INVESTIGATIONS ON IMAGE CONTRAST IN PSEUDO-HETERODYNE SCATTERING SCANNING NEAR-FIELD OPTICAL MICROSCOPY

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KEY WORDS: near-field optical microscopy, pseudo-heterodyne detection, image contrast

The imaging mechanism in scattering scanning near field optical microscopy s-SNOM is based on the optical interaction between the tip and the sample surface, mediated by the evanescent fields. This interaction modifies the amplitude and the phase of the light scattered by the probe’s tip and the detection is realized using far-field methods. Our home-made system uses a modified Michelson interferometer to implement a pseudo-heterodyne detection in which the detection signal is given by the interference between the scattered light coming from the tip-sample area and the reference beam reflected by vibrating mirror of the interferometer.

We present our results (theoretical and experimental) which show that the image quality and contrast in s-SNOM appear to be very sensitive to mirror oscillation amplitude. In particular, the vibration amplitude of the mirror has a high influence upon the image contrast, because the interference signal depends on the phase difference between the scattered light and the beam reflecting from the mirror. For different oscillation amplitudes of the reference mirror and for demodulation of the signal at two harmonic frequencies, we evaluated the contrast between a metal and a dielectric material [1].

The presented work was supported by the PNII Programme under contract number 187EU/2012 and also by LANIR project funded by the European Community's Seventh Framework Programme (FP7/20012-2015) under grant agreement n°280804. This communication reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein EC 7th Framework Programme under grant agreement n° 280804 (LANIR).

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