

High resolution correlative thermometry

Initiative: zukunft.niedersachsen (nur ausgewählte Ausschreibungen)

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Laufzeit:

The exact measurement of temperature is a crucial physical procedure and of fundamental importance for many phenomena in natural science. Most processes in the field of physics, chemistry, and biology are driven by it. To measure the temperature of nanoparticles (NPs) with high spatial resolution is thereby at the forefront of microscopy and catalysis research. Within this project between the Department of Electro-Optics Engineering at the Ben-Gurion University and the department of Photonic Sensor Technology at the Laser Laboratorium Göttingen e.V., the parametric dependence behind the temperature distribution in complex metal-dielectric composites, i. e. a metal nanoparticle in a dielectric environment for example tissue, will be clarified. Therefore, the anti-Stokes branches of both metal luminescence and Raman scattering from linked molecules will be exploited. The research will provide a methodology for a high-resolution correlative temperature imaging procedure that combines high-resolution confocal nano-optical experiments with the development of a comprehensive, first-of-its-kind theoretical model for luminescence from metal nanoparticles. The research may lead to a better control of reaction pathways in multiple disciplines, such as photothermal therapy and controlled drug delivery in medicine, energy harvesting, and in particular, will resolve all previous arguments associated with the mechanisms controlling the efficiency of plasmon-assisted photocatalysis experiments.

Projektbeteiligte

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