

Session Summaries

1. ***Design advances in nanomaterials and nanotheranostics.*** 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. Confirmed participants include:

Session chair(s): SHAHIN Victor (University of Muenster, Germany), REGE Kaushal (Arizona State University, USA)

Keynote speakers: WAGNER Ernst (LMU Munchen, Germany), CHILKOTI Ashutosh (Duke University, USA)

Invited speakers: DE SMEDT Stefaan (Ghent University, Belgium), HUANG Huang-Chiao (University of Maryland, USA)

2. ***Cellular niche: models and mechanisms.*** 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. Confirmed participants include:

Session chair(s): KLOXIN April (University of Delaware, USA), PANNIER Angela (University of Nebraska, USA)

Keynote speaker: VARGHESE Shyni (Duke University, USA)

Invited speakers: DE LAPORTE Laura (DWI, Germany), PEYTON Shelly (University of Massachusetts, USA), KREEGER Pamela (University of Wisconsin, USA), WERNER Carsten (IPR, Germany)

3. ***In vitro microfluidics and physiological assays.*** 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. Confirmed participants include:

Session chair(s): KORIN Netanel (Technion, Israel), KAIGALA Govind (IBM Zurich, Switzerland)

Keynote speaker: KAMM Roger (MIT, USA)

Invited speakers: YEO Leslie (RMIT, Australia), DECUZZI Paolo (IIT, Italy), ERTL Peter (TU Wien, Austria), GERECHE Sharon (Johns Hopkins University, USA)

4. **Industry R&D session.** This session will outline new advances in biomedical nanotechnology, microfluidics, and lab-on-a-chip systems in industry through a series of focused presentations highlighting the fundamental research, commercialization process, and new opportunities to apply nanotechnology and microfluidics products. This unique session will incorporate hands-on demos and will be integrated with an optional lunch discussion to enable new collaborations between academics and industrial scientists aimed at seeding discussion of key needs for nanotechnology/microfluidics commercialization.

Session chair(s): GUERIN Maximilien (Fluigent, France)

5. **Materials/biology interface.** 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. Confirmed participants include:

Session chair(s): JEWELL Christopher (University of Maryland, USA), MOGHIMI Moein (Newcastle University, UK)

Keynote speaker: SANTAMARIA Pere (University of Calgary, CAN)

Invited speakers: DUVALL Craig (Vanderbilt University, USA), ELISSEEFF Jennifer (Johns Hopkins University, USA), KESELOWSKY Benjamin (University of Florida, USA)