FINAL PROGRAM

CO-CHAIRS

Allen Liu, *University of Michigan, USA*

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Sponsored by TRF
TRANSDUCER RESEARCH FOUNDATION

CONFERENCE AT A GLANCE

Monday, March 26, 2018

08:30 - 08:45	**Welcome Address**
08:45 - 09:45	**M1K.1 - Keynote Speaker I** Jianping Fu, University of Michigan, USA
09:45 - 10:15	**Break**
10:15 - 10:45	**Flash Poster Session 1** **Mechanobiology and Biophysics**
10:45 - 12:15	**W1P - Poster Session 1**
12:15 - 13:45	**Lunch**
13:45 - 14:45	**M2K.2 - Keynote Speaker II** Marianna Kruithof-de Julio, University of Bern, SWITZERLAND
14:45 - 15:30	**Flash Poster Session 2** **Microphysical Model of Living Systems**
15:30 - 17:00	**W2P - Poster Session 2**
17:30 - 19:00	**Wine & Cheese Reception**

Tuesday, March 27, 2018

08:30 - 09:30	**T1K.1 - Keynote Speaker III** Amy E. Herr, University of California, Berkeley, USA
09:30 - 10:15	**Flash Poster Session 3** **Diagnostic and Detection Technologies**
10:15 - 11:45	**T1P - Poster Session 3**
11:45 - 13:30	**Lunch**
13:30 - 14:30	**T2K.2 - Keynote Speaker IV** Henry Hess, Columbia University, USA
14:30 - 15:00	**Break**
15:00 - 16:00	**T2Y - Young Investigator Presentations**
19:00 - 21:00	**Banquet**

Wednesday, March 28, 2018

08:30 - 09:30	**W1K.1 - Keynote Speaker V** Milica Radisic, University of Toronto, CANADA
09:30 - 10:30	**W1K.2 - Keynote Speaker VI** Seok “Sid” Chung, Korea University, KOREA
10:30 - 11:00	**Break**
11:00 - 11:45	**Flash Poster Session 4** **Bioassay Development / 3D Printing and Biomanufacturing**
11:45 - 13:15	**W1P - Poster Session 4**
13:15 - 13:30	**Award Ceremony and Closing Remarks**
13:30	**Conference Adjourns**

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Technical Program

GREETINGS FROM THE CHAIRS

On behalf of the International Steering Committee, we are truly delighted to welcome you to the 9th International Conference on Microtechnologies in Medicine and Biology (MMB 2018) in the seaside town of Monterey, California, USA.

The MMB conference series was co-founded by Prof. David Beebe (University of Wisconsin, Madison) and Prof. André Dittmar (University of Lyon) and was held for the first time in 2000, in Lyon, France, to foster interactions between biologists and medical researchers, chemists, physicists, and engineers to advance emerging microtechnologies for applications in medicine and biology. After eight successful MMB meetings in Lyon (2000), Madison (2002), Oahu Island in Hawaii (2005), Okinawa (2006), Québec City (2009), Lucerne (2011), Marina del Rey (2013), and Seoul (2016), the meeting has returned once again to the seaside and the Americas. Monterey, one of the most beautiful coastal cities in California, is filled with early California history with adobe buildings from the 1700s. Monterey is home to the world-famous Monterey Bay Aquarium and the protected waters of the national marine sanctuary that hugs the shoreline.

The objective of MMB is to stimulate interdisciplinary exchanges between biologists, medical researchers, chemists, physicists, and engineers as well as train the next generation of scientists and engineers dedicated to these areas. We believe that MMB 2018 will provide an intimate intellectual venue to facilitate discussions towards developing new research tools and technologies with the potential to revolutionize the fields of medicine and biological sciences.

We have organized an outstanding program that includes 6 keynote speakers, 2 young investigators, and 69 flash oral/poster presentations. These speakers were selected for their work related to our themes this year which are mechanobiology and biophysics, diagnostic and detection technologies, microphysiological model of living systems, bioassay development, and 3D printing and biomanufacturing. This conference format provides a friendly environment that promotes thought provoking discussions. The submitted papers were peer-reviewed to achieve a high quality program. We will continue our best poster awards to encourage and stimulate high quality papers that bridge microtechnologies with medicine and biology.

We thank the continued support of the Transducers Research Foundation, National Science Foundation for travel support, and Poster Award and Media support from *Analyst*, *Integrative Biology*, and *Lab on a Chip*. We are also grateful to our conference organizers at Preferred Meeting Management, Inc. (PMMI) with special thanks to Ms. Sara Stearns and Ms. Shirley Galloway for their tireless efforts to ensure a high-quality conference.

We thank you for joining us and look forward to your participation in the conference. Please enjoy the meeting and beautiful environs of Northern California.

Dan Huh
Conference Co-Chair

Allen Liu
Conference Co-Chair

GENERAL INFORMATION

Wireless Internet Service

Wireless Internet will be available in the meeting room.

- Select "**Cypress Ballroom**" from the list of available networks
- Once prompted, the code is: **mmb-2018** (case sensitive)

Meeting Room Locations

Keynote Sessions ..... Cypress Ballroom, Lower Terrace
Flash Poster Sessions ..... Cypress Ballroom, Lower Terrace
Posters ..... Monterey Bay, Lower Terrace
Breaks ..... Monterey Bay, Lower Terrace
Welcome Reception ..... Outside Lower Terrace
Lunch ..... Outside Lower Terrace
Banquet ..... Dolphins Ballroom, Street Level

Meeting Room Logistics

Please contact the Conference Registration Desk if you find the temperature in the room uncomfortable or you are unable to hear or see because of equipment difficulties.

Breaks

All scheduled breaks will be held in the Poster Room. Coffee will be served during scheduled breaks only.

Job Market Board

Please visit the Job Market Board located in the Poster room to see current job opportunities or to place your resume on the board. Refer to the poster floor plan on page 27 of this program.

Name Badges

All attendees must wear their name badge at all times.

Chimes

The chimes will ring five minutes before the end of each scheduled break. The sessions will begin on time, so please return to the sessions when you hear the chimes.

Cellular Phones and Alarms

Out of courtesy to our speakers and other attendees, please turn off any cellular phones and alarms during sessions.

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ACKNOWLEDGMENTS

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The MMB 2018 Executive Committee and the Transducer Research Foundation would like to thank the following companies and organizations for their support, encouragement, and involvement in the Ninth International Conference on Microtechnologies in Medicine and Biology Conference.

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MEMS JOURNAL

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TECHNICAL PROGRAM INFORMATION

Guide to Understanding Paper Numbering

Each paper in the technical program is assigned a unique number which indicates when the paper is presented. The number of each paper is shown before the paper title.

Typical Paper Number: **W1P.14**

The first letter (i.e. W) indicates the day of the Conference:

M = Monday T = Tuesday W = Wednesday

The second number (i.e., 1) indicates what time during the day the session is being presented:

1 = Morning 2 = Afternoon

The third letter (i.e., P) indicates the type of the paper:

K = Keynote P = Poster Y = Young Investigator

The fourth number (i.e. 14) indicates the number of the paper in the session. The poster numbers are color coded by session to assist you with locating them on the floorplan on page 27.

Session 1 (M1P) LIME GREEN
Session 2 (M2P) PURPLE
Session 3 (T1P) BRIGHT BLUE
Session 4 (W1P) FUSCHIA

Monday, March 26

08:30 **Welcome and Introduction**

Conference Co-Chairs:
Dan Huh, University of Pennsylvania, USA
Allen Liu, University of Michigan, USA

08:45 **Keynote Speaker I**

Session Chair: Allen Liu, University of Michigan, USA

M1K.01 **SYNTHETIC HUMAN EMBRYOLOGY IN A DISH**
Jianping Fu
University of Michigan, USA
KEYWORDS: Human Pluripotent Stem Cells; Human Embryology; Synthetic Human Embryology

09:45 **Break**

10:15 **Flash Poster Session 1**

Session Chair: David Beebe, University of Wisconsin, USA

Mechanobiology and Biophysics

M1P-01 **DROPLET MICROFLUIDICS FOR CONSTRUCTING ARTIFICIAL CELLS**
S. Majumder and A.P. Liu
University of Michigan, USA
KEYWORDS: Artificial Cell; Double Emulsion; Microfluidics; Cell-Free Expression

M1P-02 **EFFECT OF THE ACTIN BINDING PROTEIN FILAMIN A (FLNA) ON CELL SHAPE AND RIGIDITY TESTING OF GLIOMA CELLS**
A. Aman, M. Jun, J. Kim, and S. Park
Sungkyunkwan University, KOREA
KEYWORDS: FLNA; Traction Force; Soft Pillars; Motility

M1P-03 **MECHANICAL PHENOTYPING OF ACUTE MYELOID LEUKEMIAS FOR PREDICTING RESPONSE TO RETINOIC ACID**
B. Li, J. Kim, and L.L. Sohn
University of California, Berkeley, USA
KEYWORDS: Mechanical Phenotyping; Microfluidics; Acute Myeloid Leukemia

M1P-04 **MICROPATTERNED ADHESIVE ISLANDS REVEAL THAT PLACENTAL TROPHOBLAST FUSION IS MECHANICALLY SENSITIVE**
Z. Ma[1], R. Tran[1], L. Fagundes[2], S. Mok[1], C. Vaillancourt[2], and C. Moraes[1]
[1]McGill University, CANADA and [2]Université du Québec, CANADA
KEYWORDS: Cell Fusion; Mechanobiology; Micropatterning; Syncytiotrophoblast

M1P-05 INVESTIGATION OF THE ROLE OF LEUCINE ZIPPER PROTEIN 1 ON TIGHT JUNCTION USING A UNIAXIAL CELL STRETCHING DEVICE

J. Kim[1], S. Tsukita[2], and S. Park[1]
[1]*Sungkyunkwan University, KOREA and* [2]*Osaka University, JAPAN*

KEYWORDS: Cell Stretching; LUZP1; Tight Junction; Cell Monolayer

M1P-06 PATTERNING PROTEINS USING PHOTORESIST LIFT-OFF

A.K. Denisin, J. Moeller, and B.L. Pruitt
Stanford University, USA

KEYWORDS: Protein Patterning; Mechanobiology; Photoresist Lift-Off; Microcontact Printing

M1P-07 SINUSOIDAL GROOVE PATTERNED STATIC STRAIN INDUCING SYSTEM FOR EFFECTIVE DIFFERENTIATION MOUSE MYOBLAST CELLS

B.C. Kim[1], S.J. Park[2], T. Kim[1], S.J. Han[1], and D.S. Kim[1]
[1]*Pohang University of Science and Technology, KOREA and*
[2]*Korea University of Technology and Education, KOREA*

KEYWORDS: Static Strain; Sinusoidal Groove Pattern

M1P-08 POLYACRYLAMIDE MICROWELLS FOR CARDIOMYOCYTE CULTURE

R.E. Wilson, A.K. Denisin, and B.L. Pruitt
Stanford University, USA

KEYWORDS: Microwells; Cardiomyocyte; Mechanobiology; Hydrogels

M1P-09 STUDY IN-PLANE ELASTICITIES OF ENDOTHELIAL CELLS IN DIFFERENT DIRECTIONS UNDER FLOW SHEARING USING MICROFLUIDIC DEVICES

P.L. Ko[1], T.A. Lee[1], H.H. Hsu[2], C.K. Wang[3], W.H. Liao[1], and Y.C. Tung[1]
[1]*Academia Sinica, TAIWAN,* [2]*National Tsing Hua University, TAIWAN, and*
[3]*Tamkang University, TAIWAN*

KEYWORDS: Cell In-Plane Elasticity; Endothelial Cell; Flow Shearing; Microfluidic Device

M1P-10 DEVELOPMENT OF MICROFLUIDIC SINGLE-CELL COMPRESSION DEVICE FOR CELL MECHANICS STUDY

K.K.Y. Ho, Y.-L.Wang, and A.P. Liu
University of Michigan, USA

KEYWORDS: Compression, Cell Mechanics, Microfluidic Trapping, Microcontact Printing

M1P-11 ULTRAFAST MICROFLUIDIC MECHANICAL COMPRESSION OF CELLS FOR EFFICIENT INTRACELLULAR DELIVERY OF LARGE MACROMOLECULES

A. Liu[1], M. Islam[1], E. Waller[2], A. Alexeev[1], and T. Sulchek[1]
[1]*Georgia Institute of Technology, USA and*
[2]*Emory University School of Medicine, USA*

KEYWORDS: Microfluidics; Cell Deformation; Delivery; Cell Engineering

M1P-12 **ACOUSTIC TWEEZING CYTOMETRY FOR BIOMECHENICAL PHENOTYPING AND STIMULATION OF STEM CELLS**
X. Xue, Z. Fan, X. Hong, C. Deng, and J. Fu
University of Michigan, USA
KEYWORDS: Acoustic Tweezing Cytometry; Stem Cells; Mechanical Phenotyping; Mechanobiology

10:45 **W1P – Poster Session 1**

12:15 **Lunch**

13:45 **Keynote Speaker II**
Session Chair: Dan Huh, University of Pennsylvania, USA

M2K.02 **THE ROLE OF PROGENITOR CELLS AND ORGANOIDS IN THE TRANSLATIONAL RESEARCH OF PROSTATE CANCER**
S. Karkampouna[1], M. De Menna[1], F. la Manna[1], H. Jakupi[1], E. Snaar-Jagalska[2], L. Chen[2], L. Beimers[3], P. Kloen[4], O.T. Guenat[1], S. Zeinali[1], J. Grosjean[1], I. Klima[1], M. Spahn[1], G.N. Thalmann[1], and **Marianna Kruithof-de Julio**[1]
[1]*University of Bern, Switzerland,* [2]*Leiden University, NETHERLANDS,* [3]*Slotervaart Medical Centre, NETHERLANDS, and* [4]*Academic Medical Centre, NETHERLANDS*
KEYWORDS: Precision Medicine, Organoids, Prostate Cancer, Microvascular on Chip, Tissue Slices

14:45 **Flash Poster Session 2**
Session Chair: Robert Keynton, University of Louisville, USA

Microphysical Model of Living Systems

M2P-01 **3D BLOOD-BRAIN BARRIER MICROVASCULAR NETWORK MODEL INCLUDING HUMAN IPS-DERIVED ENDOTHELIAL CELLS, PERICYTES AND ASTROCYTES**
M. Campisi[1], Y. Shin[2], T. Osaki[2], C. Hajal[2], V. Chiono[1], and R.D. Kamm[2,3]
[1]*Politecnico di Torino, ITALY,* [2]*Massachusetts Institute of Technology, USA, and* [3]*Singapore-MIT Alliance for Research & Technology, SINGAPORE*
KEYWORDS: Blood Brain Barrier; Modeling; Vascular network

M2P-02 **A SCAFFOLD-FREE 3D ORGANOID MODEL TO STUDY NEOPLASTIC PROGRESSION IN BREAST CANCER**
S.I. Djomehri[1], C.G. Kleer[1], and S. Takayama[2]
[1]*University of Michigan, USA and* [2]*Georgia Institute of Technology, USA*
KEYWORDS: Organoid; 3D Culture; Hanging drop; Breast Cancer

M2P-03 **BIOPHYSICAL MARKER-BASED 4D MICROTUMOR ANALYSIS**

J. Cha and P. Kim
Korea Advanced Institute of Science and Technology, KOREA

KEYWORDS: 4D Microtumor; Invasion; Biophysical Markers; Tumor Microenvironment Array Platform

M2P-04 **DEVELOPMENT OF A HUMAN LUNG ALVEOLAR BARRIER BASED ON A BIOLOGICAL BASAL MEMBRANE**

P. Zamprogno[1], S. Achenbach[1], J.D. Stucki[1], N. Hobi[1], N. Schneider-Daum[2], C.-M. Lehr[2], H. Huwer[3], R.A. Schmid[4], and O.T. Guenat[1]
[1]University of Bern, SWITZERLAND, [2]Helmholtz-Institute for Pharmaceutical Research Saarland, GERMANY, [3]Völklingen Heart Center, GERMANY, and [4]University Hospital of Bern, SWITZERLAND

KEYWORDS: Organ-On-Chip; Bioartificial Membrane; Array of Alveoli; Human Primary Cells

M2P-05 **ENGINEERING DASATINIB ENCAPSULATED SUB-MICROMETER POLY (LACTIC-CO-GLYCOLIC ACID) PARTICLES AGAINST PROLIFERATIVE VITREORETINOPATHY**

R. Chauhan, R. Balgemann, C. Greb, T. Shigeo, N. Hidetaka, K. McDonald, H.J. Kaplan, and M.G. O Toole
University of Louisville, USA

KEYWORDS: Dasatinib; Proliferative Vitreoretinopathy; Single Emulsion; Spray Drying

M2P-06 **CHIPS-ON-A-PLATE SYSTEM FOR VISUALIZING THE CELL MIGRATION OF AN INTESTINAL FOLLICLE-ASSOCIATED EPITHELIUM MODEL**

Y. Lee and J.-K. Park
Korea Advanced Institute of Science and Technology, KOREA

KEYWORDS: Caco-2/Raji; Chips-on-a-Plate; Follicle-Associated Epithelium; Visualized Cell Migration

M2P-07 **HUMAN BLINKING 'EYE-ON-A-CHIP'**

J. Seo, W.Y. Byun, F. Alisafaei, A. Georgescu, M. Massaro-Giordano, V.B. Shenoy, V. Lee, V.Y. Bunya, and D.D. Huh
University of Pennsylvania, USA

KEYWORDS: Organ-on-a-Chip; Biomimetics; Eye; Blinking

M2P-08 **IN VITRO HUMAN LUNG MICROVASCULATURE-ON-CHIP FOR STUDYING ANTI-ANGIOGENIC EFFICACY OF NINTEDANIB**

S. Zeinali[1], C.A. Bichsel[2], N. Hobi[1], M. Funke-Chambour[1], O.T. Guenat[1,3], and T. Geiser[1]
[1]University of Bern, SWITZERLAND, [2]Boston Children's Hospital, Harvard Medical School, USA, and [3]University Hospital of Bern, SWITZERLAND

KEYWORDS: Microvasculature-on-Chip; Nintedanib; Angiogenesis; Permeability

M2P-09 LYMPHATIC MICROPHYSIOLOGICAL SYSTEM RECAPITULATES LYMPHATIC VASCULAR PHYSIOLOGY AND TUMOR MICROENVIRONMENTAL INTERACTIONS IN VITRO

M.M. Gong[1], K.M. Lugo-Cintron[1], B.R. White[2], P.M. Harari[1], and D.J. Beebe[1]
[1]University of Wisconsin, Madison, USA and
[2]University of Wisconsin, Platteville, USA
KEYWORDS: Lymphatic Cessel; Microphysiological System; Organotypic; Cancer

M2P-10 IN VITRO LUNG MICROVASCULATURE REMODELING INDUCED BY THE MECHANICAL STRESS OF THE RESPIRATION

E.K. Thompson[1], S. Zeinali[1], T. Geiser[1,2], and O.T. Guenat[1,2]
[1]University of Bern, SWITZERLAND and
[2]University Hospital of Bern, SWITZERLAND
KEYWORDS: 3D Cyclic Mechanical Strain; Mechanotransduction; Permeability; Morphology

M2P-11 MODULAR HYDROGEL STAMPS FOR MIMICKING PHYSIOLOGICAL CUES OF TISSUE MICROENVIRONMENTS

J.J. Tokar, J.W. Warrick, G.T. Knight, B.W. Horman, M.M. Gong, R.S. Ashton, and D.J. Beebe
University of Wisconsin, Madison, USA
KEYWORDS: Gradient; Hydrogel Stamp; Agarose; Interstitial Flow

M2P-12 RAPID EMERGENCE OF RESISTANCE OF TRIPLE NEGATIVE BREAST CANCER (TNBC) CELLS TO DOXORUBICIN IN CANCER RESISTANCE ACCELERATOR (CRA) CHIPS

W. Lim[1], J. Han[1], S. Kim[2], D. You[1], J.E. Lee[1,2], T.H. Shin[3], G. Lee[3], and S. Park[1]
[1]Sungkyunkwan University, KOREA, [2]Samsung Medical Center, KOREA, and [3]Ajou University, KOREA
KEYWORDS: Drug Resistance; Cancer Resistance Accelerator; Breast Cancer; Cancer Stem Cell

M2P-13 SENSORS EMBEDDED PLATFORM FOR ORGAN ON A CHIP

M.A. Khalid[1], Y.S. Kim[1], K.H. Kim[1], H.B. Kim[1], S.W. Kim[1], K.H. Choi, and Y.J. Cho[2]
[1]Jeju National University, KOREA and [2]Seoul National University, KOREA
KEYWORDS: Organ-on-a-Chip; Microfluidics; Drug Delivery; Embedded Sensors

M2P-14 STUDY PENETRATION OF PARTICULATE MATTER THROUGH BLOOD-AIR BARRIER IN VITRO USING A TRANSWELL-EMBEDDED MICROFLUIDIC DEVICE

T.-A. Lee, P.-L. Ko, C.-C. Peng, and Y.-C. Tung
Academia Sinica, TAIWAN
KEYWORDS: Particulate Matter (PM); Blood-Air Barrier; Transwell; Microfluidics

M2P-15 **THE DEVELOPMENT OF A 3D MICROFLUIDIC MODEL TO INVESTIGATE THE ROLE OF BBB FUNCTION IN ALZHEIMER'S DISEASE**

Y. Shin[1], S.H. Choi[2], E. Bylykbashi[2], J.A. Kim[3], S. Chung[4], and R.D. Kamm[1]
[1]Massachusetts Institute of Technology, USA, [2]Massachusetts General Hospital, USA, [3]Korea Basic Science Institute, KOREA, and [4]Korea University, KOREA

KEYWORDS: Disease-on-a-Chip; Alzheimer's Disease (AD); Blood Brain Barrier (BBB); 3D Microfluidics

M2P-16 **ULTRA-THIN, ALIGNED, FREE-STANDING NANOFIBER MEMBRANE FOR REAL-TIME VISUALIZATION OF LEUKOCYTE ADHESION CASCADE**

S.M. Park, S. Eom, H.M. Kim, K.H. Song, J. Doh, and D.S. Kim
Pohang University of Science and Technology, KOREA

KEYWORDS: Nanofiber Membrane; Electrospinning; Leukocyte; Adhesion Cascade

M2P-17 **ASSESSING ANGIOGENIC POTENTIAL OF 3D TUMOUR SPHEROIDS FOR IN-VITRO CO-CULTURE MODELS**

N. Walji and E.W.K. Young
University of Toronto, CANADA

KEYWORDS: Angiogenesis; Angiogenic Potential; Tumor Spheroids; Tumor Vascularization

M2P-18 **MINI-OPTO PLATFORM FOR VOLUMETRIC OPTICAL TOMOGRAPHIC IMAGING OF MICROPHYSIOLOGICAL SYSTEMS**

S. Hassan[1,2] and Y.S. Zhang[1,2]
[1]Brigham and Womens Hospital, Harvard Medical School, USA and [2]Harvard MIT Division of Health Sciences and Technology, USA

KEYWORDS: Optical Tomography; Imaging; Spheroids; Volumetric Imaging

M2P-19 **COMPUTATIONAL ERROR PROPAGATION FOR SEQUENTIAL UTILIZATION OF MATHEMATICAL BIOLOGY MODELS**

H.D. Neira[1,2] and A.E. Herr[1,2]
[1]University of California, Berkeley/University of California, San Francisco Joint Graduate Group, USA and [2]University of California Berkeley

KEYWORDS: Error Propagation, Bootstrapping

15:30 **W2P – Poster Session 2** (refreshments will be served)

17:00 **Adjourn for the Day**

17:30 - 19:00 **Wine & Cheese Reception**

Tuesday, March 27

08:30 **Keynote Speaker III**

Session Chair: Dan Huh, University of Pennsylvania, USA

T1K.01 **ELECTROPHORETIC CYTOMETRY: PROFILING PROTEINS & PROTEOFORMS IN SINGLE CELLS**

Amy E. Herr
University of California, Berkeley

KEYWORDS: Targeted Proteomics, Isoform, Microfluidic, Open Microfluidics

09:30 **Flash Poster Session 3**

Session Chair: Shu Takayama, Georgia Institute of Technology

Diagnostic and Detection Technologies

T1P-01 **ACOUSTIC LEVITATION FOR MONITORING OF COAGULATION DISORDERS**

V. Ansari[1], C. Brugnara[2], and R.G. Holt[1]
[1]Boston University, USA and [2]Boston Children's Hospital, USA

KEYWORDS: Thromboelastography; Coagulopathy; Acoustic Levitation

T1P-02 **AN INTEGRATED MICROPHOTONIC BIOSENSOR FOR SIMULTANEOUS REFRACTIVE INDEX AND DEFORMABILITY CELL DISCRIMINATION**

A. Leblanc-Hotte[1], G. Chabot-Roy[2], S. Lesage[2], J.-S. Delisle[2], and Y.-A. Peter[1]
[1]Polytechnique Montreal, CANADA and
[2]Maisonneuve-Rosemont Hospital Research Center, CANADA

KEYWORDS: Microphotonic; Microfluidic; Fabry-Pérot; Biosensor

T1P-03 **BACTERIAL PATHOGEN DETECTION USING AN OPTIMIZED SINGLE HEATER PCR MICROCHIP**

R. Khnouf[1], D. Karasneh[1], and M. Jaradat[1,2]
[1]Jordan University of Science and Technology, JORDAN and
[2]American University of Sharjah, UAE

KEYWORDS: PCR; Raleigh Benard Convection; Fuzzy-PID Controller; Salmonella Entridis

T1P-04 **ACOUSTIC LEVITATION: A NOVEL APPROACH TO STUDY THE PHYSICAL PROPERTIES OF BLOOD IN NORMAL SUBJECTS AND IN PATIENTS WITH SICKLE CELL DISEASE**

V. Ansari[1], C. Brugnara[2], and R.G. Holt[1]
[1]Boston University, USA and [2]Boston Children's Hospital, USA

KEYWORDS: Acoustic Levitation; Sickle Cell Disease; Fetal Hemoglobin; Blood Viscosity

T1P-05 **BIORESORBABLE FREQUENCY-SELECTIVE MAGNESIUM MICRO-RESONATORS FABRICATED BY ION BEAM ETCHING**
M. Rüegg, R. Blum, G. Boero, and J. Brugger
Ecole Polytechnique Fédérale de Lausanne, SWITZERLAND
KEYWORDS: Bioresorbable Wireless Implantable Medical Devices; Ion Beam Etching; Microwave Resonators

T1P-06 **DETECTION OF INFLUENZA ANTIGEN WITH ELECTRO-ACTIVE WAVEGUIDES**
J.H. Ghithan, M. Moreno, R.S. Keynton, M.G. O'Toole, and S.B. Mendes
University of Louisville, USA
KEYWORDS: Sensors; Guided Wave; Laser; Electrochemistry

T1P-07 **DEVELOPMENT OF A MICROFLUIDIC BIOMIMETIC DEVICE FOR TRIPLE NEGATIVE BREAST CANCER STEM CELLS EXTRAVASATION STUDIES**
A. Sivery[1], J. Duval[1], V. Senez[1], X. Le Bourhis[1,2], C. Lagadec[1,2], and A. Treizebre[1]
[1]University of Lille, FRANCE and [2]SIRIC OncoLille, FRANCE
KEYWORDS: Cancer Stem Cell (CSC); Circulating Tumor Cells (CTC); Biomimetic Microfluidic Device; Tumor-on-Chip

T1P-08 **EXOFILTER-BASED EXOSOMAL MIRNA DETECTION OF HUMAN BLOOD PLASMA IN GASTRIC CANCER**
M. Jang[1], G. Choi[1], J.-H. Cheong[2], and D. Kim[1]
[1]Korea Advanced Institute of Science and Technology, KOREA and [2]Yonsei University College of Medicine, KOREA
KEYWORDS: Exosome; Micro RNA; Gastric Cancer

T1P-09 **FLEXIBLE DUAL-FUNCTION PLATFORM FOR IN SITU MONITORING AND TREATMENT OF BACTERIAL BIOFILMS**
R.C. Huiszoon, P.R. Rajasekaran, W.E. Bentley, and R. Ghodssi
University of Maryland, USA
KEYWORDS: Bacterial Biofilm; Bioelectric Effect; Impedance Sensor; Flexible Device

T1P-10 **NON-FOULING ENCODED HYDROGEL MICROPARTICLES FOR MULTIPLEX MIRNA PROFILING DIRECTLY FROM FFPE TISSUE**
M.B. Nagarajan[1], A.M. Tentori[1], W.C. Zhang[2], F.J. Slack[2], and P.S. Doyle[1]
[1]Massachusetts Institute of Technology, USA and [2]Harvard Medical School, USA
KEYWORDS: miRNA; Hydrogel; Formalin-Fixed Paraffin-Embedded Tissue; Multiplexed Quantification

T1P-11 **MICROFLUIDIC DEVICE FOR MULTIPLEXED BIOMARKER SCREENING OF TISSUE MICROARRAY**
C.H. Cho and J.-K. Park
Korea Advanced Institute of Science and Technology, KOREA
KEYWORDS: Biomarker Screening; Immunohistochemistry; Microfluidic Device; Tissue Microarray

T1P-12 **PLATINUM-IRIDIUM COATINGS FOR INCREASING SENSITIVITY OF IMPEDANCE-BASED POLYMER MICROFLUIDIC SENSORS**

A.B. Baldwin[1], C.D. Lee[2], A. Petrossians[2], J. Weiland[3], and E. Meng[1]
[1]University of Southern California, USA, [2]Platinum Group Coatings, LLC, USA, and [3]University of Michigan, USA
KEYWORDS: Platinum-Iridium; Hydrocephalus; Microfluidics; Sensors

T1P-13 **SEPARATION OF SPERMATOZOA FROM ERYTHROCYTES FOR TESTICULAR BIOPSIES USING TUMBLING MECHANISM IN PINCH FLOW FRACTIONATION**

J.T.W. Berendsen, J.C.T. Eijkel, and L.I. Segerink
University of Twente, NETHERLANDS
KEYWORDS: Sperm Isolation; Pinched Flow Fractionation; Microfluidics; Erythrocytes

T1P-14 **TIO_2 ENCAPSULATION OF INDIVIDUAL JURKAT T CELLS FOR T-CELL THERAPY**

W. Youn, H. Lee, E.H. Ko, and I.S. Choi
Korea Advanced Institute of Science and Technology, KOREA
KEYWORDS: Artificial Spores; Cytoprotection; Immunology; Mineralization

T1P-15 **VISUALIZATION TECHNIQUE OF PH DISTRIBUTION IN A ION DEPLETION ZONE FOR EXOSOME CONCENTRATION**

K. Mogi[1,2]
[1]Tokyo Institute of Technology, JAPAN and
[2]National Institute of Advanced Industrial Science and Technology, JAPAN
KEYWORDS: Ion Depletion Zone; pH; Exosome; Nafion

T1P-16 **PH TARGETING VIA PACKAGING FOR A WIRELESS INGESTIBLE CAPSULE**

G. Banis, L. Beardslee, J. Stine, and R. Ghodssi
University of Maryland, USA
KEYWORDS: Ingestible Systems; Capsule; Capacitive Sensing; Multiplexing

T1P-17 **ISOLATION AND CONTROLLABLE RETRIEVAL OF CIRCULATING TUMOR CELL VIA GIGAHERZ ACOUSTIC DEVICE**

Y. Yang and X. Duan
Tianjin University, CHINA
KEYWORDS: Acoustofluidics; Circulating Tumor Cell; Ultrahigh Frequency Device; Single Cell

T1P-18 **OPTIMIZATION OF PHOTOTHERMAL EFFICIENCY OF THERMAL EVAPORATED GOLD FILM FOR MODULATING NEURAL ACTIVITY IN VITRO**

H. Kang, J.W. Lee, and Y. Nam
Korea Advanced Institute of Science and Technology, KOREA
KEYWORDS: Photothermal Effect; Neural Interface; Microelectrode Array; Neuromodulation

10:15 **T1P – Poster Session 3** (refreshments will be served)

11:45 **Lunch**

13:30 **Keynote Speaker IV**

Session Chair: Allen Liu, University of Michigan, USA

T2K.02 **ENGINEERING WITH BIOMOLECULAR MOTORS**

Henry Hess
Columbia University

KEYWORDS: Nanobiotechnology; Biomolecular Motors; Kinesin; Microtubule

14:30 **Break**

15:00 **Young Investigator Presentations**

Session Chair: Dan Huh, *University of Pennsylvania, USA*

T2Y.01 **SINGLE CELL TRACKING OF COLLECTIVE MIGRATION AFTER THE EPITHELIAL-MESENCHYMAL TRANSITION**

I.Y. Wong
Brown University, USA

KEYWORDS: Leader Cells; Swarming Migration; Micropillar Arrays; 3D Culture

T2Y.02 **MICROPHYSIOLOGICAL SYSTEMS FOR EMULATING HUMAN TISSUES AND DISEASES**

Y.S. Zhang[1,2]
[1]*Brigham and Womens Hospital, Harvard Medical School, USA and*
[2]*Harvard-MIT Division of Health Sciences and Technology, USA*

KEYWORDS: Microphysiological Systems, Organ-on-a-Chip, Microfluidics, Bioprinting, Bioanalysis

16:00 **Adjourn for the Day**

19:00 - 21:00 **Banquet**

Wednesday, March 28

08:30 **Keynote Speaker V**

Session Chair: Allen Liu, University of Michigan, USA

W1K.01 **TOWARDS ORGANS-ON-A-PLATE AND INJECTABLE TISSUES**
Milica Radisic
University of Toronto, CANADA

09:30 **Keynote Speaker VI**

Session Chair: Dan Huh, University of Pennsylvania, USA

W1K.02 **COMMERCIALIZATION OF MICROFLUIDIC TOOLS FROM DIAGNOSTICS TO 3D CELL CULTURE**
Seok "Sid" Chung
Korea University, KOREA
KEYWORDS: Commercial Microfluidic Tools, Diagnostic, 3D Cell Culture

10:30 **Break**

11:00 **Flash Poster Session 4**

Session Chair: Olivier Guenat, University of Berne, SWITZERLAND

Bioassay Development / 3D Printing and Biomanufacturing

W1P-01 **3D PRINTED 2- AND 4- APERTURE MICROFLUIDIC PROBES**
A.T. Brimmo[1,2], R. Alnemari[1], and M.A. Qasaimeh[1,2]
[1]New York University, UAE and [2]New York University, USA
KEYWORDS: Microfluidic Probe; Microfluidic Quadrupole; Microfluidic Dipole

W1P-02 **3D-PRINTED MICRONEEDLES FOR SKIN PENETRATION APPLICATIONS**
K. Moussi and J. Kosel
King Abdullah University of Science and Technology, SAUDI ARABIA
KEYWORDS: 3D Printing; Microneedle; Skin Penetration; Microfabrication

W1P-03 **A NOVEL HIGH FLOW RATE PUMPLESS MICROFLUIDIC DEVICE**
C.H. Chuang, Z.H. Cheng, L.W. Wu, and Y.Y. Chiang
National Chung-Hsing University, TAIWAN
KEYWORDS: Pumpless Microfluidics; Forward Osmosis; Draw Solution

W1P-04 ASSEMBLY OF MICROPATTERNED CELLULAR COLLAGEN SHEETS FOR BOTTOM-UP TISSUE ENGINEERING
J. Son and J.-K. Park
Korea Advanced Institute of Science and Technology, KOREA
KEYWORDS: 3D Cell Culture; Bottom-Up Tissue Engineering; Cellular Hydrogel Sheet; Collagen

W1P-05 ELECTROCHEMICAL STUDY OF TRAMETES VERSICOLOR LACCASE ACTIVITY ON SCREEN-PRINTED ELECTRODES
M.S. Islam and C.K. Harnett
University of Louisville, USA
KEYWORDS: Screen-Printed Electrodes; Cyclic Voltammetry; Lab-on-Chip; Membrane Reactors

W1P-06 ELECTROWETTING FOR BIO-PRINTING ON 3D HYDROPHOBIC ELECTRODES
S. Chu, M.J. Lerman, J.N. Culver, J.P. Fisher, and R. Ghodssi
University of Maryland, USA
KEYWORDS: Electrowetting; Hydrophobic Materias; 3D Electrodes; Bio-Printing

W1P-07 FABRICATION AND DEMONSTRATION OF A 3D ERROR-FREE BIO-COMPUTATION NETWORK OPERATED BY BACTERIA
A. Sudalaiyadum Perumal[1], F.C.M.J.M. Van Delft[2], S. Qiu[1], and D.V. Nicolau[1]
[1]McGill University, CANADA and [2]Nanovalk, NETHERLANDS
KEYWORDS: Bio-computation; 3D Devices; Bridges and Tunnels; Sub-Set Sum Problem; E. coli HCB437

W1P-08 FABRICATION AND CHARACTERIZATION OF BIOPOLYMER FIBERS FOR 3D ORIENTED MICROVASCULAR STRUCTURES
X.M. Fan, P.S. Soucy, M.M. Crain, S.J. Williams, and R.S. Keynton
University of Louisville, USA
KEYWORDS: Tissue Engineering; Direct-Write; Microfibers; Endothelial Cells

W1P-09 FABRICATION OF RANDOM/ALIGNED HYBRID NANOFIBER MAT FOR THE DEVELOPMENT OF 3D STACKED CARDIAC PATCH
S. Eom[1], S.M. Park[1], D.S. Kim[1], D.S. Kim[1], and H.J. Park[2]
[1]Pohang University of Science and Technology, KOREA and [2]Catholic University of Korea, KOREA
KEYWORDS: Hybrid; Nanofiber; Cardiac Patch

W1P-10 MICROFLUIDICS WITHIN A WELL: INJECTION-MOLDED PLASTIC ARRAY 3D CULTURE TISSUE PLATFORM
Y.G. Lee, J.W. Choi, D.H. Park, S.M. Lee, K.M. Son, J.H. Ko, J. Yu, J.M. Ha, and N.L. Jeon
Seoul National University, KOREA
KEYWORDS: Organ-on-a-Chip; Cell Patterning; Capillary Wetting; 3D Culture

W1P-11 **μFRET – MINIATURIZING KINASE ASSAYS FOR DRUG DISCOVERY**

M. Schappert[1], B. Seashore-Ludlow[2], and H. Joensson[1]
[1]Royal Institute of Technology, SWEDEN and [2]Karolinska Institute, SWEDEN
KEYWORDS: Drug Discovery; Microfluidic Droplets; FRET; Tyrosine Kinase Inhibition

W1P-12 **IMPROVED ELECTROSPRAYING PROCESS TO FABRICATE HIERARCHICAL MICRO/NANO STRUCTURE ON AN INSULATOR**

S.J. Lee, S.M. Park, D.S. Kim, and S.J. Han
Pohang University of Science and Technology, KOREA
KEYWORDS: Electrospraying; Electrolyte Solution; Hierarchical Micro Nano Structure

W1P-13 **PRECLINICAL MODELS OF PRECISION MEDICINE IN PROSTATE CANCER**

M. De Menna[1], S. Karkampuona[1], F. la Manna[1], H. Jakupi[1], E. Snaar-Jagalska[2], L. Chen[2], L. Beimers[3], P. Kloen[4], O.T. Guenat[1], S. Zeinali[1], J. Grosejan[1], I. Klima[1], M. Spahn[1], G.N. Thalmann[1], and M. Kruithof-de Julio[1]
[1]University of Bern, SWITZERLAND, [2]Leiden University, NETHERLANDS, [3]Slotervaart Medical Centre, NETHERLANDS, and [4]Academic Medical Centre, NETHERLANDS
KEYWORDS: Prostate Cancer; Precision Medicine

W1P-14 **SMALL RNA EXTRACTION AND PURIFICATION FROM BULK CELL-LYSATE USING ISOTACHOPHORESIS**

R. Khnouf[1,2], C.M. Han[3], S.A. Munro[3], and J.G. Santiago[2]
[1]Jordan University of Science and Technology, JORDAN, [2]Stanford University, USA, and [3]National Institute of Standards and Technology, USA
KEYWORDS: Isotachophoresis; Small RNA; Microfluidic Device; RT-QOCR

W1P-15 **POROUS SUB-MICROMETER PDMS MEMBRANES AS CELL CULTURE SUBSTRATES IN A MICROFLUIDIC CHIP**

M.P. Tibbe, H. Le-The, A.M. Leferink, J.C.T. Eijkel, and L.I. Segerink
University of Twente, NETHERLANDS
KEYWORDS: Polydimethylsiloxane Membrane; Cell Culture; Microfluidic Chip

W1P-16 **INVESTIGATING THE IMPACT OF PROBE SIZE ON IN-GEL IMMUNOASSAYS**

Alison Su and Amy E. Herr
University of California, Berkeley/University of California, San Francisco Graduate Program
KEYWORDS: Thermodynamic Partitioning, In-Gel Immunoassay, Antigen-Binding Fragments

W1P-17 **FLOW THROUGH GELS AS A TOOL TO GENERATE 3D CONCENTRATION PROFILES IN HYDROGEL-FILLED DEVICES**
J. Loessberg-Zahl, A.D. van der Meer, A. van den Berg, and J.C.T. Eijkel
University of Twente, NETHERLANDS
KEYWORDS: Flow Patterning; Hydrogel; 3D-Printing

W1P-18 **FUNCTIONALIZING POLYACRYLAMIDE GELS FOR RAPID CAPTURE AND RELEASE OF OLIGONUCLEOTIDES**
Y. Zhang[1], P.P.Y. Chan[1,2], and A.E. Herr[1]
[1]*University of California, Berkeley, USA and*
[2]*Swinburne University of Technology, AUSTRALIA*
KEYWORDS: Copolymerization, Functional Hydrogels, Oligonucleotides, Reversible Immobilization

W1P-19 **DEVELOPMENT OF ON-CHIP KIDNEY TUBULE MODEL INTEGRATED WITH TRANS-EPITHELIAL ELECTRICAL RESISTANCE SYSTEM**
Y. Tanaka and H. Kimura
Tokai University, JAPAN
KEYWORDS: Organ-on-a-Chip; Kidney Tubule; Trans-Epithelial Electrical Resistance; Drug Discovery

W1P-20 **INVESTIGATING THE IMPACT OF DENATURING DETERGENTS ON PROTEIN-HYDROGEL SYSTEMS**
A. Gopal and A.E. Herr
University of California, Berkeley, USA
KEYWORDS: Immunoassays, Multiplexing, Hydrogels

11:45 **W1P – Poster Session 4**

13:15 **Award Ceremony and Closing Remarks**

13:30 **Conference Adjourns**

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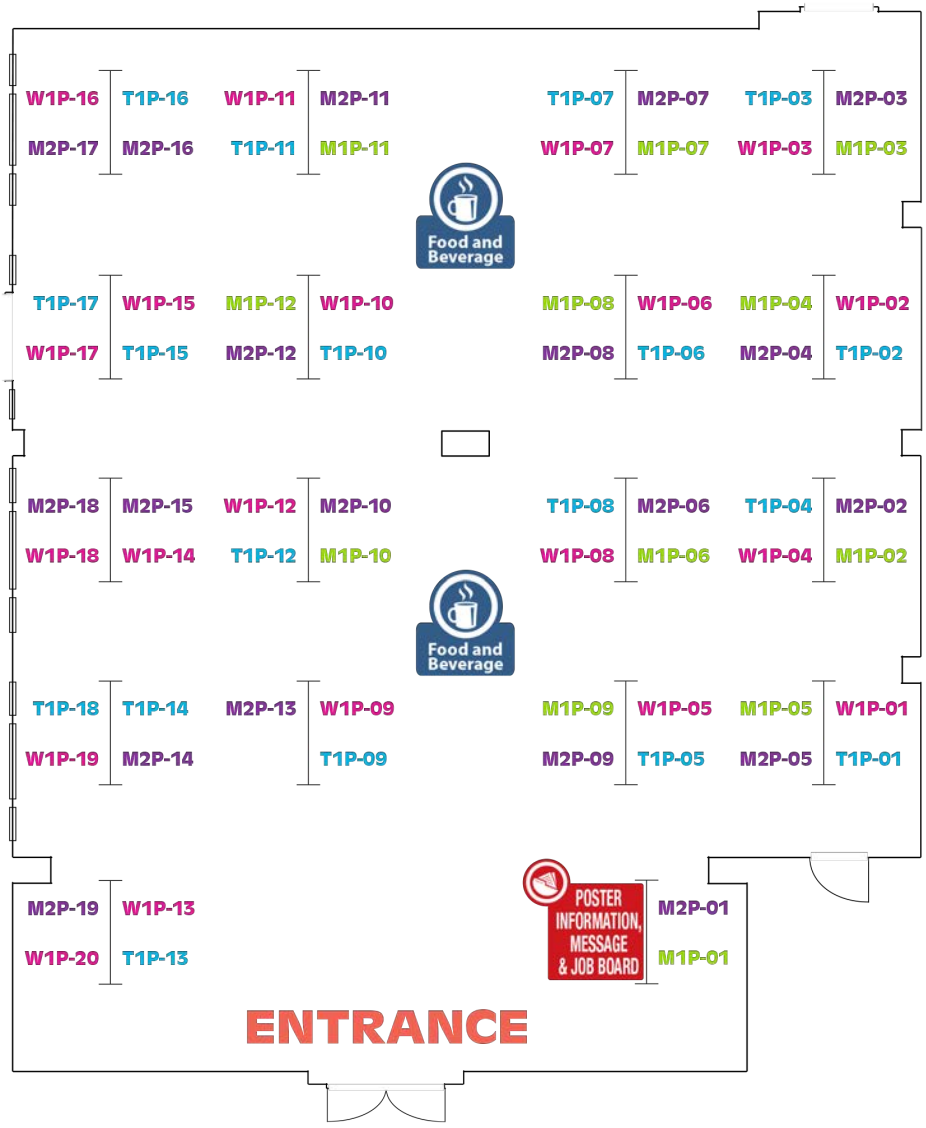

Session 1 (M1P) LIME GREEN	Session 3 (T1P) BRIGHT BLUE
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