

MANIPULATION OF MATTER ON THE NANOMETER SCALE WITH ATOMIC FORCE MICROSCOPY

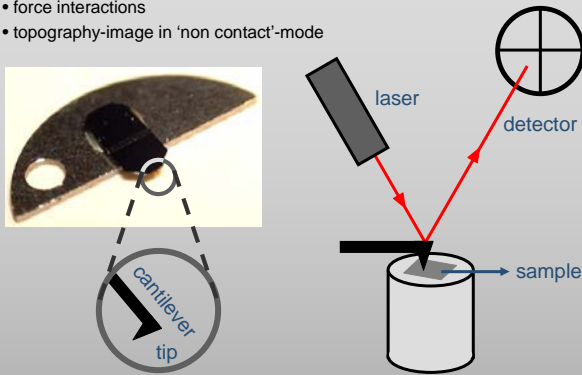
1 Introduction

- ? How can one control the structure of matter on the nanometer scale ? ($1 \text{ nm} = 10^{-9} \text{ m}$)
- ! Is the combination of an atomic force microscope (AFM) and a nanoManipulator (nM) suited to the imaging and manipulation of matter on the nanometer scale in a controlled way ?

2 Methods

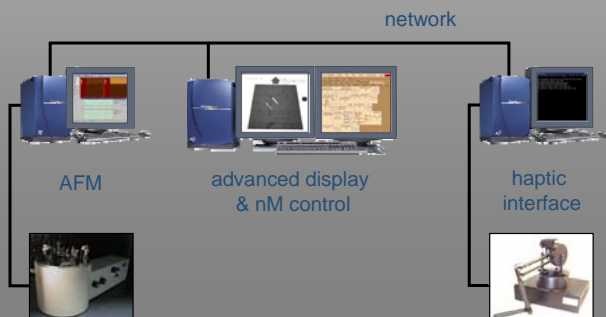
> Atomic Force Microscopy (AFM)

- sharp tip on cantilever
- force interactions
- topography-image in 'non contact'-mode



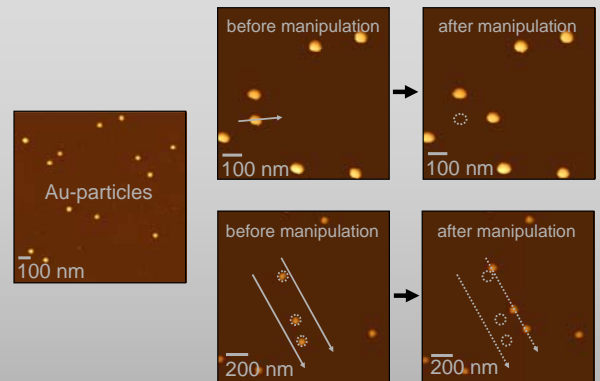
> nanoManipulator (nM)

- network
- manual control of tip position *via* the haptic interface
- mechanical contact between tip and sample allows modification

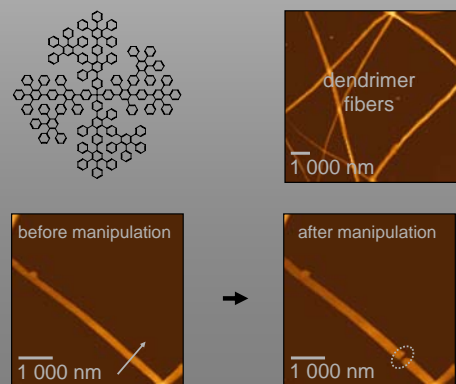


3 Results

> AFM-images of Au-particles (diameter: 20 nm) deposited on poly-L-lysine covered mica



> AFM-images of fibers formed spontaneously from a 2nd generation polyphenyl-dendrimer on silicon



4 Conclusion

- ! the combination of an AFM with a nM gives the possibility of visualising & manipulating matter in a **controlled** way
- ! the intermolecular interactions are not strong enough to manipulate the fibers as a coherent entity
→ covalent cross-linking after the fiber formation could be a solution to this problem