Society for Analytical Chemists of Pittsburgh
Spectroscopy Society of Pittsburgh

January Meeting

Wednesday, January 8, 2020

5:30 PM Social Hour – Shepperson Suite
5:30 - 6:00 PM SSP Technology Forum – Power Center Ballroom
6:30 PM Dinner – Power Center Ballroom
Student Affiliate Meeting – Shepperson Suite
7:15 PM Business Meeting – Power Center Ballroom
7:45 PM Technical Program – Power Center Ballroom

Deadline for Dinner Reservations: Thursday, January 2, 2020 before Noon

SSP TECHNOLOGY FORUM

Ryan O'Shea, Founder & Host of Future Grind
"Sensing the Future – Combining Wearables, AI, & IoT"

Decreasing size, increasing capabilities, and diminishing costs mean that sensors are becoming ubiquitous. They are in our homes, cars, offices, electronics, and even on and sometimes in our bodies. All of these sensors are generating data, and this data needs to be analyzed to identify valuable information and actionable insights. The sheer amount of data, however, makes this a daunting and often impossible task for humans. At a certain scale, the best method of making sense of this data is leveraging the capabilities of machine learning. Because of this, the futures of sensors, Internet of Things devices, and artificial intelligence are largely interconnected and interrelated - the future success of one is largely dependent on the future success of the others.

This high-level, largely non-technical presentation will provide an overview on how sensors are being used today, their relationship with Internet of Things (IoT) devices, and how machine learning and artificial intelligence are being used to analyze the data they generate. We'll also explore the future applications and implications of these sensors, as well as the rise of smart watches, smart clothing, smart tattoos, and implantable devices. Beyond this, we'll identify and discuss some of the ethical, societal, and regulatory concerns around issues of data privacy and security, bodily autonomy, "medicine", citizen science, and more.

BIOGRAPHY

Ryan O'Shea is an entrepreneur and futurist speaker from Pittsburgh, Pennsylvania. He is the host of Future Grind, a podcast and video series that explores the ethics and implications of emerging science and technology. Ryan currently serves as the spokesperson for Grindhouse Wetware, a group specializing in technology to augment human capabilities. Ryan is also a founder of the Human Augmentation Institute, an organization focused on upholding bodily autonomy and ensuring that any efforts in human augmentation are done ethically, safely, and responsibly. In 2017, Ryan co-founded the artificial intelligence startup Behaivior, which uses machine learning and automated just-in-time intervention to solve the problem of addiction. Behaivior has been named a Top 10 team in the $5 Million IBM Watson AI XPRIZE, and has received funding from the National Institutes of Health (NIH), the National Science Foundation (NSF), and others. Ryan's thought leadership on the topic of futurism has lead to his inclusion in multiple national and international documentaries, television programs, books, and magazines, and he has produced and given talks on the topic of emerging science and technology at conferences around the world including VivaTech in Paris, France, MakerFaire Rome in Rome, Italy, DEF CON in Las Vegas, Nevada, the Medical Entrepreneur Startup Hospital in Berlin, Germany, the Community Bio Summit at MIT Media Lab in Boston,

Massachusetts, and many more. Ryan has represented NASA and CalTech's Jet Propulsion Laboratory as a Solar System Ambassador, and serves both as a World Economic Forum Global Shaper and an ambassador for Pittsburgh AI. He is a graduate of the University of Pittsburgh and currently sits on the boards of numerous non-profits in Western Pennsylvania.

SACP TECHNICAL PROGRAM

Dr. Lisa Holland, Professor of Chemistry,
C. Eugene Bennett Department of Chemistry, West Virginia University
"Designer Separations with Smart Nanomaterials"

Capillary electrophoresis separations play an important role in challenging bioanalyses. With new materials and strategies, this separation technique is prominent in next generation therapeutics and in shedding light on physiological systems. This presentation will reveal the role of biocompatible nanomaterials and instrumental advances to leverage the high efficiency and throughput of capillary separations. Advances in this technology overcome barriers to universally analyzing proteins, which are among the most diverse class of physiologically relevant biomolecules. In particular, protein isoforms and post-translational modifications will be addressed. A rapid, inexpensive, and automated method is demonstrated to successfully quantify modifications with N-glycans (e.g. fucosylation, sialylation, branching, and bisection), which are a result of both normal and aberrant physiological processes. With this advance subtle differences in proteins can be distinguished. The separation is facilitated with self-assembled nanogels in a capillary that also contains stationary zones of lectins and/or enzymes. The nanogel electrophoresis generates separation efficiencies of 500,000 plates and easily resolves positional isomers. Because this technology is biocompatible, native analyses are also feasible. The nanomaterial additives used for these separations have a thermally dependent viscosity, which provides a means to precisely control and position specific zones of enzymes and lectins within the capillary to both process and separate proteins in nanoliter volumes in an automated instrument. The nanogel supports successive reaction in a channel (i.e. in series) because the viscosity of nanophases minimizes dispersion. Each molecular affinity step of the analysis utilizes a small (~5 nL) re in the channel. Nanogel preparations are inexpensive, costing $0.09 for 5 μL. The structural features of proteins are identified and quantified without the need for standards. Moreover, the nanophases are compatible with UV absorbance, fluorescence, and mass spectrometry detection. Cost-effective and rapid monitoring of glycosylation is critical to ensuring the efficacy of protein-based antibody drugs and to elucidating the role of N-glycans in physiological processes.

BIOGRAPHY

Lisa Holland is a Professor of Chemistry at West Virginia University, specializing in microscale separations of biomolecules relevant to human health. She received her B.S. degree in chemistry from the University of Maryland at College Park. She received her Ph.D. in chemistry from the University of North Carolina at Chapel Hill under the direction of Professor James Jorgenson. Through a National Research Service Award, she held a postdoctoral fellowship under the direction of Professor Susan Lunte in the Department of Pharmaceutical Chemistry at the University of Kansas. Dr. Holland is the recipient of a National Science Foundation Faculty Early Career Development award and has served as the Chair of the American Chemical Society Subdivision of Chromatography and Separation Chemistry. She enjoys teaching instrumental analysis to undergraduate and graduate students and mentoring the many outstanding researchers who have engaged in science at WVU.

DINNER RESERVATIONS: Please complete the **Online Dinner Reservation Form** NO LATER THAN Thursday, January 2, 2020, before Noon. The form is also located under the Meeting Notice on websites www.sacp.org. & www.ssp-pgh.org. Should you not be able to access the form, please call 412-825-3220, ext. 200 the SACP & SSP Administrative Assistant to make your dinner reservation. The entrée choices for January are Meat Ravioli with Marinara Sauce or Cheese Ravioli with Marinara Sauce. Please let us know if you have any dietary restrictions. Dinner will cost $10 ($5 for undergraduate students). Checks can be made payable to the SACP.

PARKING: Duquesne University Parking Garage entrance is on Forbes Avenue. Upon entering the garage, you will need to get a parking ticket and drive to upper floors. Bring your parking ticket to the dinner or meeting for a validation ticket. Should any difficulties arise, please contact Duquesne University.