

***Supported lipid bilayers as a bio membrane related model for
Tip-enhanced Raman spectroscopy***

R. Böhme¹, M. Richter¹, P. Rösch¹, V. Deckert^{1,2} and J. Popp^{1,2}

¹Institute of Physical Chemistry, Friedrich-Schiller-University Jena, Helmholtzweg 4,
07743 Jena, Germany

²Institute of Photonic Technology (IPHT), Albert-Einstein-Straße 9, 07745 Jena, Germany

To understand biological processes located on cellular surfaces, an explicit description of the underlying molecular mechanisms is required. Although conventional Raman spectroscopy allows the investigation of even small structural and chemical modifications, it cannot achieve spatial resolution on the nanometer scale, where many crucial processes are expected to take place. Combining Atomic Force Microscopy (AFM) with Surface Enhanced Raman Spectroscopy (SERS) results in so called Tip-enhanced Raman spectroscopy (TERS) [1]. In this case the spectral information stems from a very small scattering volume, hence, a spatial resolution down to 10 nm and below is possible [2]. We focus on supported lipid bilayers (SLB) labelled with proteins acting as a model for simple bio membranes. TERS spectra, recorded on these SLB structures, present a way to investigate the local distribution of protein and lipid domains. Accordingly, either Raman spectra characteristic for lipid or protein contribution can be found and correlated with the synchronously determined AFM images. This, combination of topographic and spectral information consequently provides direct bio molecular imaging with nanometer scaled resolution without the need for any labelling. Hence, this approach provides an initial step towards a label free and fast description of molecular processes located into a bio membrane.

References:

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