

***TERS as a diagnostic tool:
Tip-enhanced Raman detection of a single virus particle***

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The requirements of an ideal analytical tool are both a high specificity and a high sensitivity. With Raman spectroscopy highly specific investigations using for instance by the spectroscopic fingerprints is feasible. However, the limit-of-detection of conventional Raman is rather poor. However, Raman modes can be efficiently enhanced by metallic nanostructures, resulting in the so called surface enhanced Raman spectroscopy (SERS). Enhancement factors up to 14 orders of magnitude are reported in the literature. [1] In order to increase the spatial resolution of this very efficient method, SERS is combined with scanning probe microscopy. This combination is called tip enhanced Raman spectroscopy (TERS). Since a single virus particle is not detectable with the conventional microbiological methods, the TERS technique was applied towards a single tobacco mosaic virus yielding in spectroscopic fingerprints with a high spatial resolution. [2] Here, the first single virus TER spectra are presented and demonstrate the diagnostic potential of this method.

References:

- [1] K. K. Hering et al., *Analytical and Bioanalytical Chemistry* **390**(1), 113-124 (2008).
- [2] D. Cialla et al., *Journal of Raman Spectroscopy* **40**(3), 240-243 (2009).