NanoFlorida 2020
Hosted Virtually by the Dr. John T. Macdonald Biomedical Nanotechnology Institute of the University of Miami (BioNIUM)

September 25th, 2020
12:00 – 5:00 PM EDT

Conference Program
Conference Access

All Times are in Eastern Daylight Time (Miami)

Webinar access link. Please use this link to access most of the webinar, including the keynote and plenary talks, shark tank competition, and award ceremony.

Poster Q&A Session Access:

During our poster session from 2:45 PM – 3:45 PM, we will have two question and answer sessions with the poster presenters. Please see page 9 for more details.

Please use this access link to attend the Materials, Devices, and Enabling Technologies Q&A from 2:45 – 3:15 PM.

Please use this access link to attend the Biomedical and Biotechnology Q&A from 2:45 – 3:15 PM.

Please use this access link to attend the Environmental, Agricultural, and Energy Q&A from 3:15 – 3:45 PM.

Please use this access link to attend the Pharmaceutical Q&A from 3:15 – 3:45 PM.
Welcome to NanoFlorida 2020!

The NanoFlorida 2020 Organizers and Organizing Committee would like to welcome you to this year’s conference. NanoFlorida was established in 2007 as an annual get together of scientists, students, and faculty from a consortium of universities and colleges around the State of Florida with the goal of enhancing the stature of nanoscience and nanotechnology in the Sunshine State. This is a student organized and run conference, whose location rotates amongst the consortium member institutions. The University of Miami’s Dr. JT Macdonald Foundation Biomedical Nanotechnology Institute, BioNIUM, serves as the host in 2020, and Umer Bakali, Jessi Hersh, and Michael Moraskie, three dedicated PhD students, are the organizers.

NanoFlorida has emerged as an effective vehicle to showcase the latest discoveries, promote exchange of ideas, discuss scholarly educational programs, foster collaborations, partnerships, and interactions amongst academic, industrial, and governmental scientists. The success of NanoFlorida and the strong partnership forged by the member institutions led in 2019 to the incorporation of the consortium as a non-profit organization, the Florida Nanotechnology Association or FAN, which serves as the professional society for our State’s nanotechnology community. While FAN has a seminar series and programs to enhance interactions among its members, the most important event that FAN sponsors is NanoFlorida.

The COVID-19 global pandemic brought unprecedented challenges that were not imaginable, deeply impacting our Florida community. The nanotechnology community has played a major role in helping combat the pandemic by elucidating the mechanism of viral transmission, developing new nanotech-inspired diagnostic tests, drugs, and vaccines, and engineering masks and personal protection equipment. Celebrating nanoscience and nanotechnology made sense more than ever!

Jessi, Michael, and Umer, organizers of NanoFlorida, with advice from the organization committee composed of the leadership of BioNIUM and the FAN Executive Committee, rose to the challenge to organize a virtual conference. We are happy to report that we have a record number of participants (>450). Moreover, we have implemented exciting research and Shark Tank competitions in the program to promote innovation and entrepreneurship amongst the next generation of scientists and engineers. The program also features two lectures by international leaders in nanotechnology, namely Dr. Paul Weiss, UC Presidential Chair at UCLA, and Dr. Thomas Webster, the Art Zafiropoulo Chair at Northeastern University.

The BioNIUM leadership would like to thank Michael, Umer and Jessi for all the enthusiasm and hard work that they invested in making NanoFlorida 2020 a reality. Credit also goes to Dr. Shyam Mohapatra, the FAN Executive Committee, faculty and staff from all participating institutions who have supported and guided student participants. We also want to thank the University of Miami’s Miller School of Medicine Department of Biochemistry and Molecular Biology, and BioNIUM’s staff for helping in organizing the conference. Special thanks to our sponsors as well.

Please, join us in celebrating nanoscience and nanotechnology at a time when our diverse community of scientist and engineers have demonstrated their commitment to help others with their creativity, relentless work, and humanity. It is only when we are united, working in teams focused on a common goal that we can win the battle against the SARS-CoV-2 virus!

Thank you for attending and we hope that you enjoy NanoFlorida 2020!

Sincerely,

Sylvia Daunert, PharmD, MS, PhD
Professor and Lucille P. Markey Chair
Director, Dr. JT Macdonald Foundation Biomedical Nanotechnology Institute
Department of Biochemistry and Molecular Biology
Miller School of Medicine
University of Miami
Welcome to the NanoFlorida 2020 International Conference!

Welcome to the NanoFlorida 2020 International Conference! On behalf of the Florida Association for Nanotechnology (FAN), we welcome you to this year’s conference. Each year, universities and colleges around the state of Florida rotate their efforts in hosting the annual NanoFlorida Conference. For the past twelve years, a consortium of Florida universities organized the annual conference that addressed critical needs of research students and faculty within the state of Florida. Most importantly, NanoFlorida conferences provide a forum for academic and industrial researchers to share their recent discoveries, exchange new ideas, and develop professional relationships that strengthen the state’s nanotechnology research community.

The Steering Committee decided to officially incorporate as a non-profit, the Florida Association for Nanotechnology, to expand the education and training of the next generation in nanotechnology. It also established an International Academy of Nanotechnology and decided to hold the 13th annual meeting as the NanoFlorida International Conference (NIC) virtually hosted by the University of Miami, in Miami, Florida, on September 25th, 2020 from 12:00 – 5:00 pm.

In addition to research presentations, the conference will provide new opportunities for students to network with researchers from Florida’s leading academic institutions and the broader nanobiotechnology industry.

On behalf of the Florida Association of Nanotechnology, I would like to thank the Steering Committee, Local Support Committee and numerous faculty and staff members from all participating institutions who have worked tremendously hard to make this conference a reality. We also want to thank the University of Miami and their staff for serving as the host of this year’s event.

Please take this opportunity to network and collaborate with other researchers in the field, which will ultimately aid in the development of a new generation of nanoscientists. Be sure to share the #NanoFlorida2020 experience on our social media!

Thank you for attending and we hope you enjoy NanoFlorida 2020!

Sincerely,

Shyam S. Mohapatra, PhD
President, FAN
Conference Organizers

Michael P. Moraskie Alvarez-Tabío, is a Ph.D. student in the Biochemistry and Molecular Biology department at the University of Miami. He earned a B.S. in Biology with a minor in English Literature from Haverford College in 2016. His research interests focus on the microbiome, specifically on developing biosensors for the study of quorum sensing molecules as biomarkers of disease.

Umer Bakali is a Ph.D. student in the Department of Biochemistry and Molecular Biology at the University of Miami. He earned his B.S. in Biochemistry and Molecular Biology from the University of Miami in 2018, with a minor in Philosophy. His research interests are centered on chromatographic and spectrometric analyses of physiologically relevant compounds, including carcinogens and biomarkers of infection. He assists in evaluating hazardous occupational and environmental exposures sustained by firefighters.

Jessica Hersh is a Ph.D. student in the Department of Biochemistry and Molecular Biology at the University of Miami. She earned her B.S. in Materials Science and Engineering with a minor in Biomedical Engineering from Cornell University in 2019. Her research interests are centered on nanomedicine and targeted delivery of therapeutic cargo. Her current research involves developing cationic polymers for gene delivery applications.
Conference Organizers

Sylvia Daunert, PharmD, MS, PhD, Excma. Dra. is the Lucille P. Markey Chair of Biochemistry and Molecular Biology at the University of Miami Miller School of Medicine. She is the Director of the JT Macdonald Foundation Biomedical Nanotechnology Institute of the University of Miami (BioNIUM).

Sapna Deo, PhD, is a Professor and the Graduate Program Director of the Department of Biochemistry and Molecular Biology at the University of Miami Miller School of Medicine. She also serves as the Educational Initiatives Director of BioNIUM.

Marc R. Knecht, PhD, is a Professor of Chemistry at the University of Miami and Associate Director of BioNIUM.

Sung Jin Kim, PhD, is an Associate Professor of Electrical and Computer Engineering with a joint appointment in the Department of Biochemistry and Molecular Biology. He is also the Director of BioNIUM NanoFabrication Facility.

Ashutosh Agarwal, PhD, is an Associate Professor of Biomedical Engineering at the University of Miami. He is also an Associate Director of BioNIUM.

Courtney Dumont, PhD, is an Assistant Professor of Biomedical Engineering and holds a secondary appointment in the Department of Biochemistry and Molecular Biology at the University of Miami.
NanoFlorida 2020 Sponsors

UNIVERSITY OF MIAMI

CLINICAL & TRANSLATIONAL SCIENCE INSTITUTE

Miami CTSI Resources provided under NIH CTSA Grant # UL1TR000460

FROST INSTITUTE OF CHEMISTRY & MOLEULAR SCIENCE

NanoScience Technology Center

UCF

USF Health Taneja College of Pharmacy

UNIVERSITY OF MIAMI

THE DR. JOHN T. MACDONALD FOUNDATION BIOMEDICAL NANOTECHNOLOGY INSTITUTE BioNIUM
12:00 – 12:15 PM
Opening Remarks

**Sylvia Daunert, PharmD, MS, PhD**
Director, Dr. JT Macdonald Foundation Biomedical Nanotechnology Institute (BioNIUM)
Lucille P. Markey Chair, Biochemistry and Molecular Biology
University of Miami

**Shyam Mohapatra, PhD, MBA**
Founding President, Florida Association of Nanotechnology (FAN)
Distinguished Health Professor, University of South Florida

**Sylvia Daunert, PharmD, MS, PhD**

12:15 – 1:15 PM
Keynote Lecture

*Introduction by Shanta Dhar, PhD*

**Paul S. Weiss, PhD**
UC Presidential Chair, University of California, Los Angeles
Founding Editor and Editor-in-Chief, ACS Nano

1:15 – 2:45 PM
Shark Tank Competition

2:45 – 3:45 PM
Poster Session

3:45 – 4:30 PM
Plenary Lecture

*Introduction by Courtney Dumont, PhD*

**Thomas J. Webster, PhD**
Art Zafiropoulo Chair in Engineering
Professor of Chemical Engineering, Northeastern University
Editor-in-Chief, International Journal of Nanomedicine

4:30 – 5:00 PM
Awards and Closing Remarks

**Marc R. Knecht, PhD**
Professor of Chemistry, University of Miami
Associate Director, BioNIUM

**Ashutosh Agarwal, PhD**
Associate Professor of Biomedical Engineering, University of Miami
Associate Director, BioNIUM

Announcing NanoFlorida 2021

**Jack Judy, PhD**
Director, Nanoscience Institute for Medical and Engineering Technology (NIMET)
University of Florida
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Nanotechnology Approaches to Biology and Medicine

By controlling the exposed chemical functionality of materials from the submolecular through the centimeter scale, we have enabled new capabilities in biology, medicine, and other areas. I will discuss current and upcoming advances and will pose the challenges that lie ahead in creating, developing, and applying new tools using this capability. These advances include using biomolecular recognition in sensor arrays to probe dynamic chemistry in the brain and microbiome systems. In other areas, we introduce biomolecular payloads into cells for gene editing at high throughput for off-the-shelf solutions targeting hemoglobinopathies, immune diseases, and cancers.

We circumvent the need for viral transfection and electroporation, both of which have significant disadvantages in safety, throughput, cell viability, and cost. Mechanical deformation can make cell membranes transiently porous and enable gene-editing payloads to enter cells. These methods use specific chemical functionalization and control of surface contact and adhesion in microfluidic channels.

Paul S. Weiss graduated from MIT with S.B. and S.M. degrees in chemistry in 1980 and from the University of California at Berkeley with a Ph.D. in chemistry in 1986. He is a nanoscientist and holds a UC Presidential Chair and a distinguished professor of chemistry & biochemistry, bioengineering, and materials science & engineering at UCLA, where he was previously director of the California NanoSystems Institute. He also currently holds visiting appointments at Harvard’s Wyss Institute and several universities in Australia, China, and South Korea. He studies the ultimate limits of miniaturization, developing and applying new tools and methods for atomic-resolution and spectroscopic imaging and patterning of chemical functionality. He and his group apply these advances in other areas including neuroscience, microbiome studies, and high-throughput gene editing. He led, coauthored, and published the technology roadmaps for the BRAIN Initiative and the U.S. Microbiome Initiative. He has won a number of awards in science, engineering, teaching, publishing, and communications. He is a fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Science, the American Chemical Society, the American Institute for Medical and Biological Engineering, the American Physical Society, the American Vacuum Society, the Canadian Academy of Engineering, the Materials Research Society, and an honorary fellow of the Chinese Chemical Society and Chemical Research Society of India. He is the founding and current editor-in-chief of ACS Nano.
Green Nanomedicine, Implantable Sensors, and Oh Yes, Don’t Forget, Nanotechnology for COVID-19

COVID-19 has highlighted numerous failures in our global healthcare system, from a system focussed on centralized hospitals to a lack of platform technologies to treat viral outbreaks. This presentation will highlight new materials being developed to aid in COVID-19 prevention, detection, and therapy. Rather than waiting for a year or longer for vaccine development, this presentation will highlight how nanomaterials can be a platform technology modified to treat every new virus that comes along. It will also highlight the use of at home sensors and diagnostic kits that make it easy for patients to determine if they have been exposed to viruses rather than going to a facility (i.e., hospital) in which their infection could spread. Further, it will introduce green nanomedicine, or environmentally friendly ways that nanomaterials can be made which outperform conventional chemical synthesis. Overall, this presentation will demonstrate how new materials will better prepare us for the next viral outbreak and begin to heal our current global healthcare system which has demonstrated significant failures during the COVID-19 pandemic.

Thomas J. Webster’s (H index: 95) degrees are in chemical engineering from the University of Pittsburgh (B.S., 1995) and in biomedical engineering from Rensselaer Polytechnic Institute (M.S., 1997; Ph.D., 2000). He currently serves as the Art Zafiropoulo Endowed Chair and Professor of Chemical Engineering at Northeastern University. Prof. Webster has graduated/supervised over 189 graduate students generating over 700 peer reviewed articles in his 20 year career. He has formed 12 companies who collectively have over 21 FDA approved medical products. Prof. Webster is a fellow of over 8 societies and was the past-president of the U.S. Society for Biomaterials.
For the NanoFlorida 2020 Conference, we are proud to introduce a new and exciting event: The Shark Tank Competition. Local and international students submitted abstracts for a potential nanoscience invention, describing how it would work and why they believe it can become a profitable venture. From this original pool of applicants, five finalists have been selected to pitch their nanoscience invention to a panel of experts in commercialization. Our panel of expert Shark Tank Judges will have the opportunity to engage with our finalists and ask them for more information about their product.

Who will convince the judges to invest in their product and win the Shark Tank Competition? Join us from 1:15 PM - 2:45 PM to find out!

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<td>Emmanuel Okogbue</td>
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Shark Tank – Judges

Ruan Cox, PhD, is an Industry Alliances Development Manager at the Office of Innovation and Industry Alliances (“Innovation Office”) at the University of South Florida. He is responsible for assisting in the conceptualization, development and negotiation of collaborations with industry partners interested in sponsoring research at Moffitt Cancer Center. Ruan earned a BS from the University of Florida and Ph.D. in Molecular Medicine from the University of South Florida’s Morsani College of Medicine with a focus in Immunology. While earning his Ph.D. Ruan received prestigious fellowships from the American Heart Association, Florida Education Fund and Alfred P. Sloan Foundation. He has also received numerous awards for his presentations at the American Thoracic Society; World Allergy Congress; Federation of American Societies for Experimental Biology and American Academy for Allergy Asthma and Immunology. Ruan currently serves on boards for the Tampa Bay Economic Development Commission, American Thoracic Society and the University of Florida Alumni Association.

Jeff Hersh, PhD, MD, is the Chief Medical Officer of GE HealthCare. He is an Advisory Board Member and Program Mentor for the Entrepreneurship for Biomedicine Program at the University of Washington St. Louis. This program is a free, online, NIH-funded training program for biomedical researchers to help develop entrepreneurial thinking. Jeff has consulted for many startups and venture capitalists. Jeff has extensive clinical trial experience, including being the PI of dozens of studies, has been awarded an NIH grant, and has published well over 100 articles, written several book chapters and delivered hundreds of invited lectures. Jeff holds a medical degree from the University of Miami Leonard M. Miller School of Medicine and has numerous other degrees including a PhD in Theoretical Physics from Yale University and a MS in Electrical Engineering from George Washington University. Jeff has extensive academic credentials having held faculty positions at Yale, Dartmouth, Cornell, Tufts, the University of Massachusetts, and Harvard, amongst others.
Jennifer McKinley, MS is a part of the team at the University of Central Florida’s Office of Technology Transfer. Prior to joining UCF, Jennifer worked at Lucent Technologies in the analytical and diagnostic labs, supporting the semiconductor manufacturing line and Bell Labs researchers. She then went on to co-found NanoSpective, a company focused on nanoscale materials characterization primarily to provide scientific evidence for intellectual property assertion. Following that, Jennifer co-founded another company, IRRadiance Glass, a research and product development company for infrared optical materials. Jennifer has degrees in Chemistry and Materials Science & Engineering from UCF and carried out her graduate research within UCF’s College of Optics and Photonics.

Suhrud Rajguru, Ph.D., is an Associate Professor of Biomedical Engineering and Otolaryngology at the University of Miami and a co-founder and Chief Scientific Officer of Restor-Ear Devices, LLC. He completed his undergraduate studies in Mumbai, India prior to pursuing doctoral studies at the University of Utah. Dr. Rajguru’s research foci are on the investigations of pathophysiology, the diagnosis and treatment of various hearing and balance disorders. An educator, scientist and entrepreneur, he is an author of numerous peer-reviewed publications and is a named inventor on several issued and pending patent applications. His research is supported by the National Institutes of Health and industry partners and he is actively involved in the education and mentoring of undergraduate and graduate students.
Shark Tank - Finalists

NanoAd Antibacterial Composite
Claudia Alarcón López, Tecnológico de Monterrey

BioBandages Angiogenesis
Brandon Applewhite, University of Miami
Lipid Droplet Microarray Technology (LiMiT)
Tracey Bell, Florida State University

Mechanically Flexible Electro-thermal Smart Windows
Emmanuel Okogbue, University of Central Florida
An RNA-based Lateral Flow Assay for the Detection of Pathogenic Bacteria

Sabrina Petrucci, University of Miami
This year, students from across the state of Florida and beyond have recorded their poster presentations for your viewing pleasure. We have compiled these videos into convenient playlists, which you can access by clicking on the category buttons below. If you’d like to search for a specific presentation, please refer to the tables in the following pages.

If you have any questions for our student presenters, they will be available in dedicated Q&A meetings during the poster session break. Please refer to the table below for the times and links to these meetings. You can also leave them a question in the comments section of their video.

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Publication Opportunity

Message from the Guest Editors
This Special Issue of *Applied Sciences* will be devoted to bringing together the latest advances in various fields of applied nanoscience and nanotechnology in one compendium. The articles submitted in response to this Special Issue may comprise reviews of advances in a field, research articles and 1-2 page research reports.

A Special Issue coincides with the 2020 NanoFlorida International Conference, to be held September 25, 2020, which provides leading scientists with a venue to present the latest research in the field and discuss new directions and collaborations. Topics for NanoFlorida symposia evolve with developments in the fields of nanoscience and engineering, and parallel symposia will be organized to address scientific advances in nanobiotechnology, biosensing, microfluidics, nanodiagnostics, gene and cell technology, nanoscale drug delivery, organ-on-a-chip, nanomaterials, and other cutting-edge areas of research, which can be part of this Special Issue.

Looking forward to your contributions,

Prof. Shyam (Sam) S. Mohapatra  
President, FAN  
*Guest Editor*  
Center for Research and Education in NanoBioengineering  
Department of Internal Medicine  
Morsani College of Medicine  
Taneja College of Pharmacy Graduate Programs  
College of Pharmacy: University of South Florida

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PharmD, MS, PhD  
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*Co-Guest Editor*  
Professor and Lucille P. Markey Chair  
Dept. of Biochemistry and Molecular Biology  
Miller School of Medicine  
Director, BioNIUM  
University of Miami

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NanoFlorida 2020,  
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Associate Professor  
Department of Biomedical Engineering  
Associate Director, BioNIUM  
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NanoFlorida 2020,  
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Department of Chemistry  
Associate Director, BioNIUM  
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- Pilot Awards
- Research Data Management Tools
- Regulatory Consultations
- Community Engagement
- Integrating Special Populations in Research
- Tools for Data Exploration
- Consultations on Multi-Site Clinical Trials

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Applications for the Spring 2021 semester are being accepted. Important deadlines for Spring entry are October 1, 2020 for international applicants and November 1, 2020 for domestic applicants. The MSCTI is covered under the University’s tuition remission benefits! For more information on Graduate Tuition Remission click here.

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- **Reitz Student Union (Conference Center)**

- **Organizers:** Nanoscience and Nanotechnology Student Council

- **Location:** Reitz Union Conference Center (+ Virtual Elements)

- **Tours:** Fabrication & Characterization