

TRR Guest Scientist Lecture / Seminar

Date/Time: 08.03.2016 / 2pm

Location: UPB, P8.409

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Metamaterial-enhanced IR absorption of molecular self-assembled monolayers

Abstract:

The emerging field of plasmonic metamaterials has introduced new degree of freedom to manipulate optical field from nano- to macroscopic scale, offering an attractive platform for sensing applications. In this talk, we discuss a novel spectroscopic technique based on the metamaterial infrared (IR) absorber allowing for a low-background detection scheme as well as significant plasmonic enhancement. Specifically, we experimentally demonstrate the resonant coupling of plasmonic modes of a metamaterial absorber and IR vibrational modes of a molecular self-assembled monolayer (SAM). Symmetric/asymmetric C-H stretching modes of the molecular SAM are clearly observed as Fano-like anti-resonance peaks within a broad plasmonic absorption of the metamaterial. Spectral analysis using Fano line-shape fitting reveals the underlying resonant interference in plasmon-molecular coupled systems. Our metamaterial approach achieves the attomole sensitivity with a large signal-to-noise ratio in the far-field measurement, thus may open up new avenues for realizing ultrasensitive IR inspection technologies.

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