

Introduction to Scanning Probe Microscopy (SPM)

ADDITIONAL SPM Methods

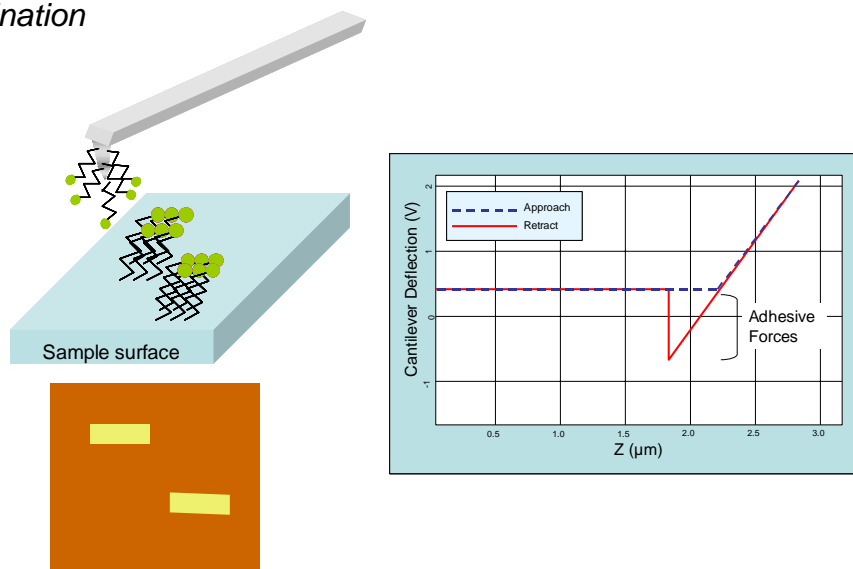
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CHEMICAL FORCE MICROSCOPY

Chemical force microscopy (CFM) is a technique, which combines the force sensitivity of the AFM with chemical discrimination. This is achieved by modifying probes with covalently linked molecules that terminate in well-defined functional groups or biological molecules. By using a suitable tip modification, chemically specific probing of the surface based on a defined tip-surface interaction can be achieved.^{1,2} For example, CFM experiments have been used to probe fundamental adhesion and friction forces at the solid-liquid interface and biological interactions such as biotin and streptavidin.

CFM Applications

- Mapping of surfaces with *chemical contrast*
- Specific imaging of biological surfaces
- Imaging of hydrophilic/hydrophobic contrasts
- Direct determination of *intermolecular forces*
- Determination of *adhesion forces* on local scale
- *Induction of chemical reactions* on local scale
- *pKa-value determination*



SPM image: Example of chemical domain mapping

Figure 1. Example of potential CFM applications: Adhesion and intermolecular forces can be determined from force curves using chemically modified tips. In addition CFM can be used to map chemical/biological domains of interest on a surface.

Online Images:

Interesting application of CFM to evaluate surface chemistry of skeletal tissue

<http://www.mnp.leeds.ac.uk/dasmith/CFM.html>

References:

1. Noy, a.; Vezenov, D. V.; Lieber, C. M. *Annu. Rev. Mater. Sci.* **1997**, 27, 381-421.
2. Excellent online resource for tip modification and potential applications.
http://www.nanocraft.de/pdf/Flyer_CFM.pdf

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