



TECHNOLOGIES
FOR FUTURE
MICRO  NANO
MANUFACTURING

Preliminary Program

Times are not finalized and may change

Technologies for Future Micro-Nano Manufacturing

Today, we see exciting new nanostructures, new nanodevices, and new applications for nanotechnology emerging every day. Missing is a coherent vision, process or plan for the growth of a real NanoManufacturing Industry. The Workshop on Future Technologies for Micro/Nano Manufacturing was initiated by the Transducers Research Foundation as the first in a series of topical meetings with the goal of exploring emerging issues to North American Engineering Technological Communities and the goal of this Workshop is to develop a technology vision for the future of micro-nano manufacturing and to articulate opportunities. We have been fortunate that our first topic selection has generated exceptional interest among industrial, academic and government leaders. The report by the President's Executive Commission on Advanced Science and Technology and the recent announcement by the Obama Administration of a new, \$500M Initiative on Advanced Manufacturing earlier this month has amplified this interest.

The Organizing Committee of the Workshop will prepare a final report containing the recommendations that emerge from this Workshop. This report will be shared with the federal agencies that are developing advanced manufacturing programs in response to the President's recently announced Advanced Manufacturing Partnership (www.whitehouse.gov/the-press-office/2011/06/24/president-obama-launches-advanced-manufacturing-partnership).

Program Overview

Day 1 – The Workshop opens with a presentation by Dr. Greg Tasse, Senior Economist at NIST, who has done extensive work studying U.S. Manufacturing and will discuss rationales and mechanisms to revitalize U.S. manufacturing R&D. This presentation will be followed by a presentation summarizing the recently released PCAST Study on Advanced Manufacturing. The afternoon will be devoted to the contributed poster session where attendees will have a chance to familiarize themselves with the most recent advances in manufacturing at the micro and nano scale. The day ends with an informal chat and extensive Q&A with MEMS pioneer Dr. Kurt Petersen, who will talk about his experiences commercializing micro/nano enabled products, and the unique challenges of manufacturing in this space.

Day 2 – This day is designed to be a ‘depth dive’ on a variety of advanced manufacturing technologies. We will hear first from plenary speaker Prof. Chad Mirkin of Northwestern University, after which we’ll spend the day hearing invited talks on some of the newest advanced manufacturing technologies at the micro/nano scale. The day concludes with a dinner on the veranda overlooking the golf course.

Day 3 – This day is structured to engage the entire workshop in developing ideas and recommendations for strengthening domestic manufacturing at the micro/nano scale. The day opens with a plenary presentation and is followed by two panel discussions. The first panel will be comprised of representatives from NSF, DoE, NIST, and DoD to discuss the various agencies perspective on manufacturing. This will be followed by a panel of experts from industry who will discuss challenges of manufacturing at the micro-nano scale. In the afternoon, the workshop will be broken up into working groups based upon several different themes, and the groups will be asked to develop ideas and recommendations. The workshop will conclude with a briefing on the recommendations of the working groups. These briefing materials will be a central part of the final report of the meeting.

Leaders and Innovators are invited and we encourage everyone to participate in this timely meeting.



Tom Kenny
Stanford University, USA



Marty Schmidt
Massachusetts Institute of Technology, USA

Monday, August 8

- 08:30 **Registration**
- 10:00 **Opening Welcome**
- 10:30 **PLENARY I**
RATIONALES AND MECHANISMS FOR REVITALIZING U.S. MANUFACTURING R&D STRATEGIES
G.S. Tassej
National Institute of Standards and Technology (NIST), USA
- 11:30 **INVITED I**
A BRIEFING ON THE PCAST REPORT ON ADVANCED MANUFACTURING
- 12:15 **Lunch**
- 13:30 **Poster Shotgun Session**
- 14:50 **Poster Session A**
- 15:50 **Poster Session B**
- P1.A A BIO-INSPIRED APPROACH TO TIP-BASED NANOFABRICATION**
S. Chung¹, J. Felts², D. Wang¹, M. Morrissey¹, F. Svec¹, W. Chung³, S.W. Lee³, W.P. King²,
and J.J. De Yoreo¹
¹*Lawrence Berkeley National Laboratory, USA,*
²*University of Illinois, Urbana-Champaign, USA, and* ³*University of California, Berkeley, USA*
- P2.B A FABRICATION METHOD FOR INTEGRATING ELECTRODES IN NANOFUIDIC CHANNELS**
T.M. Wynne, X.T. Huang, and S. Pennathur
University of California, Santa Barbara, USA
- P3.A A SIDEWALL ALN PROCESS FOR EFFICIENT 3D PIEZOELECTRIC TRANSDUCTION OF MEMS**
R. Tabrizian¹, V. Felmetger², and F. Ayazi¹
¹*Georgia Institute of Technology, USA and* ²*OEM Group Inc., USA*
- P4.B A SURFACE MICROMACHINING PROCESS BY DIRECT PRINTING: AN ALTERNATIVE MEMS FABRICATION METHOD**
E.W. Lam and M.A. Schmidt
Massachusetts Institute of Technology, USA
- P5.A ADVANCED MULTI-STRUCTURED MATERIALS VIA PATTERNED ELECTROPHORETIC DEPOSITION**
M.A. Worsley¹, T.Y. Olson¹, K. Sullivan¹, A. Pascall¹, J.S. Park², D. Saintillan², K.A. Rose¹, and
J.D. Kuntz¹
¹*Lawrence Livermore National Laboratory, USA and*
²*University of Illinois, Urbana-Champaign, USA*

- P6.B ALD FOR RELIABLE NANOWIRE SELF-ASSEMBLY ON MICROFABRICATED ELECTRODES**
J.J. Brown¹, A.I. Baca², K.A. Bertness³, and V.M. Bright¹
¹University of Colorado, USA, ²Samtec Microelectronics, Inc., USA, and
³National Institute of Standards and Technology (NIST), USA
- P7.A BATCH MANUFACTURING OF MEMS DEVICES ON FLEXIBLE SUBSTRATES**
T. Niblock, M. Micklich, D. Yerukhimov, and R. Damhuis
Magzor Corporation, USA
- P8.B CAPACITIVE MICROMACHINED ULTRASONIC TRANSDUCERS WITH INTEGRATED ELECTRONICS FOR IMAGING, THERAPY, AND SENSING**
B.T. Khuri-Yakub and Ö. Oralkan
Stanford University, USA
- P9.A CARBON NANOTUBE TEMPLATED MICROFABRICATION OF HIGH ASPECT RATIO METAL STRUCTURES**
D. McKenna, B.D. Jensen, R.R. Vanfleet, R.C. Davis, and D.D. Allred
Brigham Young University, USA
- P10.B CoBi TOOLS FOR MODEL GUIDED MANUFACTURING OF BIOLOGICS FROM SYNTHETICALLY STIMULATED BIOFACTORIES**
A.J. Przekwas, M.R. Somayaji, and Z.J. Chen
CFD Research Corporation, USA
- P11.A CONCEPTS FOR COST EFFECTIVE MANUFACTURING OF MEMS/NEMS DEVICES**
M.A. Huff
MEMS and Nanotechnology Exchange (MNX), USA
- P12.B COST MODEL AND MANUFACTURABILITY IN MEMS-CMOS PROCESS INTEGRATION**
M.A. Huff¹ and P. Lin²
¹MEMS and Nanotechnology Exchange (MNX), USA and
²Touch Micro-System Technology, TAIWAN
- P13.A DESIGN, MANUFACTURING, AND INTEGRATION OF 3D CARBON NANOTUBE MICROSTRUCTURES**
S. Tawfick¹, S.J. Park¹, D. Copic¹, M. De Volder^{1,2}, and A.J. Hart¹
¹University of Michigan, USA and ²IMEC, BELGIUM
- P14.B DEVELOPMENT OF SILICON-BASED NANOMATERIALS FOR ON-CHIP SUPERCAPACITOR APPLICATIONS**
J. Alper, M. Vincent, C. Carraro, and R. Maboudian
University of California, Berkeley, USA
- P15.A DIELECTROPHORETIC ASSEMBLY OF ORDERED NANOPARTICLES – HARNESSING THERMAL RANDOMNESS AND INTERPARTICLE INTERACTIONS**
S.J. Papadakis, J.A. Hoffmann, D. Deglau, A. Chen, P. Tyagi, A.H. Monica, and D.H. Gracias
Johns Hopkins University, USA

- P16.B DIRECT SYNTHESIS OF LARGE AREA GRAPHENE FILMS FROM SOLID SOURCE PRECURSORS**
H. Sojoudi¹, H.-J. Kim², W.P. King², and S. Graham¹
¹Georgia Institute of Technology, USA and ²University of Illinois, Urbana-Champaign, USA
- P17.A DIRECT-WRITE ASSEMBLY OF FUNCTIONAL INKS FOR PLANAR AND 3D MICROSTRUCTURES**
E.B. Duoss^{1,2}, B. Yeop Ahn², T.F. Malkowski², J.J. Adams², J.T. Bernhard², and J.A. Lewis²
¹Lawrence Livermore National Laboratory, USA and
²University of Illinois, Urbana-Champaign, USA
- P18.B ELECTROPLATING-BASED APPROACHES TO VOLUMETRIC NANOMANUFACTURING**
F. Herrault, W.P. Galle, R.H. Shafer, and M.G. Allen
Georgia Institute of Technology, USA
- P19.A FABRICATION OF NANOPARTICLES DEPOSITED PHOTONIC CRYSTALS**
J. Zhang, T. Pick, D. Gargas, S. Dhuey, E. Chan, Y. Wu, X. Liang, J. Schuck, D. Olynick, B. Helms, and S. Cabrini
Lawrence Berkeley National Laboratory, USA
- P20.B FABRICATION OF COMPLEX 3-DIMENSIONAL NANOSTRUCTURES WITH SELF-ASSEMBLED NANOSPHERE PHASE LITHOGRAPHY**
C.-H. Chang¹, L. Tian¹, W.R. Hesse¹, H. Gao¹, H.J. Choi¹, J.-G. Kim¹, M. Siddiqui¹, and G. Barbastathis^{1,2}
¹Massachusetts Institute of Technology, USA and
²Signapore-MIT Alliance for Research and Technology (SMART) Centre, SIGNAPORE
- P21.A TUNABLE PLASMONIC NANOSTRUCTURES FOR ENHANCED SENSING**
H. Sharma, N. Sharac, V. Lew, R. Ragan, and M. Khine
University of California, Irvine, USA
- P22.B FABRICATION OF ENGINEERED MATERIAL MICROSTRUCTURES USING PROJECTION MICROSTEREOLITHOGRAPHY**
H. Lee¹, T. Weisgraber³, J. Xu¹, C. Xia², M. Alonso^{2,3}, G. Farquar³, N. Fang¹, and C.M. Spadaccini³,
¹Massachusetts Institute of Technology, USA, ²University of Illinois, Urbana-Champaign, USA, and ³Lawrence Livermore National Laboratory, USA,
- P23.A FERROELECTRIC NANOPROBE TIP EMITTER WITH HEATER-THERMOMETER**
P.C. Fletcher, J. Karthik, L.W. Martin, and W.P. King
University of Illinois, Urbana-Champaign, USA
- P24.B FULLY AUTOMATED NANOSCALE SCANNING PROBE LITHOGRAPHY**
N.A. Amro, J. Haaheim, M. Nelson, J. Fragala, A. Henning, and J. Bussan
NanoInk, Inc., USA
- P25.A GRAPHENE-CNT-GRAPHENE TOWARDS 3-D MULTI-STACK GRAPHENE-CNT ARCHITECTURES FOR SUPERCAPACITOR APPLICATIONS**
K. Kumar, Y.S. Kim, F. Fisher, and E.H. Yang
Stevens Institute of Technology, USA

- P26.B** **HEXANETHIOL ENCAPSULATED GOLD NANOPARTICLE INK FOR PRINTED METAL MEMS**
R.C. Roberts and N.C. Tien
Case Western Reserve University, USA
- P27.A** **HIGH POWER LITHIUM ION MICROBATTERIES WITH 3D NANOSTRUCTURED ELECTRODES**
J.H. Pikul, H.G. Zhang, J. Cho, T.W. Kim, P.V. Braun, and W.P. King
University of Illinois, Urbana-Champaign, USA
- P28.B** **HIGH PRECISION ALIGNMENT OF PZT ELECTRODES WITH INTERCONNECT CIRCUIT FOR HIGH NOZZLE DENSITY PIEZO INKJET PRINTERHEAD**
J. Chen, C.-H. Chen, and, E. Nikkel
Hewlett Packard Company, USA
- P29.A** **HIGH-PERFORMANCE, HIGH-DENSITY TIP ARRAYS FOR RELIABLE MANUFACTURING**
J.S. Fragala, A.K. Henning, R.R. Shile, N. Amro, and J. Haaheim
NanoInk, Inc., USA
- P30.B** **HYBRID MEMS: EXTENDING MICRO MANUFACTURING WITH DIRECT WRITE PROCESSES**
D.G. Johnson, J. Getpreecharsawas, S. Balasubramanian, A. Datar, D. Cormier, and D.A. Borkholder
Rochester Institute of Technology, USA
- P31.A** **LARGE AREA MANUFACTURING OF “LOTUS LEAF” MICRO/NANO-STRUCTURED SUPERHYDROPHOBIC ALUMINUM**
A.T. Gardner¹, S. Hulseman², M. Maguire², A.H. Cannon², and W.P. King¹
¹University of Illinois, Urbana-Champaign, USA and ²Hoowaki LLC, USA
- P32.B** **LARGE AREA NANOLITHOGRAPHY ON CURVED SURFACES USING A FLEXIBLE NANO-APETURE ARRAY**
H. Hu¹, J. Yeom², G. Mensing¹, Y. Chen¹, W.P. King¹, and M.A. Shannon¹
¹University of Illinois, Urbana-Champaign, USA and ²Cbana Labs Inc., USA
- P33.A** **LASER-ASSISTED NANOFABRICATION**
S.-G. Ryu¹, D.J. Hwang^{1,3}, E. Kim¹, J.-H. Yoo¹, B. Xiang^{1,2}, O. Dubon^{1,2}, A.M. Minor^{1,2}, and C.P. Grigoropoulos¹
¹University of California, Berkeley, USA, ²Lawrence Berkeley National Laboratory, USA, and ³State University of New York, USA
- P34.B** **LOCALIZED MICROPLASMA-ASSISTED CHEMICAL VAPOR DEPOSITION AND ETCHING OF ELECTRONIC MATERIALS**
M. Tabib-Azar and W. Yuen
University of Utah, USA
- P35.A** **MAGNETIC FIELD-ASSISTED FABRICATION AND MANIPULATION OF NON-SPHERICAL POLYMER PARTICLES IN FERROFLUID-BASED DROPLET MICROFLUIDICS**
T. Zhu, G. Sheppard, J. Locklin, and L. Mao
University of Georgia, USA

- P36.B** **MAGNETIC NANOPARTICLE BASED ASSEMBLY FOR MICROSCALE HYDROGELS**
F. Xu¹, V. Rengarajan¹, T.D. Finley¹, Y. Sung¹, B. Sridharan¹, U.A. Gurkan¹, and U. Demirci^{1,2}
¹*Brigham and Women's Hospital, Harvard Medical School, USA and*
²*Harvard-MIT Health Sciences and Technology, USA*
- P37.A** **MECHANICAL MICRO-MANUFACTURING AND ITS APPLICATIONS**
O.B. Ozdoganlar, N. Kota, B. Bekiz, R. Khilwani, and G. Salas
Carnegie Mellon University, USA
- P38.B** **MEMS BASED AUTOMATED ASSEMBLY OF MICRO AND NANOSYSTEMS**
R. Saini and J. Randall
Zyvexlabs LLC, USA
- P39.A** **MEMS BY INK JET PRINTING AND THE IMPACT OF PROCESSING DECISIONS ON MEMS DEVICE DESIGN**
S.P. Bathurst and S.G. Kim
Massachusetts Institute of Technology, USA
- P40.B** **MICRO ROBOT MANUFACTURING**
R. Pelrine, A. Wong-Foy, B. McCoy, D. Holeman, and R. Mahoney
SRI International, USA
- P41.A** **MICROFABRICATION AND PROCESS INTEGRATION OF POWDER-BASED PERMANENT MAGNETS**
B.J. Bowers, O.D. Oniku, and D.P. Arnold
University of Florida, USA
- P42.B** **MICROMACHINED 3-D GLASS-BLOWN WINEGLASS STRUCTURES FOR VIBRATORY MEMS APPLICATIONS**
D. Senkal, I.P. Prikhodko, A.A. Trusov, and A.M. Shkel
University of California, Irvine, USA
- P43.A** **MICROSTRUCTURED STAINLESS STEEL MOLDS FOR HIGH VOLUME MICROSTRUCTURE MANUFACTURING**
A.H. Cannon¹, M. Maguire¹, and W.P. King^{1,2}
¹*Hoowaki LLC, USA and* ²*University of Illinois, Urbana-Champaign, USA*
- P44.B** **MODULARITY IN THE DESIGN AND MANUFACTURE OF MICROFLUIDIC DEVICES**
J. Podczerveinsky and L. Levine
ALine, Inc., USA
- P45.A** **MULTIBEAM INTERFERENCE LITHOGRAPHY TEMPLATED PATTERN TRANSFER PROCESS FOR LARGE-AREA ORDERED NANOPORE ARRAY FABRICATION**
Y.K. Yoon¹, K.-T. Kim¹, G.J. Kim¹, H. Jee², and P.N. Prasad²
¹*University of Florida, USA and* ²*University at Buffalo, State University of New York, USA*

- P46.B NANO MANUFACTURING OF SiC CIRCUITS—NANOMECHANICAL LOGIC AND NEMS-JFET INTEGRATION**
S. Rajgopal, T.-H. Lee, P.X.-L. Feng, S. Bhunia, and M. Mehregany
Case Western Reserve University, USA
- P47.A NANO OPTICAL RULER DRIVEN PIEZORESISTIVE PROBES FOR TIP BASED NANOFABRICATION**
H. Hosseinzadegan, H. Vajihollahi, N. Yoshimizu, and A. Lal
Cornell University, USA
- P48.B NANO-FABRICATED GRAPHENE-AL₂O₃ NANOPORES AND NANOPORE ARRAYS FOR THE SENSITIVE DETECTION OF DNA AND DNA-PROTEIN COMPLEXES**
B.M. Venkatesan, D. Estrada, B. Dorvel, S. Banerjee, G. Humphreys, V.E. Dorgan, A. Nardulli, E. Pop, and R. Bashir
University of Illinois, Urbana-Champaign, USA
- P49.A NEW APPROACHES TO ELECTRON-BEAM BASED NANOMANUFACTURING WITH AND WITHOUT RESISTS**
A.W. Chamberlain, E.U. Donev, S. Leontsev, S. Maloney, N. Nehru, C. Samantaray, G. Schardein, J.C. Wright, Y. Yang, and J.T. Hastings
University of Kentucky, USA
- P50.B NEW CLASS OF MEMS BASED DEVICES ENABLED BY NANOCRYSTALLINE MATERIAL**
C. Keimel, M. Aimi, A. Detor, and A. Corwin
GE Global Research, USA
- P51.A NOVEL FABRICATION PROCESS OF 3D CONDUCTIVE POLYMER STRUCTURES**
V. Ho, L. Kulinsky, and M. Madou
University of California, Irvine, USA
- P52.B NOVEL POLYMERIC INKS FOR PRECISION PATTERNING OF CARBON MICRO/NANO-FIBERS USING NEAR-FIELD ELECTROSPINNING**
G. Bisht¹, G. Canton¹, A. Mirsepassi¹, D. Dunn-Rankin¹, L. Kulinsky¹, and M. Madou^{1,2}
¹*University of California, Irvine, USA and*
²*Ulsan National Institute of Science and Technology (UNIST), KOREA*
- P53.A ORCHESTRATED STRUCTURE EVOLUTION: CONTROLLING THE GROWTH AND COMPOSITION OF SEEDED NANOSTRUCTURES**
S. Abbasi, S. Kitayaporn, D.T. Schwartz, and K.F. Böhringer
University of Washington, USA
- P54.B PARALLEL NANOTOPOGRAPHY IMAGING WITH A HEATED MICROCANTILEVER ARRAY**
S. Somnath, Z. Dai, and W.P. King
University of Illinois, Urbana-Champaign, USA
- P55.A PATTERNING CARBON NANOMATERIALS INTO ELASTOMERIC AND RESORBABLE POLYMERS VIA SURFACE ENERGY MODULATION**
D.J. Cohen and M.M. Maharbiz
University of California, Berkeley, USA

- P56.B PICOSECOND LASER ABLATION OF SAPPHIRE FOR HIGH-TEMPERATURE SENSOR FABRICATION**
D. Blood, D. Mills, M. Sheplak, and T. Schmitz
University of Florida, USA
- P57.A POLYMER JETTING TECHNIQUE FOR NOVEL 3D MMW / THZ COMPONENTS**
H. Xin and M. Gehm
University of Arizona, USA
- P58.B POST-CMOS MEMS WITH AOE AND SIDEWALL PASSIVATION**
Y.-J. Fang, P.J. Gilgunn, T. Mukherjee, and G.K. Fedder
Carnegie Mellon University, USA
- P59.A PROGRAMMABLE BATCH ASSEMBLY OF MICROPARTS**
K.S. Park¹, J.H. Hoo¹, R. Baskaran^{1,2}, and K.F. Böhringer¹
¹University of Washington, USA and ²Intel Corporation, USA
- P60.B RADIOISOTOPE POWERED ELECTRON LITHOGRAPHY WITH CURVED SOURCE FOR HIGHER THROUGHPUT**
Y. Lu and A. Lal
Cornell University, USA
- P61.A RAPID AND LOCAL GRAPHENE SYNTHESIS ON A HEATED MICROCANTILEVER**
H.J. Kim¹, H. Sojoudi², S. Graham², and, W.P. King¹
¹University of Illinois, Urbana-Champaign, USA and ²Georgia Institute of Technology, USA
- P62.B RAPID NANOFABRICATION OF GOLD NANOROD RAMAN ENHANCING NANOSTRUCTURES USING HEATED PROBE TIP ARRAY**
J.R. Felts, L. Thompson, S. Somnath, C. Murphy, and W.P. King
University of Illinois, Urbana-Champaign, USA
- P63.A RECENT PROGRESS IN MANUFACTURING AND APPLICATIONS OF MICRO-LATTICE MATERIALS FORMED VIA A SELF-PROPOGATING PHOTOPOLYMER WAVEGUIDE PROCESS**
C.S. Roper, J.A. Kolodziejska, K.J. Maloney, K.D. Fink, T.A. Schaedler, and A.J. Jacobsen
HRL Laboratories, LLC, USA
- P64.B REPLICATION OF METAL-BASED MICRO/NANO-SCALE STRUCTURES**
K. Chen¹, Y. Mu¹, B. Lu¹, W.J. Meng¹, and F. Mei²
¹Louisiana State University, USA and ²Enervana Technologies LLC, USA
- P65.A ROADMAPING MANUFACTURING NEEDS FOR MEMS TECHNOLOGIES**
M. Gaitan¹ and K. Lightman²
¹National Institute of Standards and Technology (NIST), USA and ²MEMS Industry Group, USA
- P66.B ROUGH SILICON NANOWIRE FABRICATION BY THIN-FILM DEWETTING AND METAL-ASSISTED CHEMICAL ETCHING**
B. Azeredo¹, K. Hsu¹, J. Sadhu¹, J. Ma¹, K. Jacobs¹, J. Kim¹, S. Sinha¹, N. Fang², and P. Ferreira¹
¹University of Illinois, Urbana-Champaign, USA and | ²Massachusetts Institute of Technology, USA

- P67.A** **SCALABLE, INTEGRATED SYSTEM FOR MECHANICAL, 3D ASSEMBLY OF MONODISPERSE NANOPARTICLES SYNTHESIZED ON-DEMAND**
E.Y. Erdem, M.T. Demko, S. Choi, J.C. Cheng, and A.P. Pisano
University of California, Berkeley, USA
- P68.B** **SHAPING THERMAL EMISSION WITH EMBEDDED OUT-OF-PLANE MICROANTENNAS**
D.B. Burckel¹, J.R. Wendt¹, I. Brener^{1,2}, and M.B. Sinclair¹
¹*Sandia National Laboratories, USA* and ²*Center for Integrated Nanotechnology, USA*
- P69.A** **SHRINK-INDUCED SUPERYDROPHOBIC SURFACES**
L.R. Freschauf, J. McLane, H. Sharma, and M. Khine
University of California, Irvine, USA
- P70.B** **SILICON-BASED GECKO-INSPIRED ADHESIVE STRUCTURES WITH ACTIVE AND PASSIVE ADHESION CONTROL**
M. Shavezipur, Y. Kim, C. Carraro, and R. Maboudian
University of California, Berkeley, USA
- P71.A** **SITE-CONTROLLED PATTERNING OF QUANTUM DOTS ON MEMS - NANOSTAMPING, NEAR-FIELD IMAGING AND EARLY CANCER DETECTION**
J.X.J. Zhang, K. Hoshino, A. Gopal, and Z. Wang
University of Texas, Austin, USA
- P72.B** **SOLID STATE SUPERIONIC STAMPING USING MOLDED SILVER PHOSPHATE GLASS STAMPS**
K. Jacobs¹, K. Hsu¹, B. Azeredo¹, N. Fang², and P. Ferreira¹
¹*University of Illinois, Urbana-Champaign, USA* and ²*Massachusetts Institute of Technology, USA*
- P73.A** **STANDARDIZING WAFER-LEVEL PACKAGING FOR HIGH VOLUME MANUFACTURING OF MICRO AND NANO DEVICES**
J.S. Mitchell¹, S. Lee¹, J. Giachino², and K. Najafi²
¹*ePack, Inc., USA* and ²*University of Michigan, USA*
- P74.B** **TI/TIO₂ NANODEVICES FABRICATION USING COMPLIANT PROBES AND CMOS PROBE-ARRAYS**
W. Hu, Y. Tang, Y. Zhang, J. Gu, S. Tamaru, J.A. Bain, L.R. Carley, R.F. Davis, G.K. Fedder, and D.S. Ricketts
Carnegie Mellon University, USA
- P75.A** **TOWARDS NANOMANUFACTURING OF METAL NANOSTRUCTURES AND DEVICES - MICROPLASMA ELECTROCHEMICAL REDUCTION COMBINED WITH NANOSCALE MASKING TECHNIQUES**
S.W. Lee, H. Zamani, C.A. Zorman, P.X.-L. Feng, and R.M. Sankaran
Case Western Reserve University, USA
- P76.B** **SCIENCE AND TECHNOLOGY OF ULTRANANOCRYSTALLINE DIAMOND (UNCD™) FILMS FOR MICRO/NANO-MANUFACTURING**
O. Auciello¹ and J. Carlisle²
¹*Argonne National Laboratory, USA* and ²*Advanced Diamond Technologies, Inc., USA*

P77.A

**USING HEATABLE AFM PROBES TO MANUFACTURE GRAPHENE
NANORIBBONS**

P.E. Sheehan¹, W.K. Lee¹, J. Robinson¹, A. Laracuate¹, Z. Dai², and W.P. King²

¹*U.S. Naval Research Laboratory, USA* and ²*University of Illinois Urbana-Champaign, USA*

16:50

**MODERATED DISCUSSION - A CAREER IN COMMERCIALIZING MICR/NANO
TECHNOLOGIES**

K. Peterson

Consultant, USA

17:50

Adjourn for the Day

17:00 -

Wine & Cheese Reception

18:00

Tuesday, August 9

- 08:15 Opening Remarks
- 08:30 **PLENARY II**
THE EVOLUTION OF SCANNING PROBE MOLECULAR PRINTING
C. Mirkin
Northwestern University, USA
- 09:30 **INVITED II - PLASMONIC NANOMANUFACTURING**
X. Zhang
University of California, Berkeley, USA
- 10:10 **Break**
- 10:40 **INVITED III - SELF PERFECTION OF NANOSTRUCTURES– A NEW FRONTIER IN NANOMANUFACTURING**
S.Y. Chou
Princeton University, USA
- 11:20 **INVITED IV**
NANOMANUFACTURING WITH HEATED PROBES
W.P. King
University of Illinois, Urbana-Champaign, USA
- 12:00 **Lunch**
- 13:15 **INVITED V**
ATOMICALLY PRECISE MANUFACTURING
J. Randall
Zyvex Labs LLC, USA
- 13:55 **INVITED VI**
HIGH THROUGHPUT NANO-MANUFACTURING PROCESSES
S.V. Sreenivasan
University of Texas, Austin, USA
- 14:35 **INVITED VIII**
ROLL-TO-ROLL FABRICATION OF LARGE AREA ELECTRONICS
W. Jackson
Hewlett Packard, USA
- 15:15 **Adjourn for the Day**
- 18:00 -
21:00 **Workshop Banquet**

Wednesday, August 10

- 08:15 **Opening Remarks**
- 08:30 **PLENARY III**
To Be Determined
- 09:30 **PANEL DISCUSSION I**
GOVERNMENT AGENCIES PERSPECTIVE ON ADVANCED MANUFACTURING
- 10:30 **Break**
- 11:00 **PANEL DISCUSSION II**
COMMERCIALIZATION AND INFRASTRUCTURE CHALLENGES
- 12:30 **Lunch**
- 13:45 **WORKING GROUP SESSION**
- 16:15 **REPORT OUT ON RECOMMENDATIONS FOR MICRO/NANO MANUFACTURING**
- 17:45 **Closing Remarks**
- 18:15 -
19:15 **Wine-Tasting Reception**