

PUMP-PROBE MICROSCOPY: SPATIAL RESOLUTION ENHANCEMENT VIA TRANSIENT NONLINEARITY

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ABSTRACT

Ever since the invention of the light microscope in 17th century, scientists are devoted to developing techniques with higher resolving power, but soon faced the challenge of resolution barrier due to diffraction. Nowadays, various super-resolution techniques such as STED[1], SIM[2] and localization microscopy have been proposed to surpass this limit. However, these techniques are fluorescence-based methods, which may suffer from photobleaching and phototoxicity problem. Therefore, fluorescence-free microscopy with high spatial resolution is needed.

In this work, a novel fluorescence-free contrast based on transient nonlinear scattering of silicon nanoparticles was studied by pump-probe technique. Through optimizing this nonlinear response at a specific pump-probe delay, spatial resolution enhancement is achieved down to $\lambda/4$. This technique is expected to do the super-resolution imaging in nanomaterials and fluorescence-free samples.

REFERENCE

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