2021 Fall Chem 501 Seminar

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https://www.vanderbilt.edu/chemistry/faculty/mclean.php

Thursday – August 19, 2021
Lecture: 4:30pm, Buehler 555
Hosted by: Dr. Thanh Do

"High dimensional molecular phenomics in systems, synthetic, and chemical biology: Mapping your life and everything else"

One of the predominant challenges in systems-wide analyses and molecular phenomics is the broad-scale characterization of the molecular inventory in cells, tissues, and biological fluids. Advances in computational systems biology rely heavily on the experimental capacity to make omics measurements, i.e. integrated metabolomics, proteomics, lipidomics, glycomics, etc., accompanied with fast minimal sample preparation, fast measurements, high concentration dynamic range, low limits of detection, and high selectivity. This confluence of figures-of-merit place demanding challenges on analytical platforms for such analyses. Ion mobility-mass spectrometry (IM-MS) provides rapid (ms) gas-phase electrophoretic separations on the basis of molecular structure and is well suited for integration with rapid (us) mass spectrometry detection techniques. This report will describe recent advances in IM-MS integrated omics measurement strategies in the analyses of complex biological samples of interest in systems, synthetic, and chemical biology in clinical chemistry applications. New advances in bioinformatics and biostatistics will also be described to approach biological queries from an unbiased and untargeted perspective and to quickly mine the massive datasets gathered to provide targeted and actionable information.

John A. McLean is Stevenson Professor of Chemistry, Chair of the Department of Chemistry, Past Chair of the Faculty Senate, Director of the Center for Innovative Technologies, Deputy Director of the Institute for Integrative Biosystems Research and Education at Vanderbilt University. He received his Ph.D. from George Washington University, was a postdoctoral fellow at Forschungszentrum Jülich in Germany with Prof. Dr. Sabine Becker, and a postdoctoral at Texas A&M University with Prof. David H. Russell before joining the Vanderbilt Faculty as an assistant professor in 2006. McLean and colleagues focus on the conceptualization, design, and construction of structural mass spectrometers, specifically targeting complex samples in systems, synthetic, and chemical biology. His group applies these strategies to forefront translational research areas in drug discovery, precision medicine, and 'human-on-chip' synthetic biology platforms. He served on the board of directors for the American Society for Mass Spectrometry and serves in an editorial role on the boards of several leading scientific journals. He has been honored to work closely with the NAS and NSF in several roles, including recently co-authoring an NSF report on big data science in chemistry. He has received many professional and teaching awards including his laboratory being designated as a Waters Center of Innovation and an Agilent Thought Leader Laboratory for their work in ion mobility-mass spectrometry and translational biosciences. He has published over 150 manuscripts and 30 patents in the areas of innovative bioanalytical chemistry and quantitative sciences.