Program

Nanotechnology in Medicine II:
Bridging Translational in vitro and in vivo Interfaces

An ECI Conference Series

June 5 – June 9, 2018
Grande Real Santa Eulalia Hotel, Albufeira, Portugal

Chairs
Millicent Sullivan
University of Delaware, USA

Josué Sznitman
Technion-Israel Institute of Technology, Israel

Co- Chairs
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Engineering Conferences International (ECI) is a not-for-profit global engineering conferences program, originally established in 1962, that provides opportunities for the exploration of problems and issues of concern to engineers and scientists from many disciplines.

Previous conferences in this series:

Nanotechnology in Medicine: From Molecules to Humans
July 3-7, 2016
Hernstein, Austria
Conference Chairs:
Lola Eniola-Adefeso (Department of Chemical Engineering, University of Michigan, USA)
Paolo Decuzzi (Italian Institute of Technology, Italy)

Conference Sponsors

ACS Publications

APL Bioengineering and Biomicrofluidics (AIP Publishing)

Bioengineering & Translational Medicine Journal (AIChE, SBE, and Wiley)

Biomedical Microdevices (Springer)

Elsevier

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LaVision

University of Delaware (College of Engineering, Department of Chemical & Biomolecular Engineering Department, and Department of Materials Science & Engineering)

Micronit Microtechnologies B.V.

Technion (Russel Berrie Nanotechnology Institute)

Tuesday, June 5, 2018

16:00 – 18:00	Conference Check-in (Executive Room)
18:00 – 19:00	**PLENARY** **Microfabrication of elastomeric polymers for organ-on-a-chip engineering and injectable tissues** Milica Radisic, University of Toronto, Canada
19:00 – 20:00	Opening Reception (Seas Lounge)
20:00 – 21:30	Dinner
21:30 – 22:30	Poster Session / Social Hour

NOTES

- *Technical Sessions will be held in the Balaia Room.*
- *Poster Sessions will be in the Santa Eulália Room.*
- *The ECI office will be the Executive Room.*
- *Dinner on Thursday is "on your own."*
- *Audio, still photo and video recording by any device (e.g., cameras, cell phones, laptops, PDAs, watches) is strictly prohibited during the technical sessions, unless the author and ECI have granted prior permission.*
- *Speakers – Please have your presentation loaded onto the conference computer prior to the session start (preferably the day before). Shengxi Wu will be assisting speakers in loading their presentations.*
- *Speakers – Please leave discussion time as previously directed by your session chair.*
- *Please do not smoke at any conference functions.*
- *Turn your mobile telephones to vibrate or off during technical sessions.*
- *Please write your name on your program so that it can be returned to you if lost or misplaced.*
- *After the conference, ECI will send an updated participant list to all participants. Please check your listing now and if it needs updating, you may correct it at any time by logging into your ECI account.*

Wednesday, June 6, 2018

07:00 – 09:00 Breakfast buffet

Session 1: Design Advances in Nanomaterials and Nanotheranostics
Session Chair: Victor Shahin, University of Muenster, Germany

Nanomaterials and nanotheranostics are an attractive option for the diagnosis and treatment of a number of serious diseases, as these constructs allow enhanced control over localization and cargo release. This session will focus on the current state of the art for development of nanoconstructs for use as diagnostics and therapeutics in human diseases, with emphasis on nanotechnologies that address key limitations in current clinical approaches.

09:15 – 09:55 **KEYNOTE**
Genetically encoded polymers for drug delivery
Ashutosh Chilkoti, Duke University, USA

09:55 – 10:15 **Immobilization of biologic photosensitizer conjugates on nanoparticles to enhance photoimmunotherapy efficacy**
Huang-Chiao Huang, University of Maryland, USA

10:15 – 10:35 **Photothermal therapy generates a thermal window of immunogenic cell death in neuroblastoma**
Rohan Fernandes, George Washington University, USA

10:35 – 11:05 Coffee break

11:05 – 11:25 **Synthetic cells synthesize therapeutic proteins inside tumors**
Nitzan Krinsky, Technion, Israel

11:25 – 11:45 **Soft tissue approximation and repair using Laser-activated nanomaterials**
Kaushal Rege, Arizona State University, USA

11:45 – 12:05 **New physical and chemical approaches for the cytosolic delivery of bio-therapeutics and nanoparticles into cells**
Stefaan De Smedt, Ghent University, Belgium

12:05 – 12:25 **Histidylated nanovectors for mRNA vaccine formulation: Induction of a strong anti-tumor T cell immunity combined with inflammatory state**
Chantal Pichon, Center for Molecular Biophysics-CNRS, France

12:25 – 12:45 **Polymer-nanoparticle interactions in supramolecular hydrogels: Enabling long-term antibody delivery**
Anthony Yu, Stanford University, USA

12:45 – 14:30 Lunch

Wednesday, June 6, 2018 (continued)

Session 2: Materials/Biology Interface
Session Chairs: Christopher Jewell, University of Maryland, USA
Moein Moghimi, Newcastle University, UK

The clinical translation of new nanotechnologies, biomaterials, combination products, and/or microdevices ultimately relies upon the complex series of interactions that these materials experience upon introduction into the human body. The integrated responses span multiple tissue/organ systems, as well as the immune system, ultimately governing therapeutic and/or diagnostic outcomes. This session will focus on approaches to understand and modulate systemic multi-organ/multi-tissue responses, as well as systemic and localized immune responses, including strategies to actively alter the immune interface through novel immunoengineering technologies.

14:30 – 15:10	**KEYNOTE** **Nanomedicines for the treatment of autoimmune inflammation: engineering design, mechanisms and diseases** Pere Santamaria, University of Calgary, Canada
15:10 – 15:30	**Tolerance induction with quantum dots displaying tunable densities of self-antigen** Krystina Hess, University of Maryland, USA
15:30 – 15:50	**Chimeric protein and nano-construct for tissue-retained enzyme to locally suppress inflammation** Benjamin Keselowsky, University of Florida, USA
15:50 – 16:20	Coffee break
16:20 – 16:40	**Precision polymer architectures and molecular conjugates to enable therapeutics against undruggable targets** Craig Duvall, Vanderbilt University, USA
16:40 – 17:00	**Sustained release vaccine platforms for enhanced humoral immunity** Gillie Agmon, Stanford University, USA
17:00 – 17:20	**Differential uptake of non-fouling particles by primary human neutrophils** William Kelley, University of Michigan, USA
18:00 – 19:30	Poster Session / Social Hour
19:30 – 21:00	Dinner

Thursday, June 7, 2018

07:00 – 09:00	Breakfast buffet
	Session 3: In Vitro Microfluidics and Physiological Assays Session Chair: Netanel Korin, Technion, Israel The unique physical phenomena inherent in microscale fluid flows can be leveraged in a variety of applications in biology ranging from new approaches for device fabrication to new techniques for sensing flow characteristics. These features have spurred enormous interest in development of microsystems that are able to mimic, manipulate, and/or interrogate biological systems at tiny length scales, lending new insights into cell biology and human physiology. This session will investigate cutting edge topics in the development and application of microscale phenomena towards creation of new devices and systems in biomedicine.
09:15 – 09:35	**Combinatorial nanoconstructs for biomedical imaging and drug delivery** Paolo Decuzzi, IIT, Italy
09:35 – 09:55	**Evaluating the impact of perfusion on nanomaterial uptake rates and cytotoxicity using microfluidic in vitro & in silico cell cultures systems** Peter Ertl, Technical University of Vienna, Austria
09:55 – 10:15	**Tissue microprocessing: shaping sub-nanoliter volumes of liquids on tissue sections for multi-modal analysis** Govind Kaigala, IBM Zurich, Switzerland
10:15 – 10:35	**Generation, detection and applications of in vitro oxygen gradients** Nitin Agarwal, George Mason University, USA
10:35 – 11:05	Coffee break
11:05 – 11:45	**KEYNOTE** **A model for the blood-brain barrier and its application in modeling metastasis to the brain** Roger Kamm, Massachusetts Institute of Technology, USA
11:45 – 12:05	**Acoustic enhancement of intracellular delivery for ex vivo therapeutics** Leslie Yeo, RMIT University, Australia
12:05 – 12:25	**Microphysiological models of human skin and brain vasculature for drug testing** Hasan Abaci, Columbia University, USA
12:35	Boxed lunch and excursion (Guided tour of Faro followed by catamaran to the Natural Park of the Ria Formosa)
18:30	Return to hotel
19:00	Dinner on your own

Friday, June 8, 2018

07:00 – 09:00 Breakfast buffet

Session 4: Cellular Niche: Models and Mechanisms
Session Chairs: April Kloxin, University of Delaware, USA
Angela Pannier, University of Nebraska, USA

Cells respond to a dynamic series of signals stemming from their interactions with the local extracellular environment, including the chemical/mechanical/physical properties of the extracellular matrix (ECM) (e.g., density and three-dimensional arrangement of cell adhesive ligands; composition; modulus; topology); the presence/proximity of other cells; the composition/concentration of soluble signaling molecules; and the presence/availability of nutrients. This session will focus on the design, construction, and application of integrated models able to capture these features of the cellular microenvironment to enable new insights and new therapeutic approaches relevant to nanotechnology application as well as tissue regeneration and disease.

09:15 – 09:55 **KEYNOTE**
Biomineralized materials as bone ECM mimetics: From understanding molecular mechanisms to new therapeutic interventions
Shyni Varghese, Duke University, USA

09:55 – 10:15 **Decoding mechanism that regulate re-epithelialization**
Pamela Kreeger, University of Wisconsin, USA

10:15 – 10:35 **Spatial patterning of liver progenitor cell differentiation mediated by cell contractility and notch signaling**
Gregory Underhill, University of Illinois, USA

10:35 – 11:05 Coffee break

11:05 – 11:25 **Lipid targets in prevention of clotting: Translating in vitro concepts to in vivo application**
Michael Holinstat, University of Michigan, USA

11:25 – 11:45 **A biomaterial screening approach to reveal microenvironmental mechanisms of drug resistance**
Shelly Peyton, University of Massachusetts, USA

11:45 – 12:05 **Synthetic building block for hierarchical tissue engineering**
Laura De Laporte, DWI-Leibniz Institute for Interactive Materials, Germany

12:05 – 12:25 **Scalable and physiologically relevant microenvironments for human pluripotent stem cell expansion and differentiation**
Yuguo Lei, University of Nebraska, USA

12:30 – 14:30 Lunch

14:30 - 16:00 **Session 5: Industry Session & Hands-on Demo**
Session Chair: Maximilien Guerin, Fluigent, France

19:00 – 20:00 **PLENARY**
New strategies for enhancing tumor immunotherapy by exploiting the tumor microenvironment
Melody Swartz, University of Chicago, USA

20:00 – 22:00 Conference Dinner and Poster Awards

Saturday, June 9, 2018

07:00 – 09:00	Breakfast buffet
	Departures

Poster Presentations

1. **Mechanisms of enhanced non-viral gene delivery to human mesenchymal stem cells induced by glucocorticoid priming**
   Angela K. Pannier, University of Nebraska-Lincoln, USA

2. **Use of a three-dimensional in vitro alginate hydrogel culture model to direct zonal formation of growth plate cartilage**
   Angela K. Pannier, University of Nebraska-Lincoln, USA

3. **Designing and utilizing synthetic extracellular matrices to probe breast cancer cell activation in response to microenvironment cues**
   April M. Kloxin, University of Delaware, USA

4. **Microfluidic acini-on-chip platforms as a tool to study bacterial lung exposure**
   Josue Sznitman, Technion – Israel Institute of Technology, Israel

5. **Tropoelastin coated PLLA-PLGA scaffolds promote vascular network formation**
   Ariel A. Szklanny, Technion – Israel Institute of Technology, Israel

6. **Engineered nanotherapeutics for pulmonary aerosol delivery**
   Catherine Fromen, University of Delaware, USA

7. **Modular control of innate immune signaling using self-assembly of immune signals**
   Christopher Jewell, University of Maryland, USA

8. **A microfluidic platform with permeable walls for the analysis of vascular and extravascular mass transport**
   Hilaria Mollica, Italian Institute of Technology, Italy

9. **Targeted drug delivery in arterial stenosis - role of hemodynamics**
   Moran Levi, Technion – Israel Institute of Technology, Israel

10. **Study cellular reponses at the microscale by creating heterogenity in cultured cells using a microfluidic probe**
    Nadia Enrriquez Casimiro, IBM Research - Zurich, Switzerland

11. **Synthetic cells synthesize therapeutic proteins inside tumors**
    Nitzan Krinsky, Technion – Israel Institute of Technology, Israel

12. **Controlled EGFR ligand display for tunable targeted intracellular delivery of cancer suicide enzymes**
    Rachel Lieser, University of Delaware, USA

13. **Development of a collagen-based scaffold for sequential delivery of antimicrobial agents and pdgf genes to chronic wounds**
    Raj Kumar Thapa, University of Delaware, USA

14. **Synthesis of zwitterionic-functionalized conjugated nanoparticles for targeted drug delivery applications**
    Renato Auriemma, Politecnico di Milano, Italy

15. **True-scale biomimetic multi-generation airway platforms of the human bronchial epithelium for in vitro cytotoxicity screening**
    Shani Elias-Kirma, Technion – Israel Institute of Technology, Israel

16. **Polyester-based excipients to formulate lipophilic drugs into nanoparticles directly at the bed of the patient**
Umberto Capasso Palmiero, Politecnico di Milano, Italy

17. **Adhesion kinetics of functionalized nano-particles under high shear conditions**
Yathreb Asaad, Technion – Israel Institute of Technology, Israel

18. **Tolerance induction with quantum dots displaying tunable densities of self-antigen**
Krystina Hess, University of Maryland, USA

19. **Sustained release vaccine platforms for enhanced humoral immunity**
Gillie Agmon, Stanford University, USA