

Surface sensitive photothermal AFM-IR – Probing nanoscale chemistry at the surfaces

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One method of nanoscale infrared spectroscopy and imaging, atomic force microscope based infrared spectroscopy (AFM-IR) directly detects IR radiation absorbed by the sample using the AFM probe tip to sense thermal expansion. This thermal expansion depends primarily on the absorption coefficient of the sample and is largely independent of other optical properties of the AFM tip and the sample.

Over the last years, we have developed two major improvements in the photothermal AFM-IR technique and introduced (1) resonance enhanced version of AFM-IR and (2) Tapping photothermal-based AFM-IR spectroscopy and imaging. Recently, building on our knowledge in photothermal AFM-IR, we have invented the surface sensitive AFM-IR mode. This mode allows to chemically analyze sample surfaces with a high degree of surface sensitivity by measuring IR spectra and/or images of the top of the sample surfaces. This presentation will describe the underlying technology of the new surface sensitive AFM-IR mode. Additionally, we will discuss the differences between traditional resonance enhanced AFM-IR vs surface sensitive AFM-IR and will also highlight numerous applications.

References

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