SNOM setup to study surface plasmons on nanostructured surfaces

A. Englisch, R. Schön and u. Hartmann

The detection of molecular layers on surfaces can be based on a measurement of the dispersion relation of surface plasmons, two-dimensional solutions of Maxwell's equations at a metal-dielectric interface. To reduce the area, which absorbs molecu1es, plasmon propagation in microstructured metal films can be used. In this context it is of particu1ar interest, how light in nanostructures can be guides without considerable losses. For this purpose a SNOM set-up, based on a commercia1 AFM head, was developed with a tune-fork distance regu1ation various probes can be used to col1ect the evanescent fields. The plasmons are exited by coup1ing 1ight of varying wavelength under attenuated total-ref1ection conditions into the sample. Samples were prepared in various ways. Electron lithography combined with lift-off as wel1 as scratching with AFM tips were employed to structure metal films. The metallic as well as the dielectric side of the interface can be structured. Plasmon propagation in meta1 nanostructures was studied in dependence of frequency and optical properties of the dielectric medium. Resu1ts mapping the field distribution above theses structures will be presented. An additional approach using structured adsorbates of biomolecules to arrange labeled gold spheres by specific binding will as well be presented.