TECHNOLOGY OFFER

CANTILEVER DESIGN FOR HIGH SPEED AFM: "REAL TIME" SCAN SPEED FOR SOFT BIOMATERIALS

The new cantilever design couples two microstructures with different mechanical properties. This increases scan speed and makes it especially suitable for imaging of dynamic processes and also for imaging in liquids. At the same time the effective stiffness (spring constant) of the cantilever is kept low, making it an ideal tool for the non-invasive imaging of soft biomaterials and fragile surfaces.

BACKGROUND

Atomic force microscopy (AFM) is widely used to acquire high-resolution images of biological samples. New developments are concentrating on the scan speed, as it is crucial to measure the dynamic functioning of biological molecules. Successes are mainly made in a further miniaturization of cantilevers with a positive effect on resonant frequency and scan speed, but these are partly offset by a higher spring constant i.e. stiffness of the cantilever. This causes problems in the imaging of soft materials.

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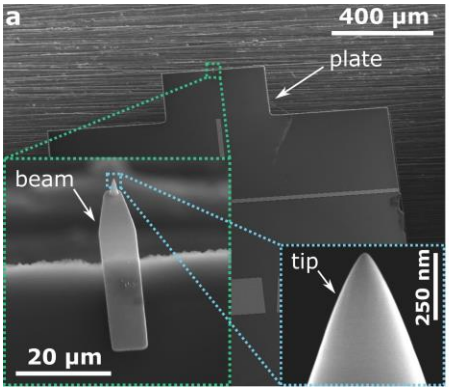
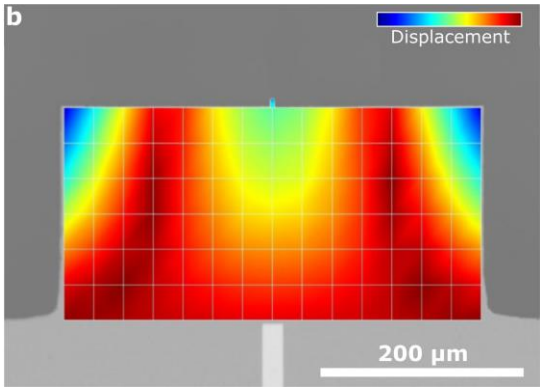
Further acceleration of scan speed demands high resonance frequency of the cantilever together with a low spring constant. This is achieved by coupling two microstructures with different mechanical properties: a broad plate with higher stiffness, like silicon and a small cantilever attached on the free end of the broad plate. The small cantilever part is soft and created out of gold or an organic material.



a) Details of cantilever setup



b) Visualization of the roof-tile shaped mode of the broad plate

ADVANTAGES

- "Real time" scan speed for the imaging of moving molecules
- Low invasive performance for the imaging of fragile surfaces (soft materials)
- High resonance frequency with high quality factor for the imaging in liquid environments

REFERENCE:
M064 /2018

DEVELOPMENT STATUS:
Prototype and test setups

APPLICATIONS:
Dynamic molecular and cell biology
Nanomedicine

KEYWORDS:
High speed AFM
Soft MEMS cantilevers
Piezo-electric resonator

OPTIONS:
R&D co-operation

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