

Polarization Modulation Microscopy.

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We present an experimental technique for measuring the extinction cross-section of anisotropic nanomaterials. The experiments are performed by focusing a laser beam to a diffraction-limited spot under an optical microscope, and rotate the polarization of the light beam. Monitoring the transmitted beam with a lock-in amplifier yields the difference in extinction for light polarized parallel and perpendicular to the optical axis of the nanostructure. Experimental results for gold nanorods are presented that demonstrate the sensitivity and properties of this technique. In particular, we show that by collecting images at many laser polarizations it is possible to construct an extinction cross-section image. The advantages and disadvantages of the PMM technique compared to existing ways of measuring the extinction of nanoparticles (photothermal heterodyne imaging and spatial modulation spectroscopy) are discussed.

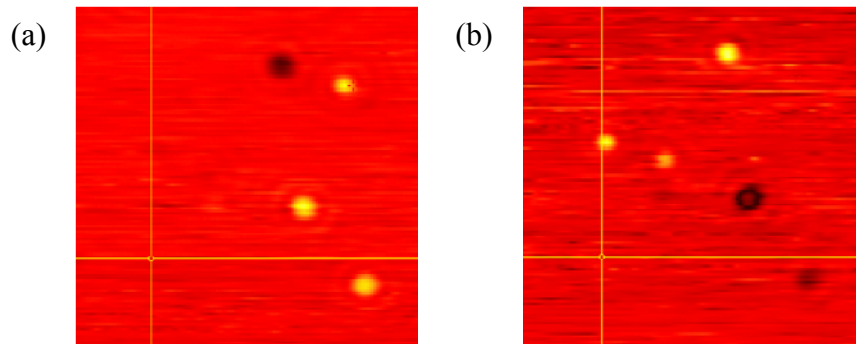


Fig: (a and b) Images of a gold nanorods recorded with a wavelength of 750 nm ($4.5 \times 4.5 \mu\text{m}$ image size; 0.1 step size) for two different polarization angles. Note the change in sign of the signal with angle.