

NNT Conference Program Schedule
December 11-13, 2002
San Francisco, California

Wednesday, December 11, 2002

Commercial Session

4:00 - 7:00 pm

Reception

6:00 - 7:30 pm

Thursday, December 12, 2002

Welcome

8:10 - 8:30 am

Conference Chair: Christie Marrian, Naval Research Laboratory
Program Chair: Stephen Chou, Princeton University

Keynote Address

8:30 - 9:10 am

(Invited) Challenges in Nano-printing: Masks, Particulates and Placement, W.F.R. Pease, *Stanford University*

International Development Session

9:10 - 9:40 am

(Invited) Nanomiprint Lithography Research in Europe: The Nanotech and Chanil Programs, L. Montelius, *Lund University*

9:40 - 10:10 am

(Invited) Nanomiprint Lithography Research in Japan, M. Komuro, *AIST*

Break

10:10 - 10:40 am

Session A - Nanoimprint (UV) (Chair - D. Herr/C. Sotomayer Torres)

10:40 - 11:10 am

A-1

(Invited) Step & Flash Imprint Lithography, S. V. Sreenivasan, *University of Texas at Austin*

11:10 - 11:40 pm

A-2

(Invited) UV-Nanoimprint-Lithography in Europe, H. Kurz, *AMO, Aachen University*

11:40 - 12:00 pm

A-3

Critical Dimension Control and Pattern Placement Issues for Step and Flash Imprint Lithography Templates, D. Resnick, D. Mancini, W. J. Dauksher, K. Nordquist, *Motorola Labs*, S. Johnson, C. Bailey, S. V. Sreenivasan, J. G. Ekerdt, and C. G. Willson, *University of Texas at Austin*

12:00 - 12:20 pm

A-4

Large Scale Homogeneity of UV Based Nanoimprint, A. Fuchs, B. Vratzov, M. Lemme, W. Henschel, H. Kurz, *Advanced Microelctronic Center Aachen, Germany*

Lunch

12:20 - 1:40 pm

Session B - Nanoimprint (Thermal) (Chair - C. Hanson/F.W. R. Pease)

1:40 - 2:10 pm

B-1

(Invited) Step & Stamp Imprint Lithography: A Versatile Method for Nanoimprinting, T. Haatainen, J. Ahopelto, *VTT Centre for Microelectronics*

2:10 - 2:30 pm

B-2

Mix and Match of NIL with UV-Lithography, H.C. Scheer, H. Schulz, M. Wissen, *University of Wuppertal*, K. Pfeiffer, F. Reuther, G. Grutzner, *Microresist Technology*, L. Montelius, B. Heidari, *University of Lund*, J. Ahopelto, T. Haatainen, *VTT Centre for Microelectronics*, Ch. Cardinaud, F. Gaboraiu, *CNRS - University of Nantes*

2:30 - 2:50 pm B-3 **Nanoimprint Lithography Development at Princeton University**, S. Chou, W. Zhang, M. Li, H. Tan, W. Wu, Z. Yu, L. Chen, H. Ge, J. Wang, S. Schablitsky, C. Keimel, J. Gu, Q. Xia, L. Kong, B. Cui, L. Zhuang, P. Deshpande, X. Lei, L. Guo, M. Austin, H. Cao, *Princeton University*

2:50 - 3:10 pm B-4 **Room Temperature Nanoimprint Technology**, S. Matsui, K. Watanabe, *Himeji Institute of Technology*, J. Fujita, M. Ishida, Y. Ochiai, *NEC Fundamental Research Laboratories*, H. Namatsu, *NTT Basic Research Laboratories*, M. Komuro, *Advanced Semiconductor Research Center*

3:10 - 3:30 pm B-5 **Deformation and Defects Studies on Nano-Imprint Lithography**, Y. Hirai, S. Yoshida, N. Takagi, Y. Tanaka, *Osaka Prefecture University*

Break

3:30 - 4:00 pm

4:00 - 4:20 pm B-6 **Nanosecond Patterning of Nanostructures in Polymers Using Laser-Assisted Nano-Imprint Lithography (LA-NIL)**, Q. Xia, C. Keimel, H. Ge, Z. Yu, W. Wu, S. Chou, *Princeton University*

Session C - Tools (Chair - H. Kurz/M. Komuro)

4:20 - 4:50 pm C-1 **(Invited) Step & Repeat Tools**, N. Schumaker, *Molecular Imprints, Inc.*

4:50 - 5:20 pm C-2 **(Invited) Nanoimprint Lithography Tools**, L. Koecher, *Nanonex Corporation*

Poster Session

5:20 - 7:00 pm

Banquet

7:00 - 9:00 pm

Friday, December 12, 2002

Session D - Nanoprint, Nanoimprint and Applications (Chair - D. Patterson/L. Cooper)

8:10 - 8:40 am D-1 **(Invited) Soft Lithography**, G. Whitesides, *Harvard University*

8:40 - 9:10 am D-2 **(Invited) Nanopatterning Applications**, D. Radack, *DARPA*

9:10 - 9:30 am D-3 **Fabrication of Sub-100 nm MOSFET on 4" Si Wafers Fully Using Nanoimprint Lithography at All Lithography Levels**, W. Zhang, W. Wu, H. Tan, G.M. Li, S.Y. Chou, *Princeton University*

9:30 - 9:50 am D-4 **(Invited) Nanoscale Molecular Electronic Circuits Fabricated by Imprint Lithography**, Y. Chen, *Hewlett-Packard Lab*

9:50 - 10:10 am D-5 **Nanoscale Patterning of Magnetic Islands by Imprint Lithography Using a Flexible Mold**, G. McClelland, M.W. Hart, M.E. Best, C.T. Rettner, K.R. Carter, B.D. Terris, *IBM Research Center, Almaden Research Center*

10:10 - 10:30 am D-6 **Thermomechanical Formation of Polymer Nanostructures with a Heated Atomic Force Microscope Cantilever Tip**, W. King, *Georgia Institute of Technology*

Break

10:30 - 11:00 am

(Chair - S. Matsui/L. Montelius)

11:00 - 11:20 am D-6 **Multifunctional and Hybrid Systems for Microfluidic Applications**, Y. Chen, A. Pepin, R. Jameson, V. Studer, D. Decanini, *Laboratoire de Photonique et de Nanostructures*

11:20 - 11:40 am D-7 **Recent Advances in Step & Flash Imprint Lithography**, N.A. Stacey, T.C. Bailey, S.C. Johnson, M.D. Dickey, B.J. Smith, A.T. Jamieson, E.K. Kim, S.V. Sreenivasan, J.G. Ekerdt, C.G. Willson, *University of Texas at Austin*

11:40 - 12:00 pm D-8 **Fabrication of Nanoscale Rings for Vertical Magnetoresistive Random Access Memory Using Nanoimprint Lithography**, L. Kong, *Nanonex Corporation*, M.T. Li, S.Y. Chou, *Princeton University*

Lunch

12:00 - 1:30 pm

Session E - Dip-Pen & Novel Processing (Chair - G. Pomrenke/S.V. Sreenivasan)

- 1:30 - 2:00 pm E-1 **(Invited) Dip-Pen Nanolithography: Towards Combinatorial Nanotechnology**, C. Mirkin, *Northwestern University*
- 2:00 - 2:20 pm E-2 **Functional Chemical and Biological Nanostructures Via Dip-Pen Nanolithography**, L.M. Demers, R. Elghanian, S. Disawal, *NanoInk, Inc.*, D.S. Ginger, K.B. Lee, J.H. Im, C. Mirkin, *Northwestern University*
- 2:20 - 2:40 pm E-3
- 2:40 - 3:10 pm E-4 **Rapid Prototyping of Hybrid Nanoscale Devices via Dip-Pen Nanolithography**, S. Hong, *Florida State University*
(Invited) Laser Assisted Direct Imprint of Nanostructures, C. Keimel, J. Gu, S.Y. Chou, *Princeton University*
- 3:10 - 3:30 pm E-5 **MxL: Molecular Transfer Lithography for Sub-100 nm High Throughput Patterning**, C. Schaper, *Stanford University*
- 3:30 - 3:50 pm E-6 **A Versatile Method for Tuning the Chemistry and Size of Molded Nanoscopic Features**, K.R. Carter, T.A. von Werne, D.S. Germack, E.C. Hagberg, V.V. Sheares, C.J. Hawker, *IBM Almaden Research Center*

Break

3:50 - 4:10 pm

Session F - Masks & Materials (Chair - Y. Chen (CNRS)/M. Komuro)

- 4:10 - 4:40 pm F-1 **(Invited) Focused Ion Beam Fabrication of Masters for Nano Contacting / Imprinting Techniques**, R. Hull, *University of Virginia*
- 4:40 - 5:10 pm F-2 **(Invited) Polymer Concepts for Pattern Transfer by Nanoimprint Lithography**, F. Reuther, *Micro Resist Technology*
- 5:10 - 5:30 pm F-3 **Implications of Stamp Layout for Large Area NIL Processing**, H. Schulz, M. Wissen, H.C. Scheer, *University of Wuppertal*, J. Ahopelto, T. Haatainen, *VTT Center for Microelectronics*
- 5:30 - 5:50 pm F-4 **Characterization of Optical Inspection of Nanoimprint Molds and Features**, Y. Deng, A. Neureuther, *University of California at Berkeley*
- 5:50 - 6:10 pm F-5 **Adhesion Effects in Nanoimprint Lithography**, C.M. Sotomayor Torres, S. Zankovych, J. Seekamp, H. Schulz, N. Roos, H.C. Scheer, *University of Wuppertal*, K. Pfeiffer, F. Reuther, G. Gruetzner, M. Fink, *Microresist Technology*, T. Haatainen, J. Ahopelto, *VTT Centre for Microelectronics*, I. Maximov, M. Beck, L. Montelius, *Lund University*, C. Finder, C. Mayer, *University of Duisburg*, C. Cardinaud, *University of Nantes*

Poster Sessions (Breaks and Thursday 5:20 - 7:00 pm) (Chair - D. Resnick/B. Terris)

Session A - Nanoimprint (UV)

- P-1 **Elimination of Bubble Defects During Nanoimprint in Atmospheric Ambient**, H. Hiroshima, M. Komuro, *Advanced Semiconductor Research Center*, N. Kasahara, Y. Kurashima, J. Taniguchi, I. Miyamoto, *Tokyo University of Science*
- P-2 **Line Edge Roughness Measurements in Nanoimprint Using Photo-Solidified Polymer**, M. Komuro, Y. Kurashima, H. Hiroshima, *Advanced Semiconductor Research Center*, J. Taniguchi, *Tokyo University of Science*
- P-3 **Step and Repeat UV-Nanoimprint Lithography: Material Issues**, M. Otto, M. Bender, B. Hadam, F. Richter, B. Spangenberg, H. Kurz, *Aachen University*

Session B - Nanoimprint (Thermal)

- P-4 **Nanoimprint Lithography for the Fabrication of Chemical Patterns**, H. Schiff, S. Park, C. Padeste, T. Scharf, J. Gobrecht, *Paul Scherrer Institut*
- P-5 **The Influence of Residual Solvent in Polymers Patterned by Nanoimprint Lithography**, C. Gourgon, C. Perret, F. Lazzarino, J.H. Tortai, G. Micouin, *Laboratoire des Technologies de la Microelectronique-CNRS*, S. Landis(b), O. Joubert, *CEA/LETI/DTS*
- P-6 **Nanoimprint Lithography and Nanoelectronics on Flexible Plastic Substrates**, M. McAlpine, C. Lieber, *Harvard University*
- P-7 **Multi Gradation Imprint Technology Using SOG Mold**, J. Taniguchi, M. Iida, S. Takezawa, Y. Kurashima, I. Miyamoto, *Tokyo University of Science*, M. Komuro, H. Hiroshima, *Advanced Semiconductor Research Center*, S. Matsui, *Himeji Institute of Technology*, K. Tada, *Toyo Gosei, Inc.*
- P-8 **A Direct Nanoimprint Method for Patterning Electrically Conducting Polymer**, H. Rowland, W. King, *Georgia Institute of Technology*
- P-9 **Technology of Nanoimprint Stamps with Sub-100 nm Features**, I. Maximov, M. Beck, E.L. Sarwe, P. Carlberg, L. Montelius, *Lund University*, S. Zankovych, C.M. Sotomayor Torres, H.C. Scheer, *University of Wuppertal*, Ch. Cardinaud, *CNRS - University of Nantes*, G. Gruetzner, F. Reuther, K. Pfeiffer, *Micro Resist Technology*, T. Haatainen, J. Salmi, J. Ahopelto, *VTT Centre for Microelectronics*
- P-10 **Nanoimprinted Active and Passive Devices**, I. Maximov, P. Carlberg, M. Beck, E.L. Sarwe, L. Montelius, *Lund University*, J. Seekamp, S. Zankovych, H.C. Scheer, C.M. Sotomayor Torres, *University of Wuppertal*, Ch. Cardinaud, *CNRS - University of Nantes*, G. Gruetzner, F. Reuther, K. Pfeiffer, *Micro Resist Technology*, T. Haatainen, J. Salmi, J. Ahopelto, *VTT Centre for Microelectronics*
- P-11 **Liff-Off Process for Nanoimprint Lithography**, P. Carlberg, M. Graczyk, E.L. Sarwe, I. Maximov, M. Beck, L. Montelius, *Lund University*, C.M. Sotomayor Torres, *University of Wuppertal*, Ch. Cardinaud, *CNRS - University of Nantes*, K. Pfeiffer, F. Reuther, M. Fink, G. Gruetzner, *Micro Resist Technology*, J. Ahopelto, T. Haatainen, *VTT Centre for Microelectronics*, C. Mayer, *University of Duisburg, Germany*

Session C - Tools

- P-12 **Manufacturing Solutions for Nanoimprinting**, G. Lecarpentier, J. Kuenholz, *SUSS Microtec*

Session D - Applications

- P-13 **Micro/Nano Patterning Method by Combined Shadow - Mask Patterning and Micro-Contact Printing**, B.J. Kim, G.M. Kim, *University of Tokyo*, S. Gopakumar, J. Brugger, *Swiss Federal Institute of Technology*
- P-14 **Nanostructuring Conjugated Materials by Lithographically Controlled Wetting**, M. Cavallini, M. Massi, I. Bilotti, F. Biscarini, *CNR - ISMN*
- P-15 **Soft Lithography Patterned Dielectric Traps for DNA and Cell Focusing**, C. Chou, F. Zenhausern, *Arizona State University*
- P-16 **Formation of Nanopillar Structure by Nano-Print Technique**, A. Miyauchi, K. Kuwabara, M. Hasegawa, *Hitachi Research Laboratory*
- P-17 **Spreading Behavior of Thiol Inks in Microcontact Printing on Gold**, R.B.A. Sharpe, J. Huskens, H.J.W. Zandvliet, D.N. Reinhoudt, B. Poelsema, *University of Twente, The Netherlands*
- P-18 **Imprinted Tracks for Biochemically Powered Motor Proteins**, R. Bunk, P. Omling, L. Montelius, *University of Lund*, J. Klinth, J. Rosengren, I. Nicholls, S. Tagerud, A. Mansson, *University of Kalmar*
- P-19 **Single Layer High Aspect Ratio Nanoimprint Lithography For Definition of a Nanogrid for 10 cm Diameter Solar Cells**, M. Wissen, H. Schultz, J.T. Horstmann, *University of Dortmund*, M. Scherff, H.C. Scheer, W.R. Fahrner, *University of Hagen*
- P-20 **Step and Flash Imprint Lithography for Thin Film Head Fabrication**, A.R. Eckert, M. Covington, H. Gentile, E. Johns, K. Mountfield, C. Seiler, X.M. Yang, *Seagate Research*, J. Choi, S. V. Sreenivasan, R. Voisin, *Molecular Imprints*

- P-21 **Nanoelectrochemical Transducers for (Bio) Chemical Sensors Fabricated Including Bondpads in One Imprint Step on 2" Wafers**, M. Beck, P. Carlber, M. Graczyk, E.L. Sarwe, I. Maximov, T.G.J. Ling, L. Montelius, *Lund University*
- P-22 **Nanofabrication of Ultr-Small Integrated Nanosystems for Biological Applications**, H. Cao, J. Tegenfeldt, Z. Yu, P. Deshpande, R. Austin, S. Chou, *Princeton University*
- P-23 **Effects of Nanoimprint Lithograph on Electrical and Optical Properties of GaInAs/InP and AlGaAs/GaAs Quantum Well Structures**, I. Maximov, I. Shorubalko, M. Beck, W. Seifert, L. Montelius, *Lund University*, S. Zankovych, J. Seekamp, S. Romanov, H.C. Scheer, C.M. Sotomayor Torres, *University of Wuppertal*, D. Reuter, P. Schafmeister, A.D. Wieck, *Lehrstuhl für Angewandte Festkörperphysik*, Ch. Cardinaud, *CNRS - University of Nantes*, G. Gruetzner, *Micro Resist Technology*, C. Mayer, *University of Duisburg*, J. Ahopelto, *VTT Centre for Microelectronics*
- P-24 **Application of Nanoimprint Lithography in Subwavelength Optical Elements**, Z. Yu, X. Lei, M. Li, H. Tan, A. Chang, S. Bai, H. Gao, W. Wu, S. Chou, *Princeton University*
- P-25 **Tunable External Cavity Laser Using Subwavelength Resonant Gratings Fabricated by Nanoimprint Lithography**, A. Chang, H. Tan, S. Bai, W. Wu, Z. Yu, S. Chou, *Princeton University*
- P-26 **Large Area Direct Nanoimprinting of SiO₂-TiO₂ Gel Gratings for Optical and Nanofluidic Applications**, M. Li, H. Tan, L. Chen, J. Wang, H. Ge, W. Wu, Z. Yu, S. Chou, *Princeton University*
- P-27 **Fabrication of Magnetic Nanostructures and Quantized Magnetic Disks, and Spin-Valve Devices by Nanoimprint Lithography**, B. Cui, W. Wu, S. Chou, *Princeton University*, L. Kong, *Nanonex Corporation*
- P-28 **Fabrication of Si Room-Temperature Single Electron Memory by Nanoimprint Lithography**, W. Wu, J. Gu, N. Li, H. Ge, S. Chou, *Princeton University*
- P-29 **(Invited) Nano-Lithography Using Self-Assembled Block-Copolymer and Nanoimprint Technology for Patterned Magnetic Media**, K. Asakawa, T. Hiraoka, H. Hieda, M. Sakurai, Y. Kamata, K. Naito, *Toshiba Corporation*

Session E - Dip-Pen & Novel Processing

- P-46 **(Invited) An Investigation of the Pertinent Parameters in DPN: Tip Loading, Thiol Diffusion, and the Water Meniscus**, P. E. Sheehan, L. Whitman, *Naval Research Laboratory*, S. Kooi, *NRC*
- P-47 **(Invited) Using Dip-Pen Nanolithography to Template Arrays of Macromolecules**, J. A. Camarero, C. L. Cheung, B. L. Weeks, A. Noy, A. Miller, J. De Yoreo, *Lawrence Livermore National Laboratory*, T. Lin, J. E. Johnson, *The Scripps Research Institute*
- P-30 **Nanoimprint and Dip Pen Lithography of Gallium**, R.W. Cohn, M.M. Yazdanpanah, S.A. Harfenist, *University of Louisville*
- P-31 **Construction of High Resolution Organic Nanostructures**, J.F. Liu, C. Baur, R. Stallcup, T. Zhang, Z. Chai, K. Bray, J. Von Ehr, *Zyvex Corporation*
- P-32 **Patterning of Organic Semiconducting Materials**, S. Allard, M. Behl, R. Zentel, *University of Mainz*, J. Seekamp, C. Sotomayor Torres, *University of Wuppertal*, D. Neher, *University of Potsdam*
- P-33 **Soft Lithography with Block Copolymer Films**, M. Brehmer, L. Funk, L. Conrad, *University of Mainz*
- P-34 **Patterning and Information Storage on a Surface Using Lithographically-Controlled Supramolecular Transformation**, M. Cavallini, F. Biscarini, *ISMN*, S. Leon, F. Zerbetto, *Università degli Studi di Bologna*, G. Bottari, D. Leigh, *University of Edinburgh*
- P-35 **Liquids at Nano-Landscapes**, O. Gang, M. Fukuto, K. Alvine, *Harvard University*, B. Ocko, *BNL*, C. Black, *IBM*, P. Pershan, *Harvard University*
- P-36 **Patterning Surfaces with Superparamagnetic Colloidal Particles**, B. Yellen, G. Friedman, *Drexel University*

P-37 **Fabrication of Large Area Nano-scale Grating with Reduced Line Edge Roughness Using Nanoimprint Lithography**, Z. Yu, L. Chen, W. Wu, H. Ge, S. Y. Chou, *Princeton University*

Session F - Masks & Materials

- P-38 **Mechanical Properties of NIL Polymer Lines**, D.A. Mendels, *National Physical Laboratory*, S. Zankovych, C.M. Sotomayor Torres, *University of Wuppertal*
- P-39 **Polymer Size Effects During Hot Embossing of Nanometer Scaled Features**, M. Wissen, N. Roos, L. Bendfeldt, H.C. Scheer, I. Joachimsthaler, L.J. Balk, *University of Wuppertal*, L. Montelius, *Lund University*
- P-40 **Fluorescence Microscopy as a New Method for Quality Control in Nanoimprint Lithography**, M. Beck, P. Carlberg, I. Maximov, E.L. Sarwe, L. Montelius, *Lund University*, C. Mayer, C. FINDER, *University of Duisburg*, J. Seekamp, S. Zankovich, C.M. Sotomayor Torres, *University of Wuppertal*, K. Pfeiffer, F. Reuther, *Micro Resist Technology*, J. Ahopelto, *VTT Centre for Microelectronics*
- P-41 **Atomic Force Microscopy Study of Resist Transport Problems in Nanoimprint Lithography**, C. Martin, *Laboratoire de Physique de la Matière Condensée*
- P-42 **Development and Characterization of Anti-Adhesion Layers for Nickel Based Stamps in Nanoimprint Lithography**, M. Beck, T.G.I. Ling, M. Graczyk, E.L. Sarwe, L. Montelius, *Lund University*, M. Keil, B. Heidari, *Obducat A.B.*, J. Ahopelto, *VTT Centre for Microelectronics*
- P-43 **Development and Characterization of Imprint-Resists as Masks For Plasma Etching** C. Cardinaud, F. Gaboriau, A. Bousquet, *University of Nantes*, K. Pfeiffer, F. Reuther, M. Fink, G. Gruetzner, *Micro Resist Technology*, H. Schultz, H.C. Scheer, C.M. Sotomayor Torres, *University of Wuppertal*, L. Montelius, *University of Lund*, C. Mayer, *University of Duisburg*, J. Ahopelto, *VTT Centre for Microelectronics*
- P-44 **Large Scale (Wafer Level) Nanopattern Generation of Templates for 10 nm Nanoimprint Lithography**, J. Zhu, J. Grunes, G. Somorjai, Y.K. Choi, J. Bokor, *University of California at Berkeley*
- P-45 **Development and Characterization of Resists for Low Temperature Nanoimprint Lithography**, F. Reuther, M. Fink, G. Gruetzner, K. Pfeiffer, *Micro Resist Technology*, J. Seekamp, S. Zankovych, C.M. Sotomayor Torres, H.C. Scheer, H. Schultz, *University of Wuppertal*, L. Montelius, *University of Lund*, C. Mayer, *University of Duisburg*, C. Cardinaud, *University of Nantes*, J. Ahopelto, *VTT Centre for Microelectronics*

Commerical Sessions (Chair - D. Resnick)

4:00 - 7:00 pm	Wednesday, December 11
8:00 am - 5:00 pm	Thursday, December 12
8:00 am - 4:00 pm	Friday, December 13