Probing Deep inside Turbid Materials using Spatially Offset Raman Spectroscopy (SORS)

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Abstract

The non-invasive analysis of diffusely scattering media at depth is a fast evolving area of Raman spectroscopy spurred by the recent advent of Spatially Offset Raman Spectroscopy (SORS)[1]. The accessible depths can be more than an order of magnitude larger than those attainable with conventional Raman spectroscopy enabling, for example, non-invasive interrogations several mm's, and in some cases several cm's, deep inside biological tissues. This presentation will focus on the development of SORS, its basic principles and discuss its application areas including the detection of explosives in airport security, pharmaceutical quality control and non-invasive cancer diagnosis[2].

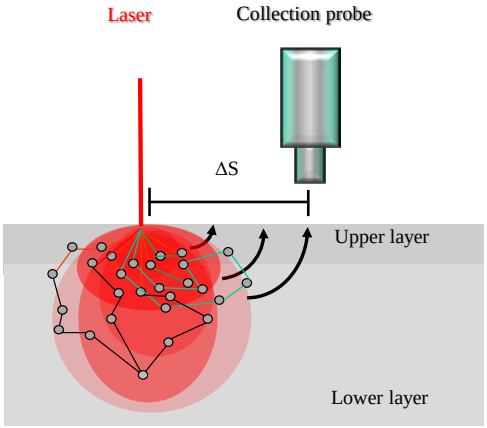

Figure 1: SORS concept relies on the separation of laser illumination and Raman collection zones on sample surface. The larger the spacing (spatial offset, ΔS) the deeper the Raman signal originates from in turbid media.

[1] Matousek, P.; Clark, I. P.; Draper, E. R. C.; Morris, M. D.; Goodship, A. E.; Everall, N.; Towrie, M.; Finney, W. F.; Parker, A. W.; Subsurface Probing in Diffusely Scattering Media Using Spatially Offset Raman Spectroscopy. Applied Spectroscopy 2005, 59 (4), 393.

[2] Mosca, S.; Conti, C.; Stone, N.; Matousek, P.; Spatially Offset Raman Spectroscopy. Nature Review Methods Primer 2021, 1 (1), 21.