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Skolkovo Institute of Science and Technology

Energy Colloquium

Super-Resolution Optical Imaging and Spectroscopy by Scanning Optical Nano-Antennas

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06 October 2015, 16:00

Skolkovo Innovation Center

Technopark, Building 3, Room 407

ABSTRACT:

This presentation will review major concepts and experimental approaches to optical imaging & spectroscopy with subwavelength spatial resolution using optical nano-antennas. In similarity to classical radio wave antennas, "optical antenna" is generally defined as a device that converts freely propagating optical radiation into localized energy and vice versa. Optical nano-antennas usually (although not always) use propagating and/or localized surface plasmons to concentrate and enhance far-field electromagnetic radiation (visible, UV or NIR light) in ~10 nm proximity of the nano-antenna apex. Scanning a nano-antenna across sample surface in a near-field proximity to it allows imaging surface optical properties with spatial resolution far beyond diffraction limit. Raman scattering, fluorescence, elastic scattering, IR absorption, optical density: these and other sample optical properties can be studied with spatial resolution down to 10 nm and even beyond. In particular, the following super-resolution near-field techniques will be reviewed and experimental data will be presented: aperture scanning near-field optical microscopy (SNOM); scattering-(apertureless-) SNOM; nanoscale infrared microscopy (nano-IR); tip-enhanced Raman scattering (TERS); tip-enhanced fluorescence; and some others. Different concepts of optical nano-antennas and approaches to their fabrication will be discussed.

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Colloquium schedule and information on how to get to the colloquium can be found at *http://www.skoltech.ru/research/en/events/energy-colloquium/*