# Photothermal detection and correlation spectroscopy of single gold nano particles in living cells

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For better insights into complex cellular processes fluorescence microscopy on the single molecule level has gained considerable importance. As this technique relies on emission processes, it is restricted to fluorescent probes and hampered by their photophysical processes such as bleaching and blinking.
Recently, photothermal microscopy, which is based on the absorption of light, has been pushed to a new level of sensitivity allowing even the detection of single molecules. The technique employs the conversion of optical energy into heat by an absorbing non-fluorescent species. The released heat has been shown to create a nano-lens deflecting a focused probe laser in a microscopy setup. Gold nano particles down to 5 nm in size exhibit large absorption cross sections, high photo stability and, thus, deliver intense and stable optical signals in photothermal microscopy with large signal to noise ratios even in heterogeneous environments. Since this method is highly sensitive to the absorbing species and non invasive, we recently startet to implement photothermal detection and correlation spectroscopy in living cells to study local dynamics in biological samples.
Further, we aim to use gold nano particles as single nano heat sources in cells to locally change the physical properties of special cell sites and to manipulate the behavior of the cells.

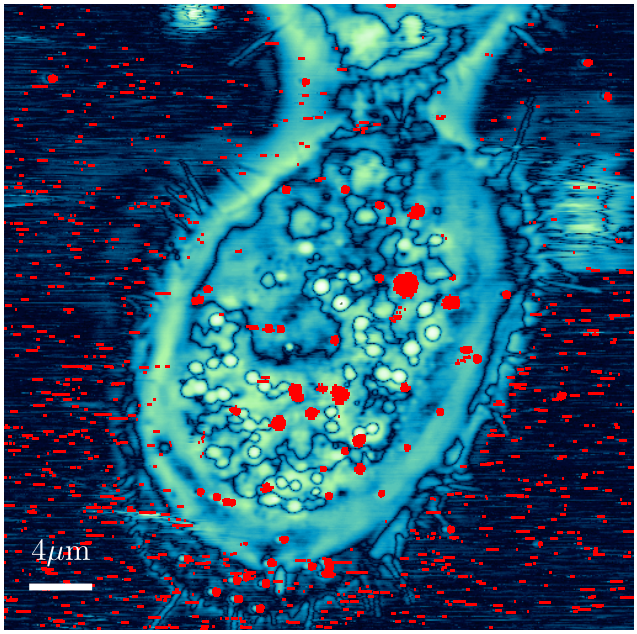


Figure: Scattering image of a MCF-10A cell superimposed with the photothermal signal of diffusing (red lines) and bound (red circles) gold nano particles