

AFM-assisted infrared nanospectroscopy

In the last decades it has become possible to perform infrared spectroscopy well beyond the classical Abbe diffraction limit of $\lambda/2$, thanks to the use of AFM setups coupled to infrared sources [1,2].

We will review two possible experimental approaches, one relying on scattering and one on photothermal expansion to describe the capabilities of infrared nanospectroscopy.

Infrared and terahertz free-propagating radiation is sent at the AFM tip apex, allowing to target specific sample excitations, e.g. the molecular vibration offering a spectroscopic fingerprint to identify chemical composition at the nanoscale.

[1] F. Keilmann and R. Hillenbrand, *Philos Trans A Math Phys Eng Sci* **362** (1817), 708 (2004).

[2] F Lu, M Jin, MA Belkin, *Nature photonics* **8** (4), 307 (2014)