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Single laser beam photothermal microscopy ANDRE HEBER, MARKUS SELMKE, MARCO BRAUN, FRANK CICHOS, Leipzig University — Fluorescence microscopy provides a tool to study dynamics in softmatter materials on a molecular level. However, the observation time for fluorescent objects is limited due to bleaching. One way to overcome this limitation is the use of gold nanoparticles as labels. They are chemically inert under typical situations. These particles are selectively imaged using a modulated heating laser and a non-absorbed detection laser even in the presence of background scatterers. The absorbed power results in a localised temperature profile and to a refractive index change which only occurs for absorption. For finite thermal diffusivities the temperature profile does not instantly follow temperature changes present on the nanoparticle's surface. This results in an out-of-phase modulation of the detection laser. By exploiting the limited thermal diffusivity we show that a single laser beam being intensity modulated is enough to selectively image and quantify absorption. The use of a single laser makes photothermal microscopy easier to implement into existing microscopy setups.

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