Abstract Submitted
for the DAMOP07 Meeting of
The American Physical Society

An Offset-Apertured Near-Field Scanning Optical Microscope Probe MICHAEL QUONG, ABDULHAKEM ELEZZABI, University of Alberta — A novel hybrid apertured and scattering-type ("hybrid") near-field scanning optical microscope (NSOM) probe design in the form of a cantilevered offset-apertured probe is presented. In the cantilever arm, a subwavelength aperture is located adjacent to the base of a metal-coated dielectric tip. Surface plasmon waves are coupled onto the tip's surface. The surface plasmon waves propagate to the tip's apex, where the fields are locally enhanced. As a result of the offset-apertured probe design, the low light throughput of typical apertured NSOMs and the background light-related problems of scattering-type NSOMs are circumvented. Unlike other hybrid NSOM probe designs, the offset-apertured probe's sharp apex allows for optical imaging in deep and narrow topographical features. To gain greater insight into the functioning of the offset-apertured probe, the dependences of the optical spot's intensity and full-width half-maximum on various geometrical parameters are characterized through numerical calculations. Results also demonstrate that an offset-apertured probe significantly improves throughput light intensity over a typical apertured NSOM probe having similar resolution.

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Date submitted: 23 Mar 2007 Electronic form version 1.4