LIPIDOMICS ODYSSEY: CURRENT STATUS AND FUTURE HORIZONS. Lise Cougnaud, Reza Maulana, Ana Carolina Dos Santos, Elissa Mariani, Oluwatosin Kuteyi, **Dajana Vuckovic**, Concordia University, 7141 Sherbrooke Street West, Montréal, QC, Canada. (dajana.vuckovic@concordia.ca)

Liquid chromatography – mass spectrometry is currently the most powerful technique for metabolomics and lipidomics due to unprecedented molecular coverage provided by fast and highly sensitive modern mass spectrometers. However, high-quality large-scale lipidomics data sets are urgently needed, in order to provide more systematic understanding of lipid dynamics and successfully validate and translate new biomarkers into the clinic. Analytical chemistry and separation science have a critical role to play in this journey to truly harness the power of metabolomics/lipidomics. In this talk, I will discuss several challenges and advances in lipidomics of biological fluids and tissue. These include (i) sample integrity and ensuring the measured lipidome is reflective of the true lipidome at the time of sampling, (ii) measuring low abundance lipids and expanding coverage of lipidomics methods, (iii) moving towards microsampling and real-time at-home sample collection and (iv) increasing quality control and data quality. Specifically, I will focus on how in vivo solid-phase microextraction can be used for longitudinal sampling of tissues and/or biofluids including challenging analytes such as oxylipins. Finally, I will highlight key results from recent inter-laboratory studies and discuss how adduct formation and internal standard selection play critical role in accuracy and data harmonization across studies.