SURFACE-ENHANCED RAMAN SCATTERING (SERS) APPLICATIONS, QUANTIFICATION AND SINGLE MOLECULE SPECTROSCOPY. **Alexandre G. Brolo**, University of Victoria, Department of Chemistry, 3800 Finnerty Road, Victoria BC V8P 5C2, Canada. (agbrolo@uvic.ca)

Surface-enhanced Raman scattering (SERS) is a highly sensitive spectroscopy method [1]. In this presentation, we will discuss examples of application of SERS in biomedicine. These include the application of SERS in immunoassays to identify infectious diseases [2] and to identify metabolites from cancer cells subjected to radiotherapy. In certain conditions, the SERS efficiency cross section rival that of fluorescence emissions, allowing the observation of events assigned to single molecules. We will discuss strong fluctuations in SERS intensities that can be assigned from single molecules molecules adsorbed on single nanoparticles [3]. The super-localization of these fluctuations provide some insights into the nature of the nanoenvironment in a SERS system. Finally, we will discuss approaches for quantification in SERS at ultra-low concentrations. Particularly, we will review that factors that affect SERS quantification and demonstrate a digital approach that allow quantification of model environmental contaminants at very low levels [4].

[1] M. Fan, G.F.S, Andrade, AG Brolo, Anal. Chim. Acta, 693 (2011) 7-25
[2] A. T. Bido, A. Azarakhshi, A.G. Brolo, Anal. Chem., 94 (2022) 17031-17038
[3] N. C. Lindquist and A. G. Brolo, J. Phys. Chem., 125 (2021), 7523-7532
[4] C.D.L. de Albuquerque, R.G. Sobral-Filho, R.J. Poppi, A.G. Brolo, Anal. Chem., 90 (2018) 1248-1254