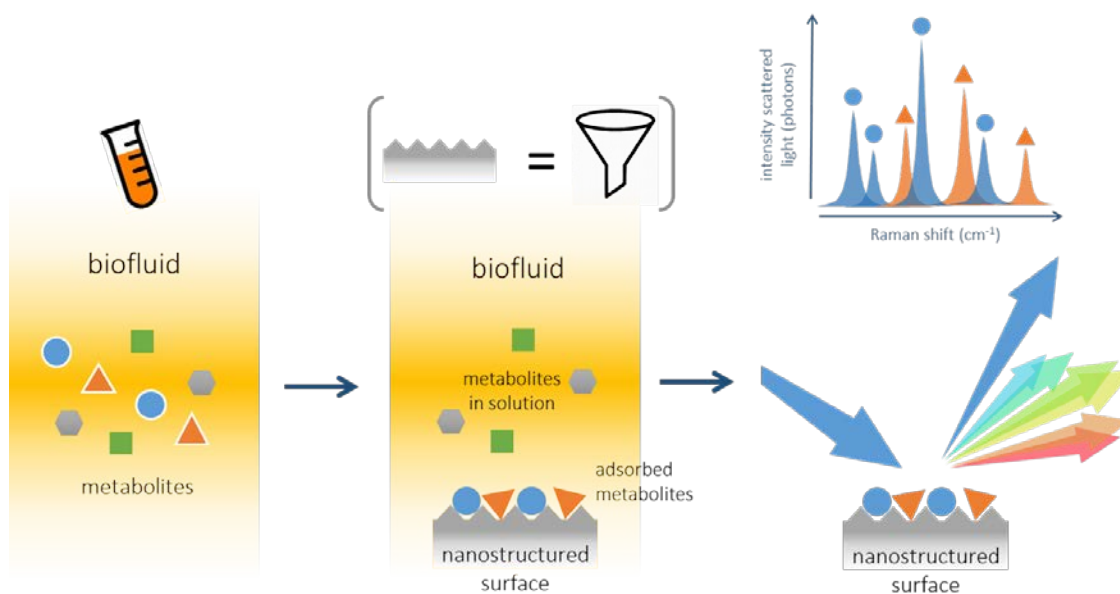


Label-free SERS and metabolomics

Alois Bonifacio

Università di Trieste, Dipartimento di Ingegneria e Architettura, Italy

Can a direct, label-free SERS detection be used for a metabolomic analysis? This contribution will address this question, starting with a discussion on the complex interplay between metallic plasmonic nanostructures and biochemically complex biofluids such as serum or plasma. It will be presented how SERS substrates act as “spectroscopic filters”, selecting a narrow subset of metabolites from thousands of metabolites present in a biofluid, and if the detected metabolites can be used for clinical (e.g. diagnostic or prognostic) purposes. Few case studies will be presented, in which different biofluids such as serum, plasma or gingival crevicular fluid are investigated with a direct label-free SERS approach by putting them directly in contact with metallic nanostructures. A look on the future perspectives will close the talk, highlighting the next steps to be taken for the complete development of SERS metabolomics, including metabolites quantification and a validation through comparison with mass spectrometry.



References:

Bonifacio A et al., *Label-free surface-enhanced Raman spectroscopy of biofluids: fundamental aspects and diagnostic applications*, Anal Bioanal Chem. 2015 Nov; 407(27):8265-77.

Gurian E et al., *Differentiation between stages of non-alcoholic fatty liver diseases using surface-enhanced Raman spectroscopy*, Anal Chim Acta. 2020 May 8; 1110:190-198.

Fornasaro S et al., *Ergothioneine, a dietary amino acid with a high relevance for the interpretation of label-free surface enhanced Raman scattering (SERS) spectra of many biological samples*, Spectrochim Acta A Mol Biomol Spectrosc. 2021 Feb 5; 246:119024.

Fornasaro S et al., *Label-free analysis of gingival crevicular fluid (GCF) by surface enhanced Raman scattering (SERS)*, Analyst 2021, in press (early online version).