# NNT '09 Program



**Wednesday, November 11**

12:00 Exhibit set-up, Room J2/J3, San Jose Convention Center

12:00 Registration

17:00 **Welcome Reception and Equipment Exhibit, Room J2/J3, San Jose Convention Center**

**Thursday, November 12, Room J1/J4 , San Jose Convention Center**

**Plenary Session** - *Session Chairs: S. Chou (Princeton) & L. Montelius (Lund)*

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| 8:15 | | Welcome: Stephen Chou and Christie Marrian | | |
| 8:30 | Plenary | NNT is Losing the Propaganda War | Fabian Pease | Stanford University |
| 9:00 | Invited 1 | Template Infrastructure for Nanoimprint Lithography | Nobuhito Toyama | Dai Nippon Printing |
| 9:20 | Invited 2 | NaPANIL: Consolidation of Nanoimprinting for Production | Jouni Ahopelto | VTT Microsystems and Nanoelectronics |
| 9:40 | Invited 3 | Shrink-Induced Nanostructures | Michelle Khine | University of California, Irvine |

10:00 Break

**Magnetics/Biology/Solar** - *Session Chairs: G. Willson (U. Texas) & H. Schift (PSI)*

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|---|---|---|---|---|
| 10:30 | Invited 4 | The Nano-imprinting Process towards Patterned Media Manufacturing | Tsai-Wei Wu | HGST |
| 10:50 | c1 | Large Scale Fabrication of Nanoimprinted Magnetic Nanoparticles with Self-Assembled Templates | Wei Hu | Stanford University |
| 11:05 | c2 | Photocatalytic Nanolithography: An Emergent Patterning Technique Relevant to Biotechnology | Jane P Bearinger | LLNL |
| 11:20 | c3 | Fabrication of 3D Cell Containers with Integrated Topography by Combined Microscale Thermoforming and Thermal Nanoimprint | Arne Schleunitz | Paul Scherrer Institut |
| 11:35 | c4 | Nanoimprinting of Subphthalocyanines for Photovoltaic Applications | Xiaogan Liang | Lawrence Berkeley National Laboratory |
| 11:50 | c5 | Nanopatterned anode for organic solar cell by nanoimprint | Dae-Geun Choi | Korea Institute of Machinery & Materials |

12:05 Lunch

**Electronics/Optoelectronics** - *Session Chairs: J. Randall (Zyvex) and S. Matsui (Hyogo)*

| | | | | |
|---|---|---|---|---|
| 13:30 | Invited 5 | Nanoimprint lithography for organic thin film transistors | Barbara Stadlober | Joanneum Research |
| 13:50 | c6 | Fabrication of organic TFT arrays on an A4-sized flexible sheet using microcontact printing | Hiroshi Fujita | Dai Nippon Printing Co., Ltd. |
| 14:05 | c7 | Printing of Sub- 20 nm Wide Graphene Ribbon Arrays over a Large Area by Imprinting Nanostructures on a Graphite Stamp and Electrostatic Force Assisted Bonding | Chao Wang | Princeton University |
| 14:20 | c8 | Planar Memristive Device Arrays Fabricated Using Nanoimprint Lithography | Qiangfei Xia | HP Labs |
| 14:35 | c9 | Coupled Nanopillar Antenna Array for Large Surface Enhanced Raman Scattering Fabricated Using Nanoimprint Lithography on Wafer-Scale Area | Wendi Li | Princeton University |
| 14:50 | c10 | Highly Sensitive Surface-enhanced Raman Spectroscopy Sensors by 3-D Nanoimprint Lithography | Wei Wu | HP Labs, Hewlett-Packard Co. |
| 15:05 | c11 | High-extraction efficiency of nanoimprinted plasmonic crystals coupled to photonic crystals | Vincent Reboud | Institut Catalan of Nanotechnology |

15:20 **NNT'09 Poster Session, Rooms J2/J3:** *Session Chairs P. Rissman (Stanford), W. Wu (HP), H. Ge (Nanjing) and J. Randall (Zyvex)*

**Process**

| | | | |
|---|---|---|---|
| p1 | Casting Metal Microstructures from a Three-Dimensional Flexible Mold | Andrew H Cannon | University of Illinois at Urbana-Champaign |
| p2 | 3D Features on Plastic Substrate by Combining Thermal and UV-nanoimprinting | Tomi Haatainen | VTT |
| p3 | Fabrication of Uniform Dense Metal Dot Arrays over a Large Area on Flexible Plastic Substrate Using UV Nanoimprint Lithography and Self-Perfection by Liquefaction (SPEL) | Chao Wang | Princeton University |
| p5 | Direct patterning of gold electrodes on ceramic substrates by Imprint Molding (IM) in microcapillaries | Michael T Demko | University of California, Berkeley |
| p6 | Stacking of Metamaterial Structures made of gold | Iris Bergmair | PROFACTOR GmbH |
| p7 | Nanostructure fabrication by room-temperature nanoimprint using liquid-phase HSQ with PDMS mold | Yuji Kang | University of Hyogo |

**Magnetics/Biology/Solar**

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|---|---|---|---|
| p8 | Rapid fabrication of Sub-micron Magnetic line using electromagnetic force-assisted UV-imprinting | Ting Ting Wen | National Tsing Hua University |
| p9 | Opto-thermally actuated polymer chips for manipulation of single genomic-length DNA molecules | Lasse H Thamdrup | Technical Univesity of Denmark |
| p11 | Replication of cicada wings' nano-patterns by hot embossing and UV nanoimprinting | Sung-Hoon Hong | Korea University |
| p12 | Implant-compatible titanium with biofunctional nanoridges. | Maciej Domanski | University of Twente |
| p13 | Thermodynamic Underpinnings of Cell Alignment on Controlled Topographies | Yifu Ding | University of Colorado, Boulder |
| p14 | Fabrication of Polymeric Nanostructures for Organic Solar Cells by Nanoimprint Lithography | Seok Kwan Hong | Korea Institute of Industrial Technology |

**Electronics/Optoelectronics**

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|---|---|---|---|
| p15 | Thin film transistors on PEN foil fabricated by imprint lithography | Pieter F Moonen | MESA+ Institute - University of Twente |
| p16 | Phase change nano-pillar device fabrication using nanoimprint lithography | Sung-Hoon Hong | Korea University |
| p17 | Residue free NIL structuring techniques for organic electronics | Herbert Gold | Joanneum Research |
| p18 | Self-aligned nano imprinted organic TFTs | Christoph Auner | Joanneum Research |
| p20 | Configuration Control of Photoreactive Polymer Liquid Crystal by using Thermal Nanoimprint Mold Pattern | Makoto Okada | University of Hyogo |
| p21 | UV-Enhanced Substrate Conformal Nanoimprint Lithography Technique for Photonic Crystals Patterning in LED Manufacturing | Michael Hornung | Suss MicroTec Lithography GmbH |
| p22 | Nanoimprint Alignment of Smectic Liquid Crystals | Youngwoo Yi | University of Colorado |
| p23 | Reverse Nanoimprinting Technique for Fabricating a Polarizer of Liquid Crystalline Polymer | Sheng Wen Lin | ITRI |
| p24 | Fabrication of Flexible Nanowire Grid Polarizer Based on Contac-Transferred and Mask-Embedded (CMEL) Lithography | Cheng-Yu Chiu | National Cheng Kung University |
| p25 | Distributed Feedback (DFB) Laser Fabrication using step and flash Imprint and i-line Stepper Lithography | Alexei Bogdanov | Canadian Photonics Fabrication Centre |
| p26 | Nanoimprint with atmospheric plasma treated mold for LED applications | Fuh-Yu Chang | National Taiwan University for Science and Engineering |
| p27 | Mass fabrication of resistive switching memory by UV-NIL process | Ki-don Kim | Korea Institute of Machinery & Materials |
| p28 | Plastic nanoelectromechanical mass sensor | Gang Luo | Lund University |

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**Modeling/Materials**

| | | | |
|---|---|---|---|
| p29 | Nano-scale Spreading of Resist Droplet in Nanoimprint Process | Ryuta Washiya | Hitachi Ltd. |
| p31 | Study on Resist Filling Process by Capillary Force in UV-Nanoimprint Lithography | Yoshinori Nagaoka | Osaka Prefecture University |
| p32 | Effects of air bubble trapping on the residual layer thickness of UV nanoimprint lithography using capacity-equalized mold | Qing Wang | National Institute of Advanced Industrial Science |
| p33 | Molecular dynamics study on resist filling process into single nano scale cavity | Akihiro Taga | Osaka Prefecture University |
| p34 | Study on Bubble Trapping in UV Nanoimprint Lithography | Yoshinori Nagaoka | Osaka Prefecture University |
| p37 | Adhesion Evaluation of Radical-, Cation-, and Hybrid-UV Nanoimprint Resins | Makoto Okada | Graduate School of Science, Univ. of Hyogo |
| p38 | Reliability of hot embossed structures | Jin-Hwa Ryu | Pusan National University |
| p39 | Degradable Resist for UV Nanoimprint Lithography | Masamitsu Shirai | Osaka Prefecture University |
| p40 | polymeric micro-zipper | Saskia Möllenbeck | University of Wuppertal |
| p41 | TiO2 patterning by thermal nanoimprint | Norihito Hoto | Osaka Pref. Univ. |
| p42 | Resists with improved release properties for thermal and UV based NIL | Marko Vogler | Micro Resist Technology |
| p43 | Feature Size Reduction by Growing Molecular Layers on Nanoimprinted Photocurable Silsesquioxane Resist | Carlos Pina | University of Michigan |
| p44 | Thiol diffusion during Rigid-Stamp Microcontact Printing | Michael Mühlberger | PROFACTOR GmbH |

**Large Area/Templates**

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| p46 | Step and Repeat high resolution large area master fabrication utilizing working stamps from EUV-IL fabricated master templates | Gerald Kreindl | EVGroup |
| p47 | Large area direct fabrication of sub-50 nm features of inorganic materials using nanoimprint lithography | M. S. M. Saifullah | Institute of Materials Research and Engineering |
| p48 | Roll-to-Roll UV Nanoimprinting With Flexible Polymer Stamps | Tapio Mäkelä | VTT |
| p49 | Bilayer Metal Wire-Grid Polarizer Fabricated by Nanoimprint Lithography on a Flexible Plastic Substrate | Fantao Meng | Lund University |
| p50 | Preparation of Plastic Replica of Master Mold and UV-NIL Using Replica Mold | Hiroyuki Wakayama | Osaka Prefecture University |
| p51 | High Vertical Resolution 3D Nanoimprint Templates | Xiaolin Wang | INA, University of Kassel |
| p52 | Multi-usable, adhesively bonded UV-NIL templates | Robert Kirchner | Dresden University of Technology (IHM/MST) |
| p53 | Fabrication of Working Stamps with Mesa Structures for Step and Repeat Nanoimprint Lithography | Arne Schleunitz | Paul Scherrer Institut |
| p54 | Investigating post-EBL thermal/UV treatment of ZEP 520A to make sub-30 nm NIL molds | Linshu Kong | Nanonex Corporation |
| p55 | UV-NIL replicates as molds for Powder Injection Molding | Rainer Schöftner | PROFACTOR GmbH |
| p56 | A Study on the Fabrication of Nano-Pattern Mold Using Anodic Aluminum Oxide Template | Jong Sun Kim | Korea Institute of Industrial Technology (KITECH) |
| p57 | Efficient Methods of Stamp Cleaning Based on Imprint Self-cleaning Effect | Fantao Meng | Lund University |
| p58 | Sub 50nm Working Stamps for Nanoimprint Lithography from CHARPAN Tool exposed Master Templates | Michael Mühlberger | PROFACTOR GmbH |

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**Large Area/Templates (cont)**

| | | | |
|---|---|---|---|
| p59 | NIL stamp replication in Silicon, Nickel, and Polymer | Søren Dahl Petersen | NIL Technology |
| p60 | Si mold fabrication with deep and smooth side wall patterns by deep RIE and Ar plasma Treatment | Jyunji Sakamoto | Osaka Prefecture University |
| p61 | Multi-silicon ridge nanofabrication by repeated edge lithography | Yiping Zhao | MESA+ Research Institute, University of |
| p62 | Fabrication of Scalloped High Aspect Ratio Pillars by UV-NIL using PDMS Template | Tomoki Nishino | Kinki Univ. |

**Tooling**

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|---|---|---|---|
| p63 | Nano injection molding: Process and quality control | Christian Rytka | Ems Chemie |
| p64 | Fabrication of Micro Pillar Array by Hot Embossing for Polymeric Reentrant Texture with Superhydrophobicitiy | Seok Kwan Hong | Korea Institute of Industrial Technology |
| p65 | Development of capillary lithography and comparison to nanoimprint lithography | Cecile Gourgon | LTM |
| p66 | A new instrument platform, µ-CP2.1, for the production of functional 2D and 3D structures in the micro- and nanometer range | Steffen Howitz | GeSiM mbH |
| p67 | New instruments for automated microcontact printing. New concept for lab on chip and biochip integration. | Elie Bou Chakra | INL - UMR CNRS 5270 |
| p68 | Molecular Transfer Lithography: Water-Dissolvable Templates, Materials Transfer, and Commercialization | Charles D Schaper | Transfer Devices, Inc. |
| p69 | UV Nanoimprint at a low imprint pressure in air and in pentafluoropropane | Hiroshi Hiroshima | National Institute of Advanced Industrial Science |
| p71 | Hierarchical pattern definition via capillary force lithography in thermal imprint | Andre Mayer | University of Wuppertal |
| p72 | Realization of Boolean operators of union, intersection and inversion of nanopatterns by nanoimprint lithography | Alessandro Pozzato | TASC CNR-INFM |
| p73 | Measurement of mechanical strength of interfaces in nanopillars | André N Kaufmann | Paul Scherrer Institut |
| p74 | Nanoscale Length Calibration: Artifacts and Testing by Comparison | Jennifer E Decker | National Research Council Canada |
| p75 | SARFUS: Access to the Nanoworld Simply With a Standard Optical Microscope | Benoit Landemaine | NANOLANE |

18:00 Buses Depart to Computer History Museum

18:30 **NNT'09 Reception and Banquet**

21:00 Buses Return

Program for Friday, November 13, on next page

**Friday, November 13, Room J1/J4, San Jose Convention Center**

**Modeling/Materials** - *Session Chairs: C. Soles (NIST) and Y. Hirai (Osaka)*

| | | | | |
|---|---|---|---|---|
| 8:15 | c12 | Nanoimprint Simulation Toolkit: Process and Geometry Optimization | David A Mendels | Cognoscens |
| 8:30 | c13 | Theoretical Analysis of Thermal Actuator Based Nanoimprint Lithography | Saurabh A Chandorkar | Stanford University |
| 8:45 | c14 | Fast simulation of pattern dependencies in thermal nanoimprint lithography | Hayden K Taylor | MIT |
| 9:00 | c16 | Study on Bubble Trapping in UV Nanoimprint Lithography | Yoshihiko Hirai | Osaka Prefecture University |
| 9:15 | c15 | Use of Shape Memory Polymers in Nanoimprint Lithography | Rainer Schöftner | PROFACTOR GmbH |
| 9:30 | c17 | High Si-contents material for Nanoimprint lithography | Satoshi Shimatani | Tokyo Ohka Kogyo Ltd. |
| 9:45 | c18 | Nanoprinting of inorganic sol-gel films with tunable optical properties | Christophe Peroz | aBeam Technologies |

10:00 Break

**Large Area/Templates** - *Session Chairs: D. Resnick (MII) and J-J Lee (KIMM)*

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|---|---|---|---|---|
| 10:30 | Invited 6 | Continuous Roll-to-roll and Roll-to-plate Nanoimprinting | Jay Guo | University of Michigan |
| 10:50 | c20 | Seamless Roller Mold Fabricated by Photolithography on Cylindrical Surface | Yung-Chun Lee | National Cheng Kung University |
| 11:05 | c21 | Industrial Application of Unconventional Lithography to Flat Panel Display: Liquid Crystal Display | Jinook Kim | LG Display R & D Centre |
| 11:20 | c22 | Large area UV Nano Imprint Lithography Machine Development | Wonho Choi | Kookmin University |
| 11:35 | c23 | Fluorinated mold treatment regeneration and low-reactivity resists in UV-nanoimprint lithography | Jumana Boussey | CNRS LTM |
| 11:50 | c19 | Fabrication of 25 nm dot pattern on a 10m-long polymer sheet | Masahiko Ogino | Hitachi, Ltd, |

12:05 Lunch

**Process** - *Session Chairs: R.F. Pease (Stanford) and M. Komuro (AIST)*

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|---|---|---|---|---|
| 13:30 | Invited 7 | Defect Inspection for semiconductors and patterned media | Douglas J Resnick | Molecular Imprints Inc. |
| 13:50 | c24 | From 1D to 2D imprinted structures characterization using optical scatterometry | Issam Gereige | CNRS |
| 14:05 | Invited 8 | Some Recent Progress in Molecular Scale and 3D Nanofabrication | John Rogers | University of Illinois |
| 14:25 | c25 | Multi-scale lithography for fabricating periodic micro/nano-droplets and concentric nano-rings by combining block copolymer self-assembly and nano-imprint lithography | Richard A Farrell | UCLA |
| 14:40 | c26 | Pit-patterned Si substrates fabricated by UV nanoimprint lithography for the ordered growth of highly uniform Si/Ge quantum dot arrays | Elisabeth Lausecker | Johannes Kepler University Linz |
| 14:55 | c27 | Impact of Resist Shrinkage in UV nanoimprint lithography | Mayuko Shibata | Osaka Prefecture University |

15:10 Break

**Tooling** - *Session Chairs: C. Marrian (Spansion) and A. Miyauchi (Hitachi)*

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|---|---|---|---|---|
| 15:40 | Invited 9 | High-Volume High-Yield Nanoimprint Manufacturing Using Air Cushion Press | Larry Koechner | Nanonex |
| 16:00 | c28 | Fiber Imprinting to Develop Fiber-On-Devices | Harutaka Mekaru | Nat. Inst. of AIST |
| 16:15 | c29 | Patterning nanostructures on curved and non-planar surfaces by Hybrid Nanoimprint-Soft Lithography (HNSL) | Haixiong Ge | Nanjing University |
| 16:30 | c30 | Direct-Write 3D Nanopatterning Using Probes | Armin W Knoll | IBM Zurich Research Laboratory |
| 16:45 | c31 | Shape control of polymer reflow structures fabricated by nanoimprint lithography | Helmut Schift | Paul Scherrer Institut |
| 17:00 | | Closing Remarks | | |