物質科学セミナー
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3B213 プレゼンテーションルーム

Nanostructure-enhanced nonlinear optics, chiroptical sensing, and super-resolution chiral imaging

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The capability to control light enables the manipulation and enhancement of light-matter interaction. Rationally designed nanostructures can function as optical antennas to control optical fields, and thereby enhance light-matter interaction, including nonlinear signal generation and chiroptical sensing. In this talk, I will present our recent progress in using smartly designed nanostructures to study the mechanism of nonlinear light-matter interaction, including Surface-enhanced coherent anti-Stokes Raman scattering (SE-CARS), second harmonic generation (SHG), and two-photon photoluminescence (TPPL) [1-2]. I will also talk about our recent results in nanostructure-enhanced chiroptical sensing, including broadband circular dichroism enhancement using 3D Archimedean spirals [3], enantioselective optical trapping [4], and a super-resolution chiral domain imaging modality, Chiral Structured illumination Microscopy [5-7]. In addition, I will also briefly cover our recent progress in the non-classical propagation behavior of extremely confined light [8].

References

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Dr. Jer-Shing Huang is currently the head of the Research Department of Nanooptics at the Leibniz Institute of Photonic Technology (Leibniz-IPHT) and a principal investigator in the Abbe Center of Photonics at Friedrich-Schiller-Universität Jena in Germany. Dr. Huang also holds positions as an adjunct professor in the Department of Electrophysics at National Yang Ming Chiao Tung University and an adjunct research fellow at the Research Center for Applied Sciences of Academia Sinica in Taiwan.

Dr. Huang is the Editor-in-Chief of the journal OPTIK (Elsevier), and a member of the Editorial Advisory Board of *ACS Photonics*. His current research focuses on the engineering of nanoscale optical fields using rationally designed nanostructures for the control and enhancement of light-matter interactions. Specific research topics include optical nanocircuits, nanoantennas, metasurfaces, optical nanosensors, chiral spectroscopy, chiral imaging, optical trapping, and fluorescent polymer microresonators.

Dr. Jer-Shing Huang obtained his Ph.D. from the Department of Chemistry at National Taiwan University in 2004. His doctoral research focused on laser-induced breakdown spectroscopy. After his Ph.D., he joined the Institute of Atomic and Molecular Science at the Academia Sinica in Taiwan, where he focused on single-molecule microscopy. From 2007 to 2010, Dr. Huang was a postdoctoral research fellow in Prof. Dr. Bert Hecht's group in the Department of Experimental Physics V at Julius-Maximilians-Universität Würzburg in Germany. There he focused on plasmonic optical nanoantennas and nanocircuits. In 2010, Dr. Huang was appointed an assistant professor at the Department of Chemistry at National Tsing Hua University in Taiwan, where he became a tenured associate professor in 2015. In 2016 November, Dr. Huang moved to the Leibniz Institute of Photonic Technology in Jena, where he is currently leading the Research Department of Nanooptics.