

T1-L3

Seeing light up close: Near-field Optical Microscopy

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Near-field optical microscopy has transformed the way optical imaging is performed beyond the diffraction limit. This lecture will introduce the historical development of near-field optics, beginning with the early ideas of subwavelength optical probing and the emergence of scanning near-field optical microscopy (SNOM/NSOM) as a practical experimental technique. The discussion will then cover the main physical principles of SNOM, including evanescent fields, probe-sample interaction, aperture and apertureless configurations, and the role of scanning probe control in achieving nanoscale spatial resolution.

Special attention will be given to how SNOM bridges optical spectroscopy and surface microscopy, enabling simultaneous access to structural, optical, and spectroscopic information at the nanoscale. The lecture will also review modern state-of-the-art approaches, including plasmonic and tip-enhanced techniques, near-field imaging of nanophotonic structures, two-dimensional materials, etc. By combining historical context, fundamental concepts, and recent advances, the lecture will provide a broad overview of near-field optical microscopy as a powerful tool for nanoscale optical characterization.

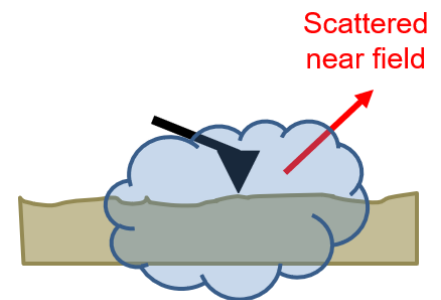


Fig. 1 Concept of near-field optical microscopy