



2022

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4th Annual

**Immune Modulation &  
Engineering Symposium**

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Philadelphia, PA, USA

December,  
07-09  
2022

The **only conference** dedicated to convergent research in translational immunology and engineering.

# About The Symposium

The mission of the Immune Modulation & Engineering Symposium is to bring together researchers in biomedical engineering and basic and translational immunology to advance the rapidly emerging field of immune engineering. The speakers and attendees represent leaders in this field, with expertise in collaborating across disciplines to generate innovative solutions to treat disease and injury by modulating the immune system.



More at <https://drexel.edu/biomed/research-and-design/overview/IMES2022/>

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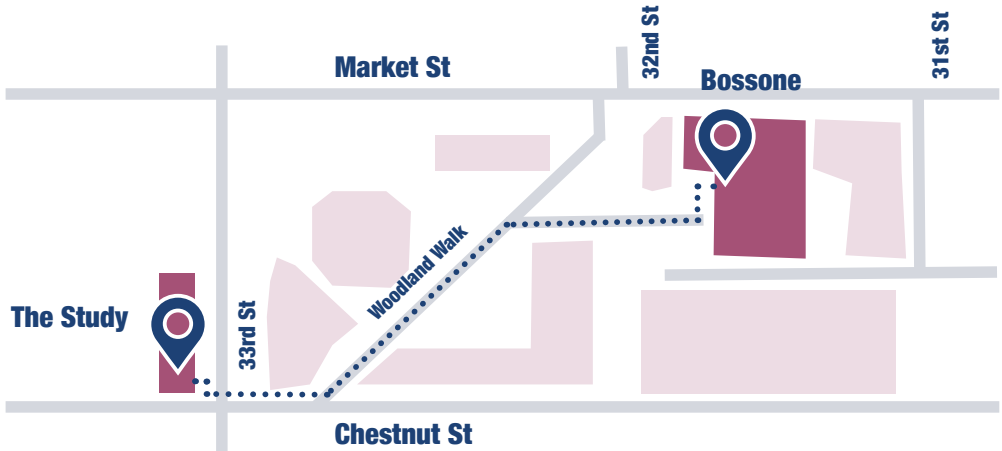


## Symposium location:

The Study Hotel  
20 S. 33rd Street  
Philadelphia, PA, USA

## Poster session location:

Bossone Research Center  
3140 Market Street, 3rd Floor  
Philadelphia, PA, USA



# Our Sponsors



# Symposium Agenda

## Day 1: December 7, 2022

5:00-7:15 PM

### Opening Reception: Diverse Perspectives in Immune Engineering

Lola Eniola-Adefeso, PhD | University of Michigan

## Day 2: December 8, 2022

8:00 AM

### Breakfast

9:00 AM

### Opening Remarks | Kara Spiller, PhD

9:05 AM

### Session 1: Regenerative medicine I

**Moderator:**  
Peter Gaskill, PhD

**Kam Leong, PhD** | Columbia University  
*"Cationic drug carriers as immunomodulating biomaterials"*

**Katherine Gallagher, MD** | University of Michigan  
*"Epigenetics in inflammation and vascular disease"*

**Megan Ballinger, PhD** | The Ohio State University  
*"Macrophage-fibroblast interactions in pulmonary fibrosis"*

10:35 AM

### Break

10:55 AM

### Session 2: Regenerative medicine II

**Moderator:**  
Yinghui Zhong, PhD

**Andres Garcia, PhD** | Georgia Tech  
*"Synthetic hydrogels for islet immune acceptance to treat type 1 diabetes"*

**Kara Spiller, PhD** | Drexel University  
*"Immunomodulatory biomaterials for regenerative medicine"*

**Erika Moore, PhD** | University of Florida  
*"Biomaterials to direct the B cell response"*

# Symposium Agenda

12:25 PM

## Lunch Break

2:00 PM

## Session 3: Infectious diseases and vaccines

**Moderator:**  
**Michele Kutzler, PhD**

**Rafick-Pierre Sekaly, PhD** | Emory University  
*"Convergent mechanisms for the development of immune based interventions for HIV and cancer"*

**Ana Jaklenec, PhD** | Massachusetts Institute of Technology  
*"Engineering novel delivery systems for vaccines and cancer immunotherapy"*

**Michael Nonnemacher, PhD** | Drexel University  
*"Role of HIV genetic variation in pathogenesis and cure strategies"*

3:30 PM

## Coffee Break

3:50 PM

## Session 4: Nanomedicine

**Moderator:**  
**Mohamad-Gabriel Alameh, PhD**

**Lola Eniola-Adefeso, PhD** | University of Michigan  
*"Polymeric microparticle decoys targeting vascular inflammation"*

**Yizhou Dong, PhD** | Olcahn School of Medicine at Mount Sinai  
*"Lipid nanoparticles for mRNA therapeutics, cancer immunotherapy, and cell therapy"*

**Evan Scott, PhD** | Northwestern University  
*"Engineering the bio/nano interface for cell-selective nanotherapy"*

5:15-7:30 PM

## Poster Session and Cocktail Reception

**@ Bossone 3rd Floor Atrium, 3140 Market Street**



Poster Session abstracts available online at <https://drexel.edu/biomed/research-and-design/overview/IMES2022/>

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# Symposium Agenda

## Day 3: December 9, 2022

8:00 AM Breakfast

9:00 AM Opening Remarks

9:05 AM **Session 5: Cancer immunotherapy**

**Moderator:** **John Maris, MD** | Children’s Hospital of Philadelphia  
*“Engineering immunotherapies for childhood cancers”*

**Jennifer Hope, PhD**

**Pierluigi Porcu, MD** | Thomas Jefferson University  
*“Allogeneic transplantation for the treatment of lymphoid malignancies”*

**Gabriele Romano, PhD** | Drexel University  
*“Chemokine-based approaches to treat immunologically “cold” tumors*

10:35 AM **Coffee Break**

10:55 AM **Session 6: Immune engineering in cell & gene therapy**

**Moderator:** **Xiao Huang, PhD** | Drexel University  
*“Control and enhance therapeutic T cells with precision bioengineering”*

**Rachel Riley, PhD**

**Klaudia Kuranda, PhD** | Spark Therapeutics  
*“Combating the immune response to gene therapy vectors.”*

**Eric Kmiec, PhD** | Gene Editing Institute  
*“Clinical development of CRISPR-directed gene editing for cancer therapeutics”*

12:25 PM **Lunch Break**

# Symposium Agenda

2:00 PM

## Session 7: Tolerogenic therapies for autoimmune disease

**Moderator:**  
**Hao Cheng, PhD**

**Jessica Weaver, PhD** | Arizona State University  
*"Placenta-inspired approaches to engineering immune tolerance"*

**Taku Kambayashi, MD, PhD** | University of Pennsylvania  
*"Skin-mediated regulation of the immune system and lipid metabolism"*

**Peter Deak, PhD** | Drexel University  
*"Engineering robust tolerogenic dendritic cells using combinations of chemical signals"*

3:30 PM

## Coffee Break

3:50 PM

**Moderator:**  
**Chris Rodell, PhD**

## Session 8: Talks by Trainee Awardees

5:00 PM

## Concluding Remarks

## Our Speakers



**Lola Eniola-Adefeso, PhD**  
University of Michigan

Dr. Omolola (Lola) Eniola-Adefeso is the University Diversity and Social Transformation Professor of Chemical Engineering and Biomedical Engineering and the Associate Dean for Graduate and Professional Education in the College of Engineering at the University of Michigan-Ann Arbor. She received a doctoral degree (2004) in Chemical and Biomolecular Engineering at the University of Pennsylvania. She was a postdoctoral associate in the Pediatrics/Leukocyte Biology at Baylor College of Medicine. She received several honors and awards, including the NSF CAREER Award, American Heart Association Innovator Award, and the BMES MIDCAREER Award.



**Kam Leong, PhD**  
Columbia University

Dr. Kam Leong is the Samuel Y. Sheng Professor of Biomedical Engineering at Columbia University, where he focuses on three major research directions: 1) Nonviral gene editing in vivo; 2) Biomaterials-assisted modulation of inflammation; 3) Human-tissue chips for disease modeling and drug screening. He has published ~500 manuscripts and holds more than 60 issued patents. He is the recipient of the Founder's Award of the Society for Biomaterials and the IEEE-EMBS Technical Achievement Award in 2022, Editor-in-Chief of Biomaterials, and a member of the USA National Academy of Inventors, the USA National Academy of Engineering, and the USA National Academy of Medicine.



**Katherine Gallagher, MD**  
University of Michigan

Dr. Katherine Gallagher, Professor of Surgery, Professor of Microbiology and Immunology and the John R. Pfeifer Professor of Surgery at U-M, is internationally known for her innovative translational research on epigenetic regulation of immune cells during normal and pathologic tissue repair and other cardiovascular disease processes. She is an expert in the molecular pathogenesis of wound repair and has contributed substantially to the understanding of epigenetics in immune cells associated with tissue repair, cardiovascular diseases, sepsis and COVID-19.



## Our Speakers



**Megan Ballinger, PhD**

The Ohio State University

Dr. Megan Ballinger is currently an Associate Professor in the Department of Internal Medicine, Division of Pulmonary, Critical Care and Sleep Medicine at The Ohio State University. She is an expert in lung immunology, in particular investigating the role of macrophages in regulating chronic lung disease. Her interdisciplinary work combines in vitro cell culture systems with both animal models of disease and isolated primary human cells to investigate the role of mechanical force, microenvironmental stimuli and cell-to-cell interactions during homeostasis as well as injury and inflammation.



**Andres Garcia, PhD**

Georgia Tech

Dr. Andrés J. García is the Executive Director of the Petit Institute for Bioengineering and Bioscience and Regents' Professor at the Georgia Institute of Technology. Dr. García's research program integrates innovative engineering, materials science, and cell biology concepts and technologies to create cell-instructive biomaterials for regenerative medicine and generate new knowledge in mechanobiology. He is a co-founder of 3 start-up companies (CollectCell, CorAmi Therapeutics, iTolerance). He is an elected member of the National Academy of Engineering, the National Academy of Medicine, and the National Academy of Inventors.



**Kara Spiller, PhD**

Drexel University

Dr. Kara Spiller is a Professor in Drexel University's School of Biomedical Engineering, Science, and Health Systems. Her research interests include the role of immune cells in tissue regeneration, the design of immunomodulatory biomaterials, and international engineering education. Her research is funded by the NIH, the NSF, and private foundations. Her awards include a Fulbright fellowship, the NSF CAREER award, and the United States nomination for the ASPIRE prize.

## Our Speakers



**Erika Moore, PhD**  
University of Florida

Dr. Erika Moore is the inaugural Rhines Rising Star Assistant Professor in the Department of Materials Science and Engineering at the University of Florida. She received her Ph.D. in Biomedical Engineering from Duke University. Dr. Moore's work broadly focuses on understanding how immune cells can be leveraged to enhance tissue regeneration. She has been recently acknowledged as Forbes 30 Under 30 in the Healthcare category and is a former Trustee on the Duke Board of Trustees. She has been awarded the KL2 NIH Training grant, a Space Research Initiative grant, the NSF Graduate Research Fellowship and the Ford Foundation Fellowship.



**Rafick-Pierre Sekaly, PhD**  
Emory University

Dr. Rafick-Pierre Sekaly is Professor and serves as Vice-Chair of Translational Medicine in the Department of Pathology and Laboratory Medicine at Emory University School of Medicine in Atlanta, Georgia. Dr. Sekaly is a Georgia Research Alliance Eminent Scholar. He is a member of the Cancer Immunology Research Program at Winship Cancer Institute. Dr. Sekaly is one of the world's leading researchers focused on a cure for HIV/AIDS and has led fundamental work on the persistence of the HIV reservoir and progression of HIV infection. For clinical trials, he has partnered with companies using gene therapy to make immune cells resistant to HIV.



**Ana Jaklenec, PhD**  
Massachusetts Institute of Technology

Dr. Ana Jaklenec is a Research Scientist and co-Principal Investigator at Massachusetts Institute of Technology in the laboratory of Dr. Robert Langer at the David H. Koch Institute for Integrative Cancer Research. Her group is focused on engineering delivery systems for global health. Dr. Jaklenec has over 15 years of experience in the area of bioengineering, materials science, micronutrient and vaccine stabilization and delivery. Dr. Jaklenec holds a B.S. in Biomedical Engineering from Boston University and a Ph.D. in Biomedical Engineering from Brown University.

## Our Speakers



**Michael Nonnemacher, PhD**

Drexel University

Dr. Michael Nonnemacher is a Professor in the Department of Microbiology & Immunology and Associate Director of the Center for Molecular Virology and Translational Neuroscience in the Institute for Molecular Medicine and Infectious Disease at Drexel University College of Medicine. In addition, he is the Program Director for the Microbiology and Immunology research intensive PhD/MS graduate program. He is a molecular virologist with research interests in HIV-1 genetic variation in disease progression, the role of viral accessory proteins in pathogenesis, gene-editing strategies for HIV cure research, and HIV/HBV coinfection in cancer.



**Yizhou Dong, PhD**

Icahn School of Medicine at Mount Sinai

Dr. Yizhou Dong is a Professor at the Icahn School of Medicine at Mount Sinai. His research focuses on the design and development of biotechnology platforms for the treatment of genetic disorders, infectious diseases, and cancers. Dr. Dong has authored over one hundred papers and patents. Several of his inventions have been licensed and are currently under development as drug candidates for clinical trials. He serves as a scientific advisory board member for Oncorus Inc, Arbor Biotechnologies, and FL85. Dr. Dong is elected as a fellow of the American Institute for Medical and Biological Engineering (AIMBE).



**Evan Scott, PhD**

Northwestern University

Dr. Scott is the Kay Davis Associate Professor of Biomedical Engineering & Microbiology-Immunology within the Northwestern University's McCormick School of Engineering and Feinberg School of Medicine. He received his Ph.D. from Washington University in Biomedical Engineering. As a Whitaker International Scholar, he spent four years in Switzerland at the EPFL performing postdoctoral research, where he developed nanoparticle-based vaccines against cancer and infectious disease. Dr. Scott is a recipient of the NIH Director's New Innovator Award, the National Science Foundation CAREER Award, and the BMES Mid-Career Award.

## Our Speakers



**John Maris, MD**

Children's Hospital of Philadelphia

Dr. John Maris is Giulio D'Angio Professor of Pediatrics in the Perelman School of Medicine at the University of Pennsylvania and the Children's Hospital of Philadelphia. He is a physician-scientist who has focused on the childhood cancer neuroblastoma with the dual goals of improving patient outcomes and using the disease as a model to understand cancer in general. His group has discovered all the known neuroblastoma susceptibility genes and identified many of the oncogenic drivers of the disease. Dr. Maris has steadfastly sought to translate these discoveries to the clinic using precision medicine.



**Pierluigi Porcu, PhD**

Thomas Jefferson University

Dr. Pierluigi Porcu is a Physician Scientist focused on T/NK-cell lymphomas and EBV-associated lymphomas. His goal is to offer patients a roadmap to understand their illness, find the determination to fight, select the best treatment and move forward with confidence. Dr. Porcu's overarching principle is patient empowerment based on knowledge. The more people know, the more prepared they are to face adversities. Knowledge guides expectations and grounds hope in facts. Great cancer care is based on compassion and research.



**Gabriele Romano, PhD**

Drexel University

Dr. Romano's lab research framework is at the crossroads of Cancer Modeling and Experimental Therapeutics, aiming to create a bench-to-bedside platform to counteract cancer drug resistance. This approach uses a unique synergy of immunocompetent mouse models, bioinformatics, and functional genomics, to uncover mechanisms "missed" by standard-of-care treatments and propose rational-based synergistic strategies. His approach is intrinsically multi-disciplinary and non-compartmentalized, as his career goal is to tackle long-standing clinical issues with complex models representing the real nature of the problem.

## Our Speakers



**Xiao Huang, PhD**  
Drexel University

Dr. Xiao Huang is an incoming Assistant Professor at Drexel University. He received his PhD degree in Chemistry and Materials at UC Santa Barbara and conducted his postdoctoral research at UC San Francisco. One highlight from his work is the development of robust chemistry to surface-functionalize biocompatible materials with exquisite precision for applications in immune modulation. He has published first-authored papers in *Nat. Nanotechnol.*, *Adv. Mater.*, *ACS Nano*, *Biomaterials*, *Nano letters*, etc., is a co-inventor on 2 pending patents and has received fellowships from UCSF-PB-BR, Li Foundation, and CIRM.



**Klaudia Kuranda, PhD**  
Spark Therapeutics

Dr. Klaudia Kuranda is the Head of Immunology at Spark Therapeutics, part of the Roche Group, an industry leader in gene therapy. Dr. Kuranda has been building the immunology capabilities at Spark from the ground up since March 2018 and today she leads immunogenicity risk assessment for programs spanning Liver, CNS and Ocular therapeutic areas. Additionally, Dr. Kuranda develops strategies to modulate vector immunogenicity using preclinical models and designs novel gene therapy approaches for immune-related disease.



**Eric Kmiec, PhD**  
Gene Editing Institute

Dr. Eric B. Kmiec is the Founder and Executive Director of the Gene Editing Institute (GEI) at ChristianaCare in Newark Delaware. He is widely recognized for his pioneering work in the fields of molecular medicine and gene editing having discovered many of the molecular activities that regulate the efficiency of human gene editing. His research and clinical teams are now focused on developing CRISPR-based gene editing approaches for solid tumors with squamous cell carcinoma of the lung and esophageal cancer as the lead protocols currently advancing through the FDA approval process.

## Our Speakers



**Jessica Weaver, PhD**  
Arizona State University

Dr. Jessica Weaver is an Assistant Professor of Biomedical Engineering in the School of Biological and Health Systems Engineering at Arizona State University and her research centers on developing translatable cell-based therapies for the treatment of disease. The Weaver lab uses biomaterials and immune engineering approaches with the aim to generate immunosuppression-free transplantation strategies. Dr. Weaver obtained her PhD in Biomedical Engineering at the University of Miami prior to completing a postdoctoral fellowship at the Georgia Institute of Technology.



**Taku Kambayashi, MD, PhD**  
University of Pennsylvania

Dr. Taku Kambayashi is an Associate Professor of Pathology and Lab Medicine at the University of Pennsylvania. He is currently the Chair of the Immunology Graduate Group and the Director of the Physician Scientist Training Program for Pathology Residency. Research in his lab focuses on signal transduction in immune cells and novel immunomodulation strategies.



**Peter Deak, PhD**  
Drexel University

Dr. Peter Deak is an Assistant Professor of Chemical and Biological Engineering at Drexel who joined the department in August 2022. His unique training combines chemistry and immunology with engineering fundamentals. His research focuses on using as minor as possible chemical modulation of innate immune cells to facilitate antigen specific tolerance. The Deak group designs nano-formulations to modulate innate immune cells as potential therapeutics for autoimmune diseases and transplantation rejection. The Deak group also works on diagnostics for autoinflammatory diseases and targeted adjuvants to generate antigen specific immunity of chronic viral infections (Hepatitis, HIV, etc.)

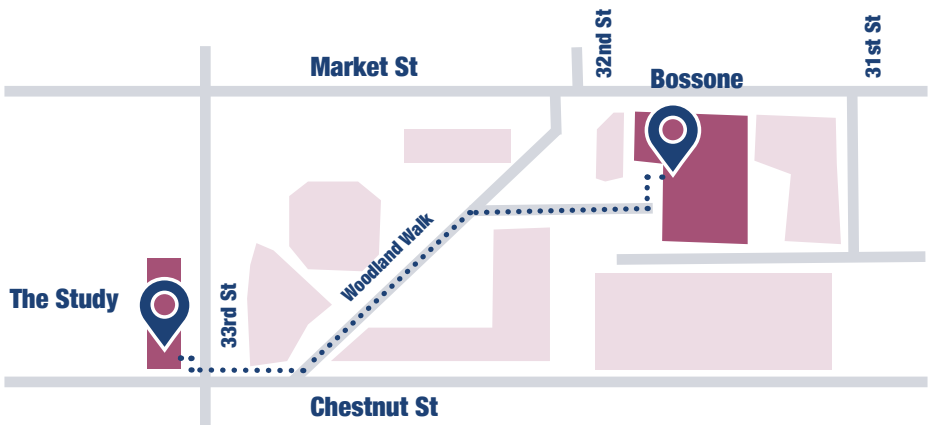
# Thank You

If you have any questions, please get in touch with us.



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## Our Office

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