

Preliminary Program



SOLID-STATE SENSORS, ACTUATORS, AND MICROSYSTEMS WORKSHOP
HILTON HEAD
31 May - 4 June *Sonesta Resort* South Carolina, USA

Sponsored by the



Sunday, 31 May

Workshop 1: Digital Twins for MEMS Manufacturing

10:00 Benyamin Davaji¹, Gary Fedder², Duane S. Boning³, Michael Cullinan⁴, Jason J. Gorman⁵, and Gordon Shao⁵
¹Northeastern University, USA, ²Carnegie Melon University, USA, ³Massachusetts Institute of Technology, USA, ⁴University of Texas, Austin, USA, and ⁵National Institute of Standards and Technology (NIST), USA

12:00 Lunch

13:00 **Industry Panel Discussion**
Michael Kranz¹, Marry Ann Maher², and Jan Tiepelt³,
¹Engenius Micro, USA, ²SoftMEMS, USA, and ³FabuBlox, USA

15:00 Adjourn

Workshop 2: Implantable MEMS Sensors for Management of Heart Failure

10:00 **CORDELLA PLATFORM**
Angad Singh
Edwards Lifesciences, USA

V-LAP PLATFORM
Adi Baram
Vectorious Medical, ISRAEL

12:00 Adjourn

Workshop 3: Perspectives on Sustainability in MEMS Engineering

10:00 Julia Körner¹ and Christopher Reiche²
*¹Leibniz IFW Dresden, GERMANY and
²Jade University of Applied Sciences, GERMANY*

12:00 **Adjourn**

Workshop 4: Use of Laser Doppler Vibrometry for Dynamic Characterization of MEMS

13:00 **INTRODUCTION TO LASER VIBROMETRY FOR DYNAMIC
CHARACTERIZATION OF MEMS**
Eric Lawrence
Polytec Inc., USA

**DYNAMIC INTERROGATION OF DLP MICRO MIRROR ARRAY
USING LASER DOPPLER VIBROMETRY**
Rick Oden
Texas Instruments, USA

**LASER VIBROMETRY FOR VALIDATION OF GROUNDED-RING
SPURIOUS-MODE SUPPRESSION IN LITHIUM NIOBATE BAW
RESONATORS FOR PIEZOELECTRIC POWER CONVERSION**
Vakhtang Chulukhadze
University of Texas, Austin, USA

**USE OF LASER VIBROMETRY FOR DYNAMIC
CHARACTERIZATION OF PROGRAMMABLE HZO-BASED
FERRONEMS FOR IN-MEMORY COMPUTING**
Shubham Jadhav
Cornell University, USA

16:00 **Adjourn**

18:00 - 21:00 **Registration & Welcome Reception**

Monday, 1 June

07:00 **Breakfast**

07:45 **Welcome**

TRF President:

Reza Ghodssi, *University of Maryland, College Park, USA*

Workshop Chair:

Swaminathan Rajaraman, *University of Central Florida, USA*

Program Chair:

Ryan D. Sochol, *University of Maryland, College Park, USA*

Plenary Speaker I

08:15 **ULTRA LOW POWER SENSORS**

Christofer Hierold

ETH Zürich, SWITZERLAND

Rising Star Speaker I

08:55 **PIEZOELECTRIC ACOUSTIC MICROSYSTEMS FOR
MILLIMETER-WAVE FILTERS, ULTRASOUND
TRANSDUCERS, AND EMERGING APPLICATIONS**

Ruo Chen Lu

University of Texas, Austin, USA

Session 1 - Nonlinear and Topological MEMS Dynamics

09:15 **ONE HUNDRED PERCENT ACOUSTIC PRESSURE
ENHANCEMENT BY A FULL-WAVE GENETIC
ALGORITHM FOR THE PACKAGE OF A COMMERCIAL PMUT**

Mostafa Sedky^{1,2}, Nikita G. Lukhanin^{1,2}, and Liwei Lin^{1,2}

¹*University of California, Berkeley, USA and*

²*Berkeley Sensor and Actuator Center, USA*

09:30 **DISPLACEMENT AMPLIFICATION VIA TOPOLOGICALLY PROTECTED INTERFACE STATES**
Onurcan Kaya, Tommaso Maggioli, Niccolò Scalise Pantuso, Marco Galli, Siddhartha Ghosh, Matteo Rinaldi, and Cristian Cassella
Northeastern University, USA

09:45 **DYNAMICS, STABILITY, AND TUNABILITY OF DIAMAGNETICALLY LEVITATED MAGNETIC PLATFORMS FOR RESONANT SYSTEMS**
Mahtab Shakibmanesh, Lois Meria Lopez, Mark Jiang, Naji Tarabay, Juan Diego Sanchez, Andrei M. Shkel, and Camilo Vélez Cuervo
University of California, Irvine, USA

10:00 **ELECTROMAGNETIC LEVITATOR FOR INERTIAL SENSING**
Vaibhav Sharma¹, Sina Askari², Martin Simon¹, and Rob Candler^{1,3}
¹University of California, Los Angeles, USA, ²ECS Federal, USA, and ³California NanoSystems Institute, Los Angeles, USA

10:15 **Break and Tabletop Inspection**

10:44 **Award Announcement**

Invited Speaker I

10:45 **TBD**
Sarah Bergbreiter
Carnegie Mellon University, USA

Session 2 - Advanced Microfabrication and Device Integration

11:05 **A MULTI-TIERED μ DICER WITH HIERARCHICAL BLADES FOR TISSUE MICRODISSECTION DOWN TO CELLULAR RESOLUTION**
Annatoma Arif¹, Rashmi Kumar², Yumi Kwon², Ramon Rodriguez¹, Seth C. Cordts¹, Saisneha Koppaka¹, Ying Zhu², Ljiljana Pasa-Tolic², and Sindy K. Y. Tang¹
¹Stanford University, USA and ²Pacific Northwest National Laboratory (PNNL), USA

11:20 **LOW-COST, RAPID, CLEANROOM-FREE MICRONEEDLE ELECTRODES FABRICATION VIA DYNAMIC REDISTRIBUTION DROP-CASTING FOR BIOMARKERS MONITORING IN INTERSTITIAL FLUID**
Md Mamunoor Islam, Gabriel A. Saucedo, Michael Lyubchenko, Robert C. Roberts, and Jorge Manrique Castro
University of Texas, El Paso, USA

- 11:35** **WAFER-SCALE FABRICATION OF SILICON NANOSPHERE ARRAYS WITH ULTRA-UNIFORM SUB-NANOMETER GAPS**
Taeyeong Kim and Jungchul Lee
Korea Advanced Institute of Science and Technology (KAIST), KOREA
- 11:50** **ONLINE OPTICAL SENSING FOR CLOSED-LOOP GEOMETRIC CONTROL IN MICRO-ADDITIVE MANUFACTURING**
Kaifan Yue, Angelo Hawa, and Kira Barton
University of Michigan, Ann Arbor, USA
- 12:05** **Poster Preview – Session 1**
- 12:45 - 14:15** **Networking Lunch**

Poster Session 1

- 14:15** **Contributed and Late News**
See page 15 for listing of poster presentations
- 16:45 - 17:45** **Student Ice Cream Social**

Tuesday, 2 June

07:30 **Breakfast**

08:00 **Announcements**

Plenary Speaker II

08:05 **MEMS: DRIVING INNOVATION FOR OVER 40 YEARS**

Emma Abel

Robert Bosch GmbH, GERMANY

Rising Star Speaker II

08:45 **HYBRID MAGNETIC–OXIDE SEMICONDUCTOR PLATFORMS FOR NEXT-GENERATION FUNCTIONAL MICROSYSTEMS**

Camilo Vélez Cuervo

University of California, Irvine, USA

Session 3 - Interventional Biomedical Microsystems

09:05 **TOWARDS ADVANCED MOTION CONTROL SYSTEMS FOR MICRO-SCALE MAGNETIC DRILLERS INSIDE VISCOELASTIC MEDIA**

Emmett Z. Freeman¹, Pranjali Chatterjee¹, Tony H. Wang¹, Angela Huang¹, Kimberly Hoang², and Azadeh Ansari¹

¹Georgia Institute of Technology, USA and ²Emory University, USA

09:20 **RADIALLY DEPLOYABLE MULTI-SENSOR INGESTIBLE DEVICE FOR SUBEPITHELIAL SEROTONIN MONITORING IN THE GUT**

Sydney Overton, Ian S. Jackson, Luke A. Beardslee, and Reza Ghodssi

University of Maryland, College Park, USA

09:35 **GALVANIC COUPLING-BASED ADVANCED SYSTEM FOR TELEMETRY AND REAL-TIME INGESTIBLE CAPSULE MONITORING: GASTRIC**

Yashwanth Ramesh, Devendra Sarnaik, Akshay Krishnakumar, Praveen Srinivasan, and Rahim Rahimi

Purdue University, USA

09:50 **3D-NANOPRINTED MICRONEEDLE ARRAYS FOR SURGICAL INJECTION INTO THE THYMUS GLAND**
Allison M. Rojas¹, Michela Sanguedolce¹, Lotte van den Goor², Adira Colton¹, M. Rho Ma¹, Siavash Khaki², Giorgio Raimondi², and Ryan D. Sochol¹
¹University of Maryland, College Park, USA and ²Johns Hopkins University, USA

10:05 **Break and Tabletop Inspection**

10:34 **Award Announcement**

10:35 **MEMS 2027 Announcement**

Invited Speaker II

10:45 **BEYOND ACCURACY: ENABLING THE NEXT GENERATION OF HIGH-PERFORMANCE INERTIAL MEMS WITH DESIGN INNOVATION, ADVANCED PROCESSING, AND AI/ML-DRIVEN SYSTEM INTELLIGENCE**
Sabah Sabah
Analog Devices, USA

Session 4 - Resonant MEMS for Timing and Computing

11:05 **EXPERIMENTAL DEMONSTRATION OF NANOMECHANICAL OSCILLATOR USING MACHINE FOR SOLVING OPTIMIZATION PROBLEMS**
Timothy W. Caplice¹, Tahmid Kaisar¹, Scott T. Habermehl², Michael L. Roukes², Steven W. Shaw³, Cristian Cassella⁴, and Philip X.-L. Feng¹
¹University of Florida, USA, ²California Institute of Technology, USA, ³Florida Institute of Technology, USA, and ⁴Northeastern University, USA

11:20 **A VISCOELASTIC NANOELECTROMECHANICAL ARTIFICIAL NEURON**
Peter F. Satterthwaite, Sarah O. Spector, Maxwell Conte, Teddy Hsieh, Eduard Bobylev, Jeremiah Johnson, and Farnaz Niroui
Massachusetts Institute of Technology, USA

11:35 **ELECTRICALLY CASCADED HIGH OVERTONE BULK ACOUSTIC RESONATORS (CASHBARS)**
Vikrant J. Gokhale and Brian P. Downey
US Naval Research Laboratory (NRL), USA

11:50 **MONOLITHICALLY INTEGRATED MEMS LC TANKS IN
PARAMETRIC FREQUENCY DIVIDERS**
Lorenzo Cantu, Nicolas Casilli, Luca Colombo, Andrea Del Giacco,
Matteo Rinaldi, and Cristian Cassella
Northeastern University, USA

12:05 **A CENTRALLY-ANCHORED 62MHZ DISTRIBUTED LAMÉ
RESONATOR (DLR) IN 4H-SIC WITH A POSITIVE TCQ FOR
TIMING APPLICATIONS**
Haoran Wen¹, Patrick Hardin¹, Zhenming Liu¹, and Farrokh Ayazi^{1,2}
¹*StethX Microsystems, USA and*
²*Georgia Institute of Technology, USA*

12:20 - **Networking Lunch**
14:00

14:00 - **MSIG Industry Session**
16:00

14:00 - **Recreational & Student Activities**
18:00

19:00 - **Banquet**
22:00

Wednesday, 3 June

07:15 **Women in MEMS Breakfast** (Savannah Jr. Ballroom)

07:30 **Breakfast**

08:10 **Announcements**

Plenary Speaker III

08:15 **HIGH-RESOLUTION PRINTING FOR ON-DEMAND FABRICATION OF HYBRID ELECTRONIC SYSTEMS**

Kira Barton

University of Michigan, USA

Rising Star Speaker III

08:55 **TBD**

Farnaz Niroul

Massachusetts Institute of Technology, USA

Session 5 - Self-Powered and Energy-Harvesting Microsystems

09:15 **A SINGLE-SHEET HYGRO-ELECTRIC WALLPAPER WITH DIRECTIONAL MOISTURE TRANSPORT FOR INDOOR HUMIDITY REGULATION AND ENERGY HARVESTING**

Guangya Yuan, Yang Gao, and Seokheun Choi

State University of New York, Binghamton, USA

09:30 **IN PLANTA LEAF TATTOO SENSOR FOR SELF-POWERED MONITORING OF PLANT STRESS VIA MOISTURE ENERGY GENERATION**

Nafize Ishtiaque Hossain, Kundan Saha, Atul Sharma, and Sameer Sonkusale

Tufts University, USA

09:45 **A FLEXIBLE SELF-POWERED OXYGEN SENSOR INTEGRATING METAL-AIR BATTERY WITH AN IONOCROMIC READOUT FOR INTELLIGENT FOOD PACKAGING**

Mohammadreza Chimehrad, Pouya Borjian, Faisal Bin Kashem,

Tristan Samson, Swaminathan Rajaraman, and Hyoung J. Cho

University of Central Florida, USA

10:00 **MIMICKING HUMAN INTESTINAL VILLI TO CREATE
NEXT-GENERATION BIOBATTERIES**
Ruohan Zhang, Botian Wang, and Seokheun Choi
State University of New York, Binghamton, USA

10:15 **Break and Tabletop Inspection**

10:44 **Award Announcement**

Invited Speaker III

10:45 **TBD**
Michelle Bourke
Lam Research, USA

**Session 6 - MEMS/NEMS for Extreme
and Harsh Environments**

11:05 **STRATEGICALLY POLED ALN TRANSDUCERS ENABLING
HIGH TEMPERATURE PRESSURE SENSORS**
Troy R. Tharpe^{1,2}, Alfred Zhao², Travis R. Young¹, Andrew I. Young¹,
Pedram Yousefian², Jeffrey Kronz¹, Meenakshi Saravanan²,
Matthew Bahr¹, Roy H. Olsson², and Giovanni Esteves^{1,2}
¹*Sandia National Laboratories, USA and*
²*University of Pennsylvania, USA*

11:20 **800 °C STABLE PIEZOELECTRIC MEMS DYNAMIC
PRESSURE SENSOR FOR HYPERSONIC BOUNDARY
LAYER CHARACTERIZATION**
Alexander J. Reilly¹, Steven Vokoun¹, Dylan Cox¹,
Venkateswarlu Gaddam¹, Hasan Karaca¹, Sariha Noor-Azad¹,
Philip X.-L. Feng¹, Roozbeh Tabrizian², and Mark Sheplak¹
¹*University of Florida, USA and* ²*University of Michigan, USA*

11:35 **THICKNESS-FIELD EXCITED BIMORPH LITHIUM NIOBATE
PIEZOELECTRIC TRANSDUCER**
Vakhtang Chulukhadze¹, Zihuan Liu¹, Lezli Matto², Ziqian Yao¹,
Michael Liao², Tzu-Hsuan Hsu¹, Mark S. Goorsky², Neal Hall¹,
and Ruo Chen Lu¹
¹*University of Texas, Austin, USA and*
²*University of California, Los Angeles, USA*

- 11:50** **RESONANT TEMPERATURE SENSOR WITH >1000 PPM/°C TCF FOR EXTREME-TEMPERATURE OPERATION**
Seyyed Mojtaba Hassani Gangaraj¹, Tanya Chauhan¹, James Lambert², Mina Rais-Zadeh², and Azadeh Ansari¹
¹Georgia Institute of Technology, USA and ²Jet Propulsion Laboratory, USA
- 12:05** **ULTRAFAST AND SPECTRALLY SELECTIVE NEMS INFRARED DETECTORS BASED ON ALSCN NANO-PLATE LATERALLY VIBRATING RESONATORS**
Aurelio Venditti, Pietro Simeoni, Zhenyun Qian, and Matteo Rinaldi
Northeastern University, USA
- 12:20** **Poster Preview – Session 2**
- 13:00 - 14:30** **Networking Lunch**
- Poster Session 2**
- 14:30** **Contributed and Late News**
See page 21 for listing of poster presentations
- 17:00 -** **Free Time**
- Poster Session 3 and Reception**
- 18:30** **Commercial and Open Posters**
See page 28 for listing of poster presentations
- 20:00 - 22:00** **Rump Session**

Thursday, 4 June

07:30 **Breakfast**

08:10 **Announcements**

Plenary Speaker IV

08:15 **FROM HUMAN ORGAN CHIP MICROFLUIDIC MODELS TO MULTIPLEXED ELECTROCHEMICAL**

Donald Ingber
Harvard University, USA

Rising Star Speaker IV

08:55 **TBD**

Benyamin Davaji
Northeastern University, USA

Session 7 - Analytical and Chemical Microsystems

09:15 **BREAKING THE DEBYE SCREENING LIMIT IN APTAMER BIOFETS FOR REAL-TIME MOLECULAR DETECTION IN PHYSIOLOGICAL ENVIRONMENTS**

Samantha van Rijs, Yasser Gidi, H. Tom Soh, and H.-S. Philip Wong
Stanford University, USA

09:30 **IN SITU MONITORING OF VASCULAR OXYTETRACYCLINE (OTC) TRANSPORT IN CITRUS PLANTS USING SILK FIBROIN MICRONEEDLE ELECTRODES (SF μ NE)**

Diana V. Rodriguez De Francisco, Sebastian Madrid, Anthony Marks, Omar S. Cepeda Torres, Giulio Diracca, Jorge Pereira, Swadeshmukul Santra, and Swaminathan Rajaraman
University of Central Florida, USA

09:45 **A HIGHLY SENSITIVE THERMAL-CONDUCTIVITY GAS SENSOR**

Hasan Albatayneh and Mohammad Younis
Binghamton University, USA

- 10:00** **ULTRASOUND PHASE-BASED ON-CHIP CALORIMETRY FOR TIME-RESOLVED IONIC DISSOLUTION**
Yilmaz Arin Manav¹, Mehmet Dogan Gunes¹, Pardis Sadeghi¹, Eda Ozyilmaz¹, Justin Kuo², Amit Lal^{2,3}, and Benyamin Davaji¹
¹*Northeastern University, USA*, ²*Geegah LLC, USA*, and ³*Cornell University, USA*
- 10:15** **A SILICON MICRONEEDLE ARRAY ATMOSPHERIC PRESSURE PLASMA IONIZATION SOURCE FOR REAL-TIME TRACE GAS CHEMICAL ANALYSIS**
Bradley S. Chew, Dylan T. Koch, Patrick Gibson, Mitchell M. McCartney, Eva Borrás, Nicholas J. Kenyon, and Cristina E. Davis
University of California, Davis, USA
- 10:30** **Break and Tabletop Inspection**
- Invited Speaker IV**
- 11:00** **HEADWAY IN MEMS DEVELOPMENT: A ROADMAP FOR MEMS WITH ILLUSTRATIONS IN MICROPHONE MEMS AND OPTOMECHANICAL SENSING**
Pierre-Damien Berger
CEA-Leti, FRANCE
- Session 8 - Late News**
- 12:20** **Award Ceremony and Closing Remarks**
- Workshop Chair:**
Swaminathan Rajaraman
University of Central Florida, USA
- Program Chair:**
Ryan D. Sochol
University of Maryland, College Park, USA
- 12:55 - 14:00** **Networking Lunch**
- 14:00** **Workshop Adjourns**

Poster Presentations - Session 1

Contributed and Late News Posters
Monday, 1 June 14:15– 16:45

Chemical or Biological Sensors, Actuators or Systems

- MP-01** **A FAST AND SENSITIVE NANO-ELECTROMECHANICAL HYDROGEN SENSOR**
Hohyeon Kim, Jinwoo Sim, Peter F. Satterthwaite, Jeffrey H. Lang, and Farnaz Niroui
Massachusetts Institute of Technology, USA
- MP-02** **A UNIFIED INKJET-PRINTED SENSING-ACTUATION PLATFORM WITH LOCALIZED ALKALIZATION: ENABLING NEUTRAL-PH ELECTROCATALYSIS VIA ACTIVE AND PASSIVE HYDROXIDE MODULATION**
Yun-Hsuan Yao¹, Zih-Rong Syue¹, Tien-Yu Huang¹, Yu-Ting Cheng¹, Hsiao-En Tsai², and Yih-Sharnng Chen²
¹*National Yang Ming Chiao Tung University, TAIWAN* and
²*National Taiwan University Hospital, Hsinchu, TAIWAN*
- MP-03** **AN APPROACH FOR IN SITU CELL SEEDING OF BIOMEDICAL SCAFFOLD USING DLW-BASED MICROINJECTION NEEDLE ARRAYS**
Mealakthey Sok, Micah Wingell, Anamul Hoque, Cole Mitchell, Meera Balaji, Lily Woodcock, Diya Asawa, Simon Brooks, Cathal J. Kearney, and Sunandita Sarker
University of Massachusetts, Amherst, USA
- MP-04** **A NEW DUAL-FLOW STRIP PLATFORM WITH HIGH-SENSITIVE COLORIMETRIC ASSAY FOR DETECTING TUBERCULOSIS LIPOARABINOMANNAN (TB-LAM) IN URINE**
Supreeth Setty¹, Heeyeong Jang¹, Nogi Park², Keun Seok Seo², and Chong Ahn¹
¹*University of Cincinnati, USA* and
²*Mississippi State University, USA*
- MP-05** **FABRICATION AND ELECTRICAL CHARACTERIZATION OF SELF-BIASING MICROPARTICLES FOR MICROBIAL ELECTROCHEMICAL APPLICATIONS**
Tianqi Luo, Daniel R. Bond, and Joseph J. Talghader
University of Minnesota, USA

- MP-06** **MICROFABRICATED ON-CHIP PH SENSORS FOR CONTINUOUS POTENTIOMETRIC MEASUREMENTS FOR ORGANS-ON-A-CHIP**
Surbhi Tidke, Ji Chang, Elizabeth Heiser,
and Swaminathan Rajaraman
University of Central Florida, USA
- MP-07** **MICROFLUIDIC PACIFIER SENSOR FOR NON-INVASIVE SALIVARY LACTATE MONITORING FOR ASTRONAUT HEALTH APPLICATIONS**
Ali Doostmohammadi and Pouya Rezai
York University, CANADA
- MP-08** **REAL-TIME MONITORING OF STIMULI-RESPONSIVE POLYMER DISSOLUTION USING A SMART INGESTIBLE DEVICE**
Praveen Srinivasan, Muhammad Masud Rana,
Akshay Krishnakumar, Devendra Sarnaik, Yashwanth Ramesh,
Robyn R. McCain, and Rahim Rahimi
Purdue University, USA
- MP-09** **SELF POWERED WEARABLE TATTOO FOR SWEAT HUMIDITY MONITORING VIA MOISTURE-ENERGY HARVESTING**
Nafize Ishtiaque Hossain, Atul Sharma, Wenxin Zeng, Rachel Riccio,
Michael Romero, and Sameer Sonkusale
Tufts University, USA
- MP-10** **SMART CAPSULE FOR MONITORING INFLAMMATION PROFILE THROUGHOUT THE GASTROINTESTINAL TRACT**
Akshay Krishnakumar¹, Sarath Gopalakrishnan¹, Rithu Thomas¹,
Sotoudeh Sedaghat¹, Sadid Khan², Trevor Meyer², Pedro Irazoqui²,
and Rahim Rahimi¹
¹Purdue University, USA and ²Johns Hopkins University, USA

Physical Sensors, Actuators, or Systems

- MP-11** **12.3 GHZ LONGITUDINAL MODE SURFACE ACOUSTIC WAVE RESONATOR IN LITHIUM NIOBATE ON SILICON CARBIDE**
Joshua Campbell¹, Tzu-Hsuan Hsu¹, Lezli Matto², Mark S. Goorsky²,
and Ruo Chen Lu¹
¹University of Texas, Austin, USA and ²University of California, Los Angeles, USA

- MP-12 A DUAL-RATIO MEMS FREQUENCY REFERENCE COMPENSATED AGAINST TEMPERATURE AND DC BIAS VARIATIONS**
 Jie Yan¹, Jintark Kim¹, Rakibul Islam¹, Alkim Bozkurt¹, Karim Elmeligy¹, Gabrielle Vukasin², Hyun-Keun Kwon², Thomas W. Kenny², Pavan K. Hanumolu¹, and Gaurav Bahl¹
¹*University of Illinois, Urbana-Champaign, USA and*
²*Stanford University, USA*
- MP-13 A LOW-POWER ALN PMUT BASED SYSTEM FOR CARDIOVASCULAR MONITORING**
 Panu Helistö, Teuvo Sillanpää, Abhilash Thanniyil Sebastian, and Cyril Baby Karuthedath
VTT Technical Research Centre of Finland, FINLAND
- MP-14 A THREE-TERMINAL FERROELECTRIC HZO RESONATOR WITH INDEPENDENT ELECTROSTATIC GATING FOR NEUROMORPHIC APPLICATIONS**
 Shubham Jadhav, Luis M. Amaro, Kaustav Roy, and Amit Lal
Cornell University, USA
- MP-15 AN ELECTROWETTING TRIPLET LENS FABRICATED WITH DIRECT LASER WRITE LITHOGRAPHY**
 Darwin R. Quiroz, Nhi Doan, Mahima Rana, Mo Zohrabi, Juliet T. Gopinath, and Victor M. Bright
University of Colorado, Boulder, USA
- MP-16 A PZT-BASED WEARABLE PMUT ARRAY TOWARD ACTIVE TRANSCRANIAL AMYGDALA NEUROMODULATION**
 Declan M. Fitzgerald¹, Nikita Lukhanin¹, Sean Isomatsu¹, Yudong Xie², Nae Nakamura³, Pannawit Tipsawat³, Susan Trolrier-McKinstry³, and Liwei Lin¹
¹*University of California, Berkeley, USA,*
²*Tsinghua University, CHINA, and*
³*Pennsylvania State University, USA*
- MP-17 BIMORPH LITHIUM NIOBATE THICKNESS-SHEAR OVERTONE RESONATOR WITH HIGH Q ABOVE 20,000 AT 779 MHZ**
 Ziqian Yao¹, Ian Anderson¹, Jack Kramer¹, Tzu-Hsuan Hsu¹, Lezli Giselle², Mark Goorsky², and Ruochen Lu¹
¹*University of Texas, Austin, USA and*
²*University of California, Los Angeles, USA*

- MP-18 CHARACTERIZATION OF 2:1 INTERNAL RESONANCE IN A MEMS DOUBLE-ENDED TUNING FORK RESONATOR**
Jiawei Yang¹, Yunhan Chen¹, Manaka Gomi¹, Steven W. Shaw², and Thomas W. Kenny¹
¹Stanford University, USA and ²Florida Institute of Technology, USA
- MP-19 ELECTROSTATIC MEMS MICROSPEAKER WITH A COMPLIANT PDMS DIAPHRAGM**
Yicheng Zhang, Anik Sengupta, Akash Roy, and Eun S. Kim
University of Southern California, USA
- MP-20 FABRICATION OF 3D NANOPRINTED MICROFLUIDIC TRANSISTORS VIA EX SITU DIRECT LASER WRITING**
Paige M. Campbell, Molly Carton, Prithwish Dasgupta, Daria Didenko, Travis Dutton, Aamir Ghadially, Dennis Gomez, and Ryan D. Sochol
University of Maryland, College Park, USA
- MP-21 FREQUENCY SCALING AND Q ENHANCEMENT OF PALLADIUM-COATED LATERALLY VIBRATING ALN RESONATORS FOR HYDROGEN SENSING**
Gaia Giubilei, Farah Ben Ayed, Pietro Simeoni, Zhenyun Qian, and Matteo Rinaldi
Northeastern University, USA
- MP-22 HIGH SENSITIVITY FREE-FREE BEAM LITHIUM-NIOBATE-ON-SILICON RESONANT ACOUSTIC SENSORS**
Jennyfer D. Vivas Gomez, Justin Phelps, Ryan Witt, and Reza Abdolvand
University of Central Florida, USA
- MP-23 IMPROVED FIGURE-OF-MERIT IN HIGH-GAIN BULK PIEZOELECTRIC TRANSFORMER USING AN ISOLATION FRAME**
Justin Phelps, Michael Z. Franz, and Reza Abdolvand
University of Central Florida, USA
- MP-24 MINIATURIZED SPIN-WAVE CHANNEL SELECT FILTERS**
Connor Devitt, Pavitra Jain, Xinyi Zhang, and Sunil A. Bhawe
Purdue University, USA
- MP-25 MONOLITHIC SOFT MICROACTUATORS WITH JAMMING-BASED STIFFNESS MODULATION VIA DIRECT LASER WRITING**
Anamul Hoque, Hung Ta (Odin) Chu, Wilson Chi, Ethan Voelmicke, Mealakthey Sok, and Sunandita Sarker
University of Massachusetts, Amherst, USA

- MP-26** **PIEZOELECTRIC OPTICAL MICRORESONATOR-BASED BACKSCATTER COMMUNICATION FOR SUB-MILLIMETER WIRELESS MEDICAL IMPLANTS**
Alp A. Derin, Ahmed S. Zikrallah, Kapil Saha, and Soner Sonmezoglu
Northeastern University, USA
- MP-27** **THREAD-MATRIX SMART INSOLE FOR SPATIAL AND SIDE-WALL FOOT PRESSURE SENSING**
Youssef Toureg, Onkar Singh, Byung Kim, Georges Karam, Mohamed Gallai, Azaz-Ur-Rehman Nasir, and Anwar Elhadad
Binghamton University, USA
- MP-28** **ULTRA- HIGH- SENSITIVITY VACUUM PACKAGED SCANDIUM ALUMINUM NITRIDE MEMS RESONATOR FOR LOW-NOISE INFRARED SENSING**
Farah Ben Ayed, Aurelio Venditti, Kapil Saha, Pietro Simeoni, Zhenyun Qian, and Matteo Rinaldi
Northeastern University, USA
- MP-29** **ZERO-DISPERSION PARAMETRIC PUMPING IN ENCAPSULATED MICROMECHANICAL RESONATORS**
Nicholas J. Ewing¹, Nathan J. Stefanski¹, Hyun-Keun Kwon², Gabrielle D. Haddon-Vukasin², Steven W. Shaw^{3,4}, Thomas W. Kenny², and James M.L. Miller¹
¹*Trine University, USA*, ²*Stanford University, USA*,
³*Florida Institute of Technology, USA*, and
⁴*Michigan State University, USA*

Technology, Materials, Packaging, and CAD

- MP-30** **ADHESION OPTIMIZATION FOR METALLIZED TPP-PRINTED MEMS ON FLEXIBLE SUBSTRATES**
Regan Kubicek^{1,2}, Gabriel Smith², and Sarah Bergbreiter¹
¹*Carnegie Mellon University, USA and*
²*Army Research Laboratory, USA*
- MP-31** **HERMETICALLY SEALED, HYBRID-MICROFABRICATED, IMPEDIMETRIC MICROSYSTEM FOR WIRELESS MONITORING IN MULTIFARIOUS ENVIRONMENTS**
Faisal Bin Kashem¹, John Zuluaga¹, Zack Groth¹, Omar S. Cepeda Torres¹, Cacie McDorman², Gary Davies², and Swaminathan Rajaraman¹
¹*University of Central Florida, USA and* ²*Alleima, USA*

- MP-32** **HYBRID MICROFABRICATED FLEX- RIGID 3D MICROELECTRODE ARRAYS FOR SIMULTANEOUS ENVELOPED- AND THROUGH-ORGANOID ELECTROPHYSIOLOGY**
Omar S. Cepeda Torres, Surbhi Tidke, Mohammadreza Chimerad, Diana Rodriguez De Francisco, Faisal Bin Kashem, Hyoung J. Cho, and Swaminathan Rajaraman
University of Central Florida, USA
- MP-33** **MICROBIAL ELECTRONICS: LIVING RESISTORS, CAPACITORS, AND BATTERIES BUILT FROM METABOLISM**
Botian Wang, Ruohan Zhang, Yang Gao, and Seokheun Choi
State University of New York, Binghamton, USA
- MP-34** **PASSIVE NARROW-BAND ULTRA-HIGH GAIN VHF FRONT-END ENABLED BY QUARTZ RESONATOR AND COMPACT ANTENNA**
Mary E. Galanko Klemash¹, Shuping Li², Chung-Tse Michael Wu², Theodore K. Anthony¹, Michael A. Restaino³, and Sarah S. Bedair¹
¹*DEVCOM Army Research Laboratory, USA,*
²*Rutgers University, USA, and* ³*General Technical Services, USA*
- MP-35** **ROBUST MICRO-TO-MACRO FLUIDIC INTERFACING OF 3D-NANOPRINTED GLASS MICRONEEDLES VIA A HYBRID DIRECT LASER WRITING ASSEMBLY STRATEGY**
Prisha Nishar¹, Adira Colton¹, Molly Carton¹, Kinneret Rand-Yadin², and Ryan Sochol¹
¹*University of Maryland, College Park, USA and*
²*AkriVita Inc., USA*
- MP-36** **SELECTIVE LASER SINTERING OF MAGNETICALLY PROGRAMMABLE COMPOSITES FOR SOFT ACTUATORS**
Naji Tarabay, Mahtab Shakibmanesh, and Camilo Vélez Cuervo
University of California, Irvine, USA

Poster Presentations - Session 2

Contributed and Late News Posters
Wednesday, 3 June 14:30– 17:00

Chemical or Biological Sensors, Actuators or Systems

- WP-01** **A HYPODERMIC-INSPIRED 3D-PRINTED MICRONEEDLE SENSOR FOR MINIMALLY INVASIVE IN-PLANT XYLEM SENSING**
Matin Ataei Kachouei, Meysam Sohani Darban, Jeffrey S. Walling, and Md. Azahar Ali
Virginia Tech, USA
- WP-02** **AN ORAL-SWAB PLATFORM FEATURING DUAL-MODE SENSING FOR CYTOKINE DETECTION**
Atul Sharma, Nafize Ishtiaque Hossain, and Sameer Sonkusale
Tufts University, USA
- WP-03** **HYBRID 3D PRINTING OF SOFT CATHETER ROBOTS TO EMPOWER IN SITU BIOPRINTING FOR CARDIAC TISSUE REPAIR**
Michela Sanguedolce¹, Arman Tekinalp¹, Adira Colton¹, Olivia Young¹, Bryan Smith^{2,3}, Aitor Aguirre², Miroslaw Janowski⁴, Eleonora Tubaldi¹, and Ryan D. Sochol¹
¹*University of Maryland, College Park, USA,*
²*Michigan State University, USA,* ³*Ohio State University, USA,* and
⁴*University of Maryland, Baltimore, USA*
- WP-04** **HYBRID MICROFLUIDIC RT-LAMP BASED SENSOR FOR DETECTING PATHOGENIC VIRAL AEROSOLS DIRECTLY FROM AIR**
Jahsim Ablaghdadi¹, Arian Ghaicy¹, Yasmith Asuru¹, Vineetha Mareddy², Michael Caffrey¹, Veronique Caffrey¹, Ying Fang², and Igor Paprotny¹
¹*University of Illinois, Chicago, USA and*
²*University of Illinois, Urbana-Champaign, USA*
- WP-05** **LABEL-FREE NANOGAP SENSOR FOR TRACE-LEVEL PFOS DETECTION FOR ULTRALOW VOLUME SAMPLES**
Pouya Borjian¹, Mohammadreza Chimerad¹, Sang Hyun Lee², Hyunjung Lee³, and Hyoung Jin Cho¹
¹*University of Central Florida, USA,*
²*Chonnam National University, KOREA, and*
³*Jeonbuk National University, KOREA*

- WP-06** **LIQUID METAL NANODROPLET-COATED ELECTROGENIC ENDOSPORES AS STABLE, HIGH-POWER LIVING BIOANODES FOR ON-DEMAND BIOENERGY**
 Yang Gao and Seokheun Choi
State University of New York, Binghamton, USA
- WP-07** **MICROMACHINED THERMOCOUPLE MICROPROBE FOR REAL-TIME MAPPING OF ACTIVITY-EVOKED HEAT IN HIPPOCAMPAL CA1**
 Angelo Gaitas¹, Vishwendra Patel², and Onnop Srivannavit¹
¹*University of North Carolina, Charlotte, USA and* ²*Mount Sinai, USA*
- WP-08** **OMNI: AN OSMOTIC MICRONEEDLE IMPLANT TOWARDS LONG-TERM DIRECT-TO-BRAIN DRUG DELIVERY**
 Henley Chen¹, Anamul Hoque¹, Mansoor M. Amiji², and Sunandita Sarker¹
¹*University of Massachusetts, Amherst, USA and* ²*Northeastern University, USA*
- WP-09** **PREDICTING NO₂ CONCENTRATION DYNAMICS UNDER VARYING HUMIDITY WITH A CNT-FET SENSOR**
 Cristina Gentili, Cosmin I. Roman, Ines Kraiem, Miroslav Haluska, and Christofer Hierold
ETH Zürich, SWITZERLAND
- WP-10** **RELIABLE GAS SENSOR RECOVERY WITH LOCAL ELECTRODE HEATING**
 Ines Kraiem, Cristina Gentili, Miroslav Haluska, Cosmin Ioan Roman, and Christofer Hierold
ETH Zürich, SWITZERLAND
- WP-11** **THE UMBOMIC: BIOCOMPATIBILITY AND TESTING OF A MIDDLE-EAR MICROPHONE FOR FULLY-IMPLANTABLE COCHLEAR IMPLANTS**
 Emma F. Wawrzynek¹, John Z. Zhang¹, Julie G. Arenberg^{2,3}, D. Bradley Welling^{2,3}, Ioannis Kymissis⁴, Elizabeth S. Olson⁴, Hideko Heidi Nakajima^{2,3}, and Jeffrey H. Lang¹
¹*Massachusetts Institute of Technology, USA,* ²*Harvard University, USA,* ³*Mass Eye and Ear, USA,* and ⁴*Columbia University, USA*
- WP-12** **TOWARDS SENSING WITH EVERYDAY OBJECTS - STREAMING POTENTIAL IN MICROPOROUS SUBSTRATES**
 Tianyi Zhang, Sanduni Devasinghe, and Robbyn K. Anand
Iowa State University, USA

Physical Sensors, Actuators, or Systems

- WP-13 A GRAPHENE/PMN-PT HETEROSTRUCTURE FOR EFFICIENT ACOUSTOELECTRIC POWER GENERATION**
Hamed Atashbar¹, Hakhamanesh Mansoorzare¹, Tara Jabegu¹, Sidong Lei¹, Mary E. Galanko Klemash², Sarah S. Bedair², and Reza Abdolvand¹
¹University of Central Florida, USA and
²U.S. Army Combat Capabilities Development Command, USA
- WP-14 A SELF-LOCKING INGESTIBLE CAPSULE FOR CONTAMINATION-FREE SMALL INTESTINAL FLUID SAMPLING**
Jihyun Kim, Danilo M. Dos Santos, Debora R. da Silva, Giovanni Widmer, and Sameer Sonkusale
Tufts University, USA
- WP-15 A WIDE-BANDWIDTH FREQUENCY SHIFTING RESONANT PRESSURE SENSOR**
James L. Lambert¹, Tanya Chauhan², Seyyed M. Hassani Gangaraj², Azadeh Ansari², and Mina Rais¹
¹Jet Propulsion Laboratory, USA and
²Georgia Institute of Technology, USA
- WP-16 AN ELECTRICALLY ACTIVE SOI OUT-OF-PLANE HINGE FOR MULTI-FUNCTIONAL 3D MICRO-MECHANISMS**
Yichen Liu¹, Daniel Lovell¹, Daniel Finell², and Kristopher Pister¹
¹University of California, Berkeley, USA and
²Ecole Polytechnique Fédérale de Lausanne, SWITZERLAND
- WP-17 CORONA-MODULATED SENSING OF PYROELECTRIC VOLTAGE**
Rohan Sanghvi and Amit Lal
Cornell University, USA
- WP-18 CRYOGENIC CHARACTERIZATION OF SCALN-ON-SIC PHONONIC RACETRACK RESONATORS**
Jack Guida, Kartikey Agarwal, Marco Colangelo, and Siddhartha Ghosh
Northeastern University, USA
- WP-19 DIAMAGNETICALLY LEVITATED GRAPHITE ROTORS TOWARD LOW-DISSIPATION GYROSCOPE**
Samira Yasmin¹, Pooja Roy¹, Yunong Wang², Philip Feng², and Jaesung Lee¹
¹University of Central Florida, USA and ²University of Florida, USA

- WP-20 EFFECTS OF GAMMA-RAY RADIATION ON THE PERFORMANCE OF MEMS RESONATOR AND OSCILLATOR**
Jennyfer D. Vivas Gomez¹, Parvin Akhkandi¹, Jeasung Lee¹, Reza Abdolvand¹, Luke Minks², and Kevin Hoopingarner²
¹University of Central Florida, USA and ²Renesas Electronics, USA
- WP-21 ELECTRODYNAMIC MICRO-SPEAKER WITH FOUR NARROW FLEXURES SUPPORTING COIL AND THIN-METAL-REINFORCED CENTER REGION ON PDMS DIAPHRAGM**
Yicheng Zhang, Anik Sengupta, Kianoush Sadeghian Esfahani, Akash Roy, Hongxiang Gao, and Eun S. Kim
University of Southern California, USA
- WP-22 ENABLING LITHIUM NIOBATE PHONONIC FREQUENCY COMBS VIA THERMAL ENGINEERING AND DESIGN**
Ian Anderson, Xingwei Gao, Ziqian Yao, Byeongjin Kim, Jack Kramer, David Burghoff, and Ruochen Lu
University of Texas, Austin, USA
- WP-23 EXTENDED NONLINEAR DYNAMIC RANGE ENABLED BY HIGH VELOCITY T-SHAPED MEMS RESONATORS**
Hansaja Herath¹, Connor A. Watkins², Aswathi M. Madhu², Yilin Kou¹, Benoit Hamelin³, Philip XL. Feng², and Hanna Cho
¹Ohio State University, USA, ²University of Florida, USA, and ³Engenius, Micro LLC, USA
- WP-24 GIGAHERTZ ACOUSTOELECTRIC EFFECT IN MONOLAYER GRAPHENE-LITHIUM NIOBATE HETEROSTRUCTURES**
Jack Kramer, Harshvardhan Gupta, Tzu-Hsuan Hsu, and Ruochen Lu
University of Texas, Austin, USA
- WP-25 HIGH DYNAMIC RANGE AND Q-FACTOR GHZ OPTOMECHANICAL RESONATORS FOR TIMING APPLICATIONS**
Hemant Kumar Verma, Thomas Furcatte, Munique Kazar Mendes, Sebastien Hentz, Franck Badets, and Marc Sansa
CEA Leti., Grenoble, FRANCE
- WP-26 INERTIAL EXCITATION AND OPTICAL SENSING FOR DIAMAGNETICALLY LEVITATED GYROSCOPES**
Lois Meira-Lopez, Mahtab Shakibmanesh, Camilo Velez Cuervo, and Andrei M. Shkel
University of California, Irvine, USA

- WP-27** **INTEGRATION OF DROPLET-CONFINED REDOX CYCLING WITH SELECTIVE SURFACE WETTING FOR ULTRASENSITIVE VIRAL DETECTION**
Pouya Soltan Khamsi and Aida Ebrahimi
Pennsylvania State University, USA
- WP-28** **LANGASITE AS A MATERIAL FOR HIGH-TEMPERATURE PRESSURE SENSING**
Shubham P. Khandare¹, Meera Garud¹, Kushal Bhattacharjee²,
Mariam Gigauri¹, Noah F. Opondo¹, Amrita Masurkar³,
and Dana Weinstein¹
¹*Purdue University, USA*, ²*Kampanics, L.L.C., USA*, and
³*BAE Systems Inc., USA*
- WP-29** **PERFORMANCE CHARACTERIZATION OF A HEAVILY-DOPED SILICON DISTRIBUTED LAMÉ RESONATOR FOR RECONFIGURABLE TCMO AND OCMO APPLICATIONS**
Shubham Sahasrabudhe¹ and Farrokh Ayazi^{1,2}
¹*Georgia Institute of Technology, USA* and
²*StethX Microsystems Inc., USA*
- WP-30** **SPATIALLY PROGRAMMABLE OPTICAL EXCITATION OF ORTHOGONAL HEMISPHERICAL MICRO-MECHANICAL RESONATOR MODES**
Melika Momenzadeh, Lois Meira Lopez, Austin R. Parrish,
Andrei M. Shkel, and Maxim R. Shcherbakov
University of California, Irvine, USA
- WP-31** **SQUARE-PLATE EXTENSIONAL MODE PIEZOELECTRIC RESONATOR FOR MAGNETIC-LESS POWER CONVERSION**
Sourav Naval and Jessica D. Boles
University of California, Berkeley, USA
- WP-32** **THERMALLY DRIVEN SILICON NITRIDE NANOBEAMS FOR HIGH-PRECISION ON-CHIP DISPLACEMENT SENSING**
Omer Halevy^{1,2}, Yiliang Bao¹, and Vladimir Aksyuk¹
¹*National Institute of Standards and Technology, USA* and
²*University of Maryland, College Park, USA*
- WP-33** **THINNEST PECVD SILICON NITRIDE OR PARYLENE FILMS WITH LOW POROSITY FOR ELECTRICAL INSULATION OF PIEZOELECTRIC SENSOR**
Hongxiang Gao, Anik Sengupta, Junyi Wang, Yicheng Zhang, and
Eun Sok Kim
University of Southern California, USA

WP-34 UNDERWATER ACOUSTIC PROPELLER BASED ON PMN-PT AND LINEAR SELF-FOCUSING ACOUSTIC TRANSDUCER (SFAT) FOR HIGH PROPULSION FORCE
Akash Roy, Kianoush Sadeghian Esfahani, Anik Sengupta, Yicheng Zhang, and Eun S. Kim
University of Southern California, USA

WP-35 WHIP-MODE FLEXURAL RESONANCE IN LITAO3-ON-SIO2 BIMORPH PIEZOELECTRIC MICRORESONATOR ENABLING NEAR 60 M/S TIP VELOCITY
Tzu-Hsuan Hsu, Zihuan Liu, Harshvardhan Gupta, Ziqian Yao, Wei Wang, Vakhtang Chulukhadze, Jack Kramer, Neal Hall, and Ruo Chen Lu
University of Texas, Austin, USA

Technology, Materials, Packaging, and CAD

WP-36 APPLICATION OF 3D NANOPRINTING TOWARD A RETINAL VASCULAR PHANTOM LIBRARY
Haena-Young Lee, Xin Xu, Molly Carton, Francis G. VanGessel, Osamah J. Saeedi, and Ryan D. Sochol
University of Maryland, College Park, USA

WP-37 CHARACTERIZATION OF INTEGRATED VACUUM FOR HIGH PERFORMANCE MEMS DEVICES
Hélène Duchemin, Caroline Coutier, and Mikaël Colin
CEA-Leti, Grenoble, FRANCE

WP-38 DIGITAL TWIN FOR FHE: BRIDGING OPTICAL METROLOGY AND ELECTRICAL TEST DOMAINS VIA PHYSICS-INFORMED LEARNING
Haiyang Yun, Hao Chun Liao, and Benyamin Davaji
Northeastern University, USA

WP-39 LASER-ANNEALING-BASED NANOSTENCIL FOR SOLVENT-FREE FABRICATION OF PLASMONIC NANOSTRUCTURES
DooHong Min, Taeyeong Kim, and Jungchul Lee
Korea Advanced Institute of Science and Technology (KAIST), KOREA

WP-40 MULTIFUNCTIONAL BIOMEDICAL SURFACE ENGINEERING VIA COLD ATMOSPHERIC PLASMA-DEPOSITED SIOX NANOCOMPOSITES
Md Mahabubur Rahman, Akshay Krishnakumar, Advika Vidhyadhiraja, Muhammad Masud Rana, Devendra Sarnaik, and Rahim Rahimi
Purdue University, USA

- WP-41** **SELF-TEMPERATURE-STABILIZED ALSCN-ON-SI RESONATOR
ENABLED BY 2:1 INTERNAL RESONANCE**
Shruti Mishra, Jinghan Gao, Mahmudul Hasan,
and Roozbeh Tabrizian
University of Michigan, USA
- WP-42** **VACUUM NUCLEATION CLEANING (VNC): A ROBUST METHOD
FOR CLEARING HIGH ASPECT RATIO BLIND HOLES IN
3D-PRINTED MOLDS**
Kathryn J. Pacheco and Don DeVoe
University of Maryland, College Park, USA

Poster Presentations - Session 3

Commercial and Open Posters
Wednesday, 3 June 18:30– 20:00

Commercial - Physical Sensors, Actuators, or Systems

- WCP-1 ADI'S FIRST FULLY-CALIBRATED 6-DOF COMPONENT IMU**
Tyler Dunn, Bill Clark, Jianglong Zhang, Ruben Fernandez,
Ashok Solanki, Amrit Abrol, Dave Giordano, Julia Zhao,
Walter Oldham, Rajev De Silva, Ali Shakir, and Gaurav Vohra
Analog Devices, USA
- WCP-2 ADVANCED CHARACTERIZATION OF MICROSTRUCTURES,
USING OPTICAL MEASUREMENT SOLUTIONS**
Heinrich Steger¹, Marcus Heilig¹, Martin Johansmann¹,
Eric Lawrence², and Vikrant Palan²
¹Polytec GmbH, GERMANY and ²Polytec, Inc., USA
- WCP-3 THE INTEGRATED NANOSYSTEMS RESEARCH FACILITY AT
THE UNIVERSITY OF CALIFORNIA, IRVINE**
Camilo Velez Cuervo, and Andrei Shkel
University of California, Irvine, USA

Commercial - Technology, Materials, Packaging, and CAD

- WCP-4 STRATEGIES TO EXTEND RESOLUTION LIMITS FOR
DIRECT WRITE LITHOGRAPHY**
Manasi Rathore¹, Matthias Wahl¹, Steffen Diez¹, Sven Preuss¹,
Benedikt Stender¹, Emine Cagin², Holger Sailer³,
and Angela Schneider³
*¹Heidelberg Instruments, GERMANY,
²Heidelberg Instruments Nano AG, SWITZERLAND, and
³Institut für Mikroelektronik Stuttgart, GERMANY*