Xue Jiang, Jiangnan University (China)</i>	536
12:30	Influence of Components on the Properties of Pigment Inks for Textiles (Interactive) , <i>Xia Zhang, Kuanjun Fang, Shaohai Fu, Xue Jiang, Anli Tian, and Chaoxia Wang, Southern Yangtze University (China)</i>	540

12:35–2:00 PM Session Break/Lunch on own

Security and Forensic Printing

Session Chairs: Steven Simske, Hewlett-Packard Company, and Shuichi Maeda, Oji Paper Co., Ltd.
2:00–5:30 PM

2:00	Security Printing Deterrents: A Comparison of TIJ, DEP, and LEP Printing (Focal) , <i>Steven Simske, Jason Aronoff, Margaret Sturgill, and Galia Golodetz, Hewlett-Packard Company (USA)</i>	543
2:30	Printer Mechanism-Level Information Embedding and Extraction for Halftone Documents: New Results , <i>Sungjoo Suh, Jan P. Allebach, George T.-C. Chiu, and Edward J. Delp, Purdue University (USA)</i>	549
2:50	Digital Watermarking Using Clear Toner (Interactive) , <i>Detlef Schulze-Hagenest, Kodak Digital Printing Solutions NexPress GmbH (Germany); and Arun Chowdry and Dinesh Tyagi, Eastman Kodak Company (USA)</i>	554

2:55–4:00 PM Exhibit Time and Coffee Break (3:30-4:00 PM)
Exhibit Hall (Cook/Arteaga)

4:00	Application of Thermal Printing Technology for Security Printing (Focal) , <i>Fariza B. Hasan, Zink Imaging, LLC (USA)</i>	558
4:30	Development of an Electrophotographic Laser Intensity Modulation Model for Extrinsic Signature Embedding , <i>Peiju Chiang, Aravind K. Mikkilineni, Sunjoo Suh, George T.-C. Chiu, Edward J. Delp, and Jan P. Allebach, Purdue University (USA)</i>	561
4:50	The Application of Silver Nanoparticles for Security Printing Applications , <i>Greg Jablonski, Mike Mastropietro, and Chris Wargo, PChem Associates, Inc; and Steve Simske, Hewlett-Packard Company (USA)</i>	565
5:10	Digital Print Technology: An Opportunity and a Threat to Banknote Production , <i>Astrid Mitchell, Currency News (UK)</i>	566

Conference Reception

7:00–10:00 PM

Anchorage Museum of History and Art; see details page xxvii

NIP TRACK 3

Summit Hall 1

Media for Digital Printing

Session Chairs: Abbie Parker, Hewlett-Packard Company; Wolfgang Schmidt, Felix Schöller,
and Toshiharu Enomae, University of Tokyo

9:40 AM–3:10 PM

- 9:40 **Micro-sizing Degree as a Property of Ink-jet Media Printability**, Toshiharu Enomae, Yohta Mori, and Akira Isogai, University of Tokyo (Japan). 567
- 10:00 **Efficient and Accurate MTF Measurement for Spatially Non-uniform Paper**, Masayuki Ukishima, Norimichi Tsumura, Toshiya Nakaguchi, and Yoichi Miyake, Chiba University (Japan); and Markku Hauta-Kasari and Jussi Parkkinen, University of Joensuu (Finland). 571
- 10:20 **Improving the Performance of Ink Jet and Laser Printing Through Paper Modification**, John Stoffel, Hewlett-Packard Company (USA). 577
- 10:40 **Application of CLSM Observation Technique to Multicolored Ink-jet Dots (Interactive)**, Mikiko Naito, Yasushi Ozaki, and Hisato Nagashima, National Printing Bureau; and Toshiharu Enomae and Akira Isogai, University of Tokyo (Japan). 580
- 10:45 **Approach for Detecting Localization of Inkjet Ink Components using Dynamic-SIMS Analysis (Interactive)**, Masaya Shibatani and Tsutomu Asakawa, Seiko Epson; and Toshiharu Enomae, and Akira Isogai, University of Tokyo (Japan). 586
- 10:50 **Preparation and Properties of Thermo-sensitive Latex Films (Interactive)**, Zhongxiao Li, Yujuan Zhang, Luhai Li, and Jialing Pu, Beijing Institute of Graphic Communication (China). 591
- 10:55–11:30 AM Coffee Break
Exhibit Hall (Cook/Arteaga)
- 11:30 **Inkjet Printing Dynamics: Influence on Ink Distribution in Paper and Print Quality (Focal)**, Jonas Örtengren, Johan Eklund, and Jakob Norstedt-Moberg, Mid-Sweden University; Elisabeth Alftan, M-real Corporation/Technology Centre Örnsköldsvik; Jan-Erik Häggglund, MoRe Research (Sweden); Lutz Engisch, Technical University Chemnitz (Germany); and Arne Erikson, Norwegian University of Science and Technology (Norway). 595
- 12:00 **Silica Properties for Matte-Coated Media for Pigment Based Inks**, Stephanie Rose, INEOS Silicas Americas, and Gemma Morea-Swift, INEOS Silicas Ltd. (USA). 599
- 12:20 **Improving Inkjet Print Performance with Fumed Silica at the Size Press**, Leo M. Nelli, Degussa Corporation (USA). 603
- 12:40–2:00 Session Break/Lunch on own
- 2:00 **Printability of Ink-jet Printing on Surface-treated Nonwoven Fabrics (Focal)**, Hitomi Hamada, Yasushi Ozaki, and Mikiko Naito, National Printing Bureau (Japan). 608
- 2:30 **Photo-Quality Print Media**, Mridula Nair, Narasimharao Dontula, and Joseph Sedita, Eastman Kodak Company (USA). 613
- 2:50 **Development of High Quality Inkjet Printing Paper**, Ryoichi Nakano and Hiroshi Yamamoto, FUJIFILM Company (Japan). 618

3:10–4:00 Exhibit Time and Coffee Break (3:30-4:00 PM)
Exhibit Hall (Cook/Arteaga)

Electronic Paper and Paper-like Displays

Session Chairs: Beng Ong, Xerox Corporation, and Hideyuki Kawai, Seiko Epson, Co., Ltd.

4:00–5:30 PM

- 4:00 **Novel Type of Bistable Reflective Display (QR-LPD)TM and Material Design of Electronic Liquid PowderTM (Focal)**, *Koji Takagi, Norihiko Kaga, and Itsuo Tanuma, Bridgestone Co. (Japan)* **624**
- 4:30 **Reason Why We Prefer Reading on Paper Rather than Displays: An Approach to the Ideal Design of Readable Electronic Paper**, *Junko Imai and Makoto Omodani, Tokai University (Japan)* **628**
- 4:50 **Control of Particle Movement for Color Toner Display**, *Takashi Kitamura, Sakiko Nakamura, Muneharu Takeuchi, and Nobukazu Kiyagawa, Chiba University (Japan)*. **633**
- 5:10 **Achieving Color Uniformity from Multi Element Display and Printhead Devices**, *Behnam Bastani and David Donovan, Hewlett-Packard Company (USA)* **636**

Conference Reception

7:00–10:00 PM

Anchorage Museum of History and Art; see details page xxvi

DIGITAL FABRICATION

Summit Hall 4/5

Industrial and Commercial Applications

Session Chairs: James Stasiak, Hewlett-Packard Company, and Masahiko Fuji, Fuji Xerox Company, Ltd.

9:40–11:00 AM

- 9:40 **Substrate Alignment for Single and Multilayer Ink Jet Materials Deposition in Digital Fabrication Systems**, *Ross N. Mills and Thomas W. Miller, imaging Technology international (iTi) Corporation (USA)*. **877***
- 10:00 **Inkjet Method for Forming Openings to Buried Semiconductor Layers of Silicon Solar Cells**, *Alison Lennon, Roland Utama, Anita Ho-Baillie, Martha Lenio, Nicole Kuepper, and Stuart Wenham, University of NSW (Australia)*. **882**
- 10:20 **Inkjet Printed Indicators**, *Jali Heilmann, VTT Technical Research Center of Finland (Finland)* **886**
- 10:40 **Integration and Modeling for Ink-Jet Printing of Cholesteric Liquid Crystal in a Roll-to-Roll System**, *Wanda W. W. Chiu, Wei-Hsun Huang, Chih-Jian Lin, Cheng-Yi Wang, Chen-Chu Tsai, Chien-Kai Chang, and Kevin Cheng, DTC/Industrial Technology Research Institute (Taiwan)* **890**

11:00–11:30 AM Coffee Break
Exhibit Hall (Cook/Arteaga)

Printed Architectural Components

Session Chairs: James Stasiak, Hewlett-Packard Company, and Shinri Sakai, Seiko Epson Corporation

11:30 AM–12:25 PM

- 11:30 **In Search of the Impossible Ceramic Object**, *David Huson, University of the West of England (UK)*. **894**
- 11:50 **Development of a Femto Liter Piezo Ink-jet Head for High Resolution Printing (Interactive)**, *Kin'ya Ozawa, Takahiro Usui, Katsuya Ide, Hayato Takahashi, and Shinri Sakai, Seiko Epson Corporation (Japan)* **898**

* Please note: All Digital Fabrication papers are grouped together after the NIP papers in the hardcopy proceedings, thus appearing out of order in this table of contents.

11:55	3D Printing as a Function of 2D Printing (Interactive) , Branka Lozo, Maja Stanic, and Sonja Jamnicki, University of Zagreb (Croatia); and Tadeja Muck, University of Ljubljana (Slovenia)	902
12:00	Phase Change Rapid Prototyping with Aqueous Inks , Dario Mager, Patrick J. Smith, and Jan G. Korvink, IMTEK–University of Freiburg (Germany)	908
12:20	Epitaxial-film-bonding Technology for Integrating Dissimilar Device Materials (Interactive) , Tomoki Igari, Takahito Suzuki, Hironori Furuta, Tomohiko Sagimori, Yusuke Nakai, Hiroyuki Fujiwara, and Mitsuhiro Ogihara, Oki Digital Imaging Corporation (Japan)	912

12:25–2:00 Session Break/Lunch on own

Materials and Substrates

Session Chairs: Maikel van Hest, National Renewable Energy Laboratory, and Masaaki Oda, ULVAC
2:00–3:10 PM

2:00	Overview of Liquid Coal and Its Applications , Khe C. Nguyen, Sinh T. Do, and Thong V. Le, Saigon Hi Tech Park Research Laboratories (Vietnam)	917
2:20	Customizing Paper-Based Substrates for Digital Fabrication Printing (Interactive) , Wolfgang A. Schmidt, Felix Schoeller Jr. (Germany)	923
2:25	Inkjet Printing as a Fabrication Method for Hydrophobic Surfaces (Interactive) , Liisa Hakola, Kim Eiroma, Jali Heilmann, Hannu Linna, and Terho Kololuoma, VTT Technical Research Centre of Finland (Finland)	925
2:30	Polymeric Materials for Printed Electronics and Their Interactions , Erika Hrehorova, Alexandra Pekarovicova, Valery N. Bliznyuk, and Paul D. Fleming, Western Michigan University (USA)	928
2:50	Inkjet Printed Active Element on Paper Based on Conductive and Thermochromic Materials , Liisa Hakola, Kim Eiroma, Jali Heilmann, Kaisa Lehtinen, Tapio Mäkelä, and Marja Viikman, VTT Technical Research Centre of Finland (Finland)	932

3:10–4:00 PM Exhibit Time and Coffee Break (3:30–4:00PM)
 Exhibit Hall (Cook/Arteaga)

Conference Reception

7:00–10:00 PM

Anchorage Museum of History and Art; see details page xxvi

THURSDAY, SEPTEMBER 20, 2007

La Perouse

Plenary Session/Honors and Awards Presentation

Session Chair: Ross Mills, imaging Technology international (iTi)

8:30–9:30 AM

- 8:30 **Engineering Challenges in Biofabrication**, *Thomas Boland, R. Groff, T. Burg, and K.J.L. Burg, Clemson University (USA)* **7***

NIP TRACK 1

Summit Hall 1

Photo-electronic Materials and Devices

Session Chairs: Andronique Ioannidis, Xerox Corporation; Hans Josef Humpert, AEG Efo; and Norio Nagayama Osaka University

9:50 AM–3:30 PM

- 9:50 **Development of OPC for High Speed Digital Monochromatic MFP (Focal)**, *Naohiro Toda, Ryohichi Kitajima, Tatsuya Niimi, Nozomu Tamoto, Ichiroh Shimeki, Takeshi Orito, Maiko Koeda, and Yasuyuki Yamashita, Ricoh Company, Ltd (Japan)* **639**
- 10:20 **Incremental Charging Method to Elucidate the Role of (+) Trapped Charges near the OPC Surface in Electrostatic Image Defect Formation (Interactive)**, *Zbig Tokarski and YongJin Ahn, Samsung Electronics (Korea); and Valentas Gaidelis, Jonas Sidaravicius, Robertas Maldzius, and Tadeusz Lozivski, Vilnius University (Lithuania)* **643**
- 10:25 **A Novel Ring-Structured Diphenone Based on Calix[4]arene as Electron Transport Material Doped in OPC and Its Performances (Interactive)**, *Ti Wu, Wen-Guang Wang, Wei-Min Zhang, and Jia-Ling Pu, Beijing Institute of Graphic Communication (China)* **649**
- 10:30 **Aqueous Surface-Smoothing Layer Compositions for High-Quality Photoreceptors**, *Michel F. Molaire, Eastman Kodak Company (USA)* **653**
- 10:50 **Corona Charging Characterization of Organic Photoreceptors**, *David S. Weiss, Bruce R. Benwood, and Donald L. Troendle, Eastman Kodak Company (USA)* **657**
- 11:10–11:45 AM Coffee Break
Explorer and Summit Hall Lobbies
- 11:45 **Diphenone Derivatives and Their Applications as Charge Transport Material in Single-layered Organic Photoreceptor (Interactive)**, *Weimin Zhang, Ti Wu, Wenguang Wang, and Jialing Pu, Beijing Institute of Graphic Communication (China)* **661**
- 11:50 **Hydrogen Gas Sensor Utilizing a High Proton Affinity of P-diketodipyridylpyrrolopyrrole**, *Hiroo Takahashi and Jin Mizuguchi, Yokohama National University (Japan)* **665**
- 12:10 **Complete Decomposition of Benzene, Toluene, and Particulate Matter (PM) Contained in the Exhaust of Diesel Engines by Means of Thermally-excited Holes (Interactive)**, *Toru Ebara, Takashi Makino, Keiji Matsumoto, Takashi Mine, Takumi Ohtsuka, and Jin Mizuguchi, Yokohama National University (Japan)* **669**

* Please note: All plenary papers are grouped at the beginning of the Proceeding book, which is why their page numbers appear to be out of order.

12:15	Preparation of TiO₂ on Ti-wires or Fixation of Powdered TiO₂ onto Wires of Heating Element for Decomposition of Organic Wastes by Thermally-generated (Interactive), Daigo Yamaguchi, Keita Kimura, Toru Ebara, Keiji Matsumoto, and Jin Mizuguchi, Yokohama National University (Japan)	675
12:20	Partial Decomposition of Methanol by Means of Thermally-generated Holes in TiO₂ for the Production of Hydrogen (Interactive), Yoshiyuki Sato, Keiji Matsumoto, Toru Ebara, and Jin Mizuguchi, Yokohama National University (Japan)	679
12:25	Abnormal Effect in Hydrogen Gas Sensors Based upon Pyridylimidazonaphthalene (Interactive), Yuichiro Tsukada, Keita Hirao, and Jin Mizuguchi, Yokohama National University (Japan)	683
12:30	Anomalous Phenomenon in Hydrogen Gas Sensors Based upon Pyridylimidazoperylene, Keita Hirao, Yuichiro Tsukada, Shigeru Suzuki, Hiroo Takahashi, and Jin Mizuguchi, Yokohama National University (Japan)	687
12:50–2:20 PM Session Break/Lunch on own		
2:20	Crystal Structure of Parallel-stacked Peryleneimides and Their Application to Organic FET Devices, Kazuyuki Sato and Jin Mizuguchi, Yokohama National University; and Sinji Aramaki and Yoshimasa Sakai, Mitsubishi Chemical (Japan)	692
2:40	Organic FET Devices Based upon Latent Pigments of Unsubstituted Diketopyrrolopyrrole and Quinacridone (Interactive), Hiroyuki Yanagisawa, Sony Corporation; Jin Mizuguchi, Yokohama National University; and Sinji Aramaki and Yoshimasa Sakai, Mitsubishi Chemical (Japan)	696
2:45	Photovoltaic Effect of a Thiophene Substituted Diarylethene Polymer Film (Interactive), Taechang Kwon, Jaekwon Do, Jaehoon Baek, and Eunyoung Kim, Yonsei University (Korea)	700
2:50	The Optical-drive Type Organic Field Effect Transistor for Driving the Electronic Paper, Norio Nagayama, Jin Yoshikawa, and Masaaki Yokoyama, Osaka University (Japan)	704
3:10	Highly Fluorescent Anthracene Oligomers for Direct Photo Patterning, Eunyoung Kim, Krishnamurthy Rameshbabu, and Jungmok Yoo, Yonsei University (Korea)	708

Interactive Session

Session Chairs: Hugh Allen (NIP), SunJet, a division of Sun Chemical, and
Gregory Herman (Digital Fabrication), Hewlett Packard Company
3:50–6:00 PM
Cook/Arteaga

NIP TRACK 2

Summit Hall 2/3

Image Permanence

Session Chairs: Franziska Frey, Rochester Institute of Technology; Juerg Reber, ILFORD Imaging Switzerland GmbH; and Takao Abe, Shinshu University
9:50 AM–3:50 PM
sponsored by ILFORD Imaging Switzerland GmbH

9:50	Spectroscopic Investigation of IJ Layer Yellowing, Juerg Reber, Rita Hofmann, Marc Pauchard, and Urs Fuerholz, ILFORD Imaging Switzerland GmbH (Switzerland)	711
10:10	Effect of Airflow on Rate of Paper Yellowing in Dark Storage Test Conditions, Matthew Comstock, Paul Sacoto, Rebecca Silvertan-Keith, and Ann McCarthy, Lexmark International, Inc. (USA)	716

10:30	Stain Resistance as Part of Image Permanence for Consumer Digital Ink-Jet and Thermal Imaging Systems , <i>Kristine Lawrence, Joseph LaBarca, Deborah Cigna, Wendell Brattlie, and David Erdtmann, Eastman Kodak Company (USA)</i>	721
10:50	Test Methods of Humidity Fastness of Inkjet Printing Materials , <i>Hideki Kaimoto and Yoshihiko Shibahara, FUJIFILM Corporation (Japan)</i>	728
11:10–11:40 AM Coffee Break Explorer and Summit Hall Lobbies		
11:40	Image Permanence: Comparing the Technologies (Focal) , <i>Peter Mason and Len Carreira, Torrey Pines Research (USA)</i>	732
2:10	Rf Method of Reciprocity Performance Testing, Part II: Long Term Performance Verification , <i>Adam R. Bush, Joseph LaBarca, Douglas Bugner, and Jon Kapecki, Eastman Kodak Company (USA)</i>	733
2:30	Simulating Accelerated Commercial In-Window Display: Predicted Print Longevity for Pigment Ink Systems on a Range of Media Types , <i>Kali Campbell, Nils Miller, Lori Books, and Katie Burns, Hewlett-Packard Company (USA)</i>	734
12:50–2:20 PM Session Break/Lunch on own		
2:20	Lightfastness Properties of Different Digital Printers and Papers (Focal) , <i>Steven Rice and Paul D. Fleming III, Western Michigan University (USA)</i>	739
2:50	Evaluating the Image Permanence of Full Tonal Scale Human Skintone Colors in Photographs Using the CIELAB Colorimetry Based WIR i-Star “Retained Image Appearance” Metric , <i>Henry Wilhelm and Dmitriy Shklyarov, Wilhelm Imaging Research, Inc. (USA)</i>	743
3:10	Effects of Paper Manufacturing Factors on Inkjet Print Quality and Lightfastness , <i>Lokendra Pal, Sachin Agate, and Paul D. Fleming, Western Michigan University (USA)</i>	749
3:30	A Review of the Evolution of Ink Jet Print Durability Against Environmental Gases , <i>Stephan Moeller, Wolfgang Schmidt, Dieter Kaumkoetter, and Gerd Papier, Felix Schoeller Jr. (Germany)</i>	755

Interactive Session

Session Chairs: Hugh Allen (NIP), SunJet, a division of Sun Chemical, and
Gregory Herman (Digital Fabrication), Hewlett Packard Company
3:50–6:00 PM
Cook/Arteaga

NIP TRACK 3

Summit Hall 4/5

Printing Systems Engineering and Optimization

Session Chairs: George T.-C. Chiu, Purdue University; Reinhard R. Baumann, Chemnitz University of
Technology; and Teruaki Mitsuya, Ricoh Printing Systems, Ltd.
10:30 AM–3:10 PM

10:10	Industrial Printing Beyond Color , <i>Reinhard R. Baumann, Chemnitz University of Technology (Germany)</i>	759
10:30	Electronics for Industrial Digital Printers: Architecture of a Universal Solution , <i>Clive Ayling and Phil Duffy, The Technology Partnership plc, (UK)</i>	762

10:50	Optimized Automatic Recovery of Nozzle Health in Inkjet Systems , <i>Jose Luis Valero, Cynthia Jaram, and Esteve Comas, Hewlett-Packard Company (Spain)</i>	766
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11:10–11:40 AM Coffee Break
Explorer and Summit Hall Lobbies

11:40	Monte-Carlo Optimal Inkjet Nozzle Design (Focal) , <i>Jinquan Xu and Christopher Muir, Eastman Kodak Company (USA)</i>	771
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12:10	Heat Transfer Issues in Print-heads: Control and Applications (Focal) , <i>Pere Cantí, Hewlett-Packard Company (Spain)</i>	776
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12:40	A Robust Multi-pass Printing Method (Interactive) , <i>Cesar Nino and Roger Keane, Dupont Color Communication (USA)</i>	781
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12:45–2:20 PM Session Break/Lunch on own

2:20	Development of 650nm-Wavelength-20-Channel Laser Diode Array with Narrow Pitch (Focal) , <i>Junshin Sakamoto, Junichi Matsuno, and Hiroshi Inenaga, Ricoh Printing Systems, Ltd.; and Shinich Nakatsuka and Masahiro Aoki, Hitachi, Ltd. (Japan)</i>	787
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2:50	A Coupled Analysis of Mechanical Vibration Problem and Transfer Process , <i>Akin Ecer, Vladimir Rubek, and Kemal Arican, Technalysis, Inc. (USA)</i>	792
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3:10–3:50 PM Break

Interactive Session

Session Chairs: Hugh Allen (NIP), SunJet, a division of Sun Chemical, and Gregory Herman (Digital Fabrication), Hewlett Packard Company

3:50–6:00 PM
Cook/Arteaga

DIGITAL FABRICATION

La Perouse

Printing of Biomaterials

Session Chairs: Jan Sumerel, FUJIFILM Dimatix, and Makoto Nakamura, Tokyo Medical and Dental University

9:50 AM–12:00 PM

9:50	Application of Inkjet in Tissue Engineering and Regenerative Medicine: Development of Inkjet 3D Biofabrication Technology , <i>Makoto Nakamura, Yuichi Nishiyama, Chizuka Henmi, Kumiko Yamaguchi, Keichi Akita, and Hidemoto Nakagawa, Tokyo Medical and Dental University; Shuichi Mochizuki, Osaka Institute of Technology; and Koki Takiura, Yamagata University (Japan)</i>	936*
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10:10	Printed Epoxy-based Hydrogel Sensors and Actuators , <i>Paul Calvert, Prabir Patra, and Deepak Duggal, University of Massachusetts (USA)</i>	941
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10:30	Damage to Biological Materials During Ink-Jet Printing , <i>Brian Derby, Rachel Saunders, and Julie Gough, University of Manchester (UK)</i>	944
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10:50	Piezoelectric Inkjet Printing of Horseradish Peroxidase on Fibrous Substrates ,	
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* Please note: All Digital Fabrication papers are grouped together after the NIP papers in the hardcopy proceedings, thus appearing out of order in this table of contents.

Sabina Di Risio and Ning Yan, University of Toronto (Canada). **945**

11:10–11:40 AM Coffee Break
Explorer and Summit Hall Lobbies

11:40 **Displays are Here to Stay: Method Development for High Throughput Process Manufacturing Methods Employing R&D Scale Ink Jet Printing**, *Jan L. Sumerel and John Staton, Fujifilm Dimatix, Inc.; and Leila F. Deravi and David W. Wright, Vanderbilt University (USA)*. **950**

12:00–12:10 PM Break for Session Change

New and Novel Direct Write Methods

Session Chairs: Thomas Boland, Clemson University, and Masaya Ishida, Seiko Epson Cambridge Lab.

12:10–3:50 PM

12:10 **Micron Order Patterning by a Novel Inkjet Technology, SIJ**, *Kazuhiro Murata, AIST; Kazuo Shimizu, SIJTechnology, Inc.; and Yorishige Matsuba, Harima Chem., Inc. (Japan)*. . . **956**

12:30 **Characterization of Photo-reduced Silver Organometallic Salt Deposited by Inkjet Printing**, *Jonathan Stringer, Bojun Xu, and Brian Derby, University of Manchester (UK)*. **960**

12:50–2:30 PM Session Break/Lunch on own

2:30 **Electronic Circuit Printing, 3D Printing and Film Formation Utilizing Electrostatic Inkjet Technology**, *Hiroyuki Kawamoto, Waseda University (Japan)*. **961**

2:50 **Powder Coating using Electromagnetic Brush Technology**, *Juergen Kress and Alex Bruderer, Atotech Germany GmbH (Switzerland)*. **965**

3:10 **Hierarchically Structured Membranes Manufactured by Inkjet Technology**, *Stephan Jahn, Susann Ebert, Lutz Engisch, Werner R. A. Goedel, and Reinhard R. Baumann, Chemnitz University of Technology (Germany)*. **967**

3:30 **Direct Circuit Formation Technology Using Electrophotography**, *Yuichiro Sano and Toru Miyasaka, Hitachi, Ltd. (Japan)*. **970**

Interactive Session

Session Chairs: Hugh Allen (NIP), SunJet, a division of Sun Chemical, and Gregory Herman (Digital Fabrication), Hewlett Packard Company

3:50–6:00 PM

Cook/Arteaga

FRIDAY, SEPTEMBER 21, 2007

SPECIAL EVENT

Interactive Panel

Environmental Issues Discussion

Friday, 12:10–12:40 pm
Summit Hall 2/3

Moderated by
Axel Fischer,
International Association of the
Deinking Industry (INGEDE)

Friday morning's speakers
will discuss the impact of
environmental requirements and
how different countries act and
different companies react.

La Perouse

Breakfast Plenary

Session Chair: Ramon Borrell, Xaar plc

8:00–9:20 AM

8:30 **Multi-Primary Printing**, Ján Morovic, Hewlett-Packard Company (Spain) 10*

Summit Hall 2/3

Environmental Issues

Session Chairs: Eric Stelter, Eastman Kodak Company; Axel Fischer, INGEDE;
and Koji Hirakura, Ricoh Company, Ltd.

9:30 AM–12:40 PM

9:30 **Environmental Issues and Non-Impact Printing (Focal)**, Velliyur R. Sankaran,
Sankaran Consulting (USA). 793

10:00 **Environmental Compliance Testing of Fuser and Pressure Roller Products**,
Wade Eichhorn and Dave Winters, 7-SIGMA, Inc. (USA) 794

10:20 **Chemical Emissions: Product Stewardship for Printers in the 21st Century**, William Davis,
Bradford Brooks, Arthur Fong, Gary Utter, James De Broy, and Susan Kreiser, IBM (USA) . . 797

10:40–11:00 AM Coffee Break

Summit Hall Lobby

IS&T Registration and Bookstore Closes

11:00 **Digitally Printed Newspapers: Unrecyclable Trash or Still a Sustainable Resource? (Focal)**,
Axel Fischer, International Association of the Deinking Industry (INGEDE) (Germany) 801

11:30 **The Application of High Intensity Ultrasound to the Deinking of Recycled Papers**, Robert Thompson,
Andrew Manning, and Anna Fricker, University of the Arts London (UK) 804

11:50 **Austrian Eco Label for Printed Paper Products**, Werner Sobotka, Druckinnovation; and
Christian Kornherr, Verein für Konsumenteninformation (VKI) (Austria) 809

Environmental Issues Panel Discussion

12:10–12:40 PM

see details at left

* Please note: All plenary papers are grouped at the beginning of the Proceeding book, which is why their page numbers appear to be out of order.