Hyper-NA Imaging and Near-Field Optics

College of Optical Sciences/University of Arizona
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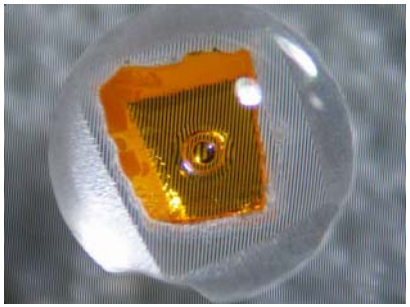
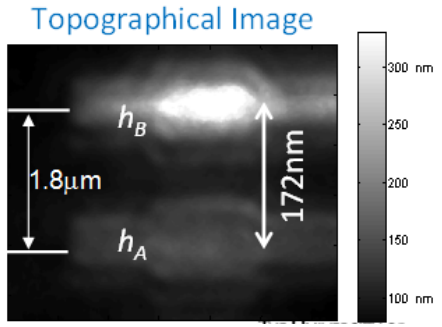
Description and Objective

Description: Investigate potential and application of hyper numerical aperture (NA >1.0) imaging systems, including induced polarization and plasmonic effects. Investigate properties of nano transducers, antennas and particles. Efficiently produce arrays of sub-25 nm diameter light spots, evaluation of nano-optical features.

Objectives: Develop imaging applications in bio and other imaging areas. Apply nano light spots to feature formation.



NA = 2.5 micro lens element



Measurement of lithographic phase mask with induced polarization.

Approach

Combine near-field technologies, like solid immersion lenses (SILs), aperture probes and antenna structures.

Develop imaging applications through theoretical, simulation and experimental techniques.

Demonstrate probes in proof-of-principle application experiments.

Applications

Lithography, data storage, biology, general microscopy

Accomplishments and Plans

Developed first APSIL probe (combination of solid immersion lens and dielectric nano aperture).

Fabrication and measurement of 60 micron diameter GaP solid immersion lens array.

Fabrication of NA=2.5 (in the visible) SIL.

Used evanescent imaging with induced polarization to study surface features on semiconductor wafers and masks

Developed hyper-NA microscope for Blu-Ray disk imaging.

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