Abstract Submitted
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Toward Nanoscale Fluorescence Microscopy of Biological Systems[1] JORDAN GERTON, BEN MANGUM, CHUN MU, EYAL SHAFRAN, University of Utah — Fluorescence microscopy is a very powerful imaging technique in the biological sciences because of its ability to detect and identify individual molecules. The spatial resolution of traditional optical microscopy, however, is limited to ∼250 nm (in the visible spectrum) due to light diffraction. Thus, traditional optical microscopy is of limited utility for studying the molecular-scale architecture of biological systems where the fundamental length scale is on the order of 10 nm, the size of the constituent proteins. We have developed a technique that uses the enhanced optical intensity at the tip of an illuminated needle to surpass the diffraction limit with the goal of elucidating the relationship between the structure and function of protein networks embedded in biological membranes. We have used this microscope to image nanocrystal quantum dots and end-labeled DNA oligomers with spatial resolution of ∼10 nm. We are now working to improve the microscope contrast so that it can be applied to dense networks of biological molecules where the background signal will be high. We are also investigating single-wall carbon nanotubes as potential nano-optical probes to study energy transfer between fluorophores in molecular networks of importance for photovoltaic applications.

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