NCCAVS - TFUG/PAG Joint Virtual Meeting

Plasma and Thin Film technology helping in the fight against COVID-19

Thursday, September 24, 2020
Time: 2:00 p.m. - 4:00 p.m. (PDT)

Northern California Chapter of the AVS Thin Film Users Group (TFUG) and Plasma Applications Group (PAG) joint virtual meeting on Biomedical Applications involving **Plasma and Thin Film technology helping in the fight against COVID-19**.

AGENDA:

2:00 pm: Intro and Welcome

2:05 pm: Point-of-Care Molecular Detection for Pathogen Testing
Nader Pourmand PhD, *Professor of Biomolecular Engineering, University of California Santa Cruz*

2:35 pm: Cellular Nanosponges for the Treatment of Viral Infection
Liangfang Zhang PhD, *Professor of Nanoengineering, Bioengineering, and Chemical Engineering, University of California San Diego*

3:05 pm: Plasma decontamination of surfaces
Daphne Pappas PhD, *Manager, Applications / R&D Plasmatreat USA, Inc.*

ABSTRACTS AND BIOS:

Point-of-Care Molecular Detection for Pathogen Testing, Nader Pourmand, PhD

Abstract: Any pandemic poses critical challenges to clinical testing, demanding real-time results with high level of accuracy and portability of electronic detection and readouts. With their high selectivity, sensitivity and rapid response, nanotechnology-based tools hold great promise for biochemical sensing and microbial detection. During my talk I will compare the shortcomings of current immunoassays and available techniques for microbial detection with the capabilities of nanotechnology. I'll share present results showing the rapid and reversible response of our nanosensors to various analytes, including Covid-19 antigen. If time permits, I will explain our strategy for proteomics technology based on our nanotechnology platform to simultaneously analyze multiple analytes, including antigens, antibodies, proteins and other small molecules.

Bio: Nader Pourmand, PhD, is Professor of Biomolecular Engineering at the Baskin School of Engineering at the University of California at Santa Cruz and Pinpoint's Chief Scientist. The Pourmand lab is focused on developing biological and electrical technologies that aid in the study of genes and proteins. Pourmand's lab has generated over 20 issued patents with several pending. He has been published in more than 90 scientific journals,. Dr. Pourmand received his PhD at the Karolinska Institute, Stockholm, Sweden. During his time at Stanford, his lab developed the science underlying Ion Torrent, a benchtop next-gen sequencing system (acquired by Life Technologies, then by Thermo-Fischer). Dr. Pourmand has been a cofounder of innovative startups, including Pinpoint Science, BioStinger, MagArray, Xagros Technologies, and contributed to others including HiPic, Nvigen, Ion Torrent, Bioprobix, and Pathogenix. Dr. Pourmand's research falls into interrelated areas at the interface of bioelectronics and DNA sequencing to advance studies in the field of nanogenomics.

He has developed innovative technology based on functionalized nanopipettes, which can be used to study genomics and proteomics of individual living cells at nanoscale. This nanopipette technology was recently described in Nature Nanotechnology as a major advance in Single Cell Genomics and was recognized by the NIH as 2017 First Prize winner of the NIH's "Follow that Cell Challenge" for the development of this technology for interrogating single living cells. This same nanopipette technology is the basis for Pinpoint's rapid, handheld diagnostic platform for detecting microbial pathogens.

Cellular Nanosponges for the Treatment of Viral Infection

Liangfang Zhang, PhD

Abstract: The global incidence of infections caused by bacteria and viruses has been increasing, which imposes a major threat to public health given the high morbidity and mortality rates associated with these diseases. Nanoparticle technology has enabled a wide array of improvements in the treatment of infectious diseases, ranging from improved efficacy in drug delivery to enhanced immunogenicity of vaccines. Among the different bio-inspired nanotechnology strategies, utilization of cellular membrane material for nanoparticle preparation presents a unique top-down approach that offers the advantage of being able to completely replicate the surface antigens and functions of source cells. Herein, I discuss the biological functionalization of polymeric nanoparticles with a layer of membrane coating derived from natural cells. Specifically, I will focus on the use of these cell-mimicking nanoparticles for the treatment of viral infections including SARS-CoV-2 infection.

Bio: Dr. Liangfang Zhang is Professor of Nanoengineering and Bioengineering and Director of Chemical Engineering Program at the University of California San Diego. Dr. Zhang received his B.E. and M.S. degrees in Chemical Engineering from Tsinghua University, and his Ph.D. in Chemical & Biomolecular Engineering from the University of Illinois at Urbana-

Champaign in 2006 under the supervision of Prof. Steve Granick. He was a postdoctoral associate in the laboratory of Prof. Robert Langer at MIT during 2006-2008. He joined the Department of Nanoengineering at UC San Diego as an Assistant Professor in 2008 and was promoted to Professor in 2014. Dr. Zhang has made seminal contributions to the field of bioengineering and nanomedicine. He has published 219 peer-reviewed articles in highly regarded journals. In 2017, 2018 and 2019, he was among the Thompson Reuters list of “Highly Cited Researcher”. He is an inventor of 108 patents and patent applications worldwide. He has received numerous mainstream recognitions, including the Victor K. LaMer Award (2009) and Unilever Award (2012) from the American Chemical Society, MIT Technology Review’s TR35 Innovator Award (2013), Allan P. Colburn Award (2014) from the American Institute of Chemical Engineers, Popular Science’s Brilliant 10 Award (2016), U.S. Department of State ASPIRE Award (2017), and Kabiller Young Investigator Award (2017). Professionally, Dr. Zhang was recently elected to the College of Fellows of the American Institute for Medical and Biological Engineering (AIMBE) in 2015 and to the Fellows of the American Association for the Advancement of Science (AAAS) in 2018.

Plasma Decontamination of Surfaces

Daphne Pappas, PhD

Abstract: Plasma medicine is a new field of research that combines gas plasma chemistry and physics, biology and life science. In the past decade, extensive research has been conducted to understand the fundamentals of the interactions between plasmas and various microorganisms such as bacteria, fungi and viruses. Plasma application for the treatment of medical materials, devices and personal protective equipment (PPE) is an important subject of research and commercialization in the fight against pathogens. In this talk, the effect of plasma activated water and vapor produced under atmospheric pressure conditions on a variety of surfaces will be presented.

Bio: Dr. Daphne Pappas comes from a background in plasma technology and surface engineering. Since October of 2018, she holds the position of R&D and Applications Manager at Plasmatreat USA. Prior to joining Plasmatreat, Daphne worked in the semiconductor industry at Lam Research Corporation and for a start-up company. Aside from her experience in industry, Daphne conducted research for the DoD for 7 years and served as Adjunct Assistant Professor at the Department of Chemical and Biomolecular Engineering at Case Western Reserve University.
Daphne holds a Ph.D. in Chemical Engineering and a Masters degree in Materials Science. She is the author of more than 50 peer-reviewed journal articles and technical reports and is listed as co-inventor on 3 US patents. Her research interests involve plasma-enhanced chemical vapor deposition (PECVD) of thin films using atmospheric and low pressure plasmas, surface characterization techniques and study of plasma-surface interactions.
She currently serves as Chair of the Plasma Applications group of the Northern California Chapter of the American Vacuum Society.

Meeting Co-hairs

Daphne Pappas
Plasmatreat USA, Inc.

Duane Bingaman
Kurt J. Lesker Company

Jacques Matteau
Protech Materials

Michael Oye, moye@ucsc.edu
University of California Santa Cruz

Paul Werbaneth
Ichor Systems

Zoran Misetic
Kurt J. Lesker Company