TECHNOLOGY OFFER

WISSENS/
TRANSFER/
OST/

www.wtz-ost.at

Demodulation of AFM Cantilever Oscillation

The invented method allows amplitude and phase measurements of Atomic Force Microscopy (AFM) cantilever oscillation without expensive external demodulators, such as Lock-In Amplifiers. An AC-voltage is applied to integrated piezoresistive elements on the cantilever, which enables an electromechanical downconversion of the high frequency oscillation. The method can therefore significantly reduce the cost and complexity of AFM systems.

REFERENCE:
M017/2018

APPLICATION:
Atomic Force Microscopy

DEVELOPMENT STATUS:
Lab prototype and measurements available

KEYWORDS:
AFM, Dynamic imaging modes, Demodulation

IPR:
Patent application (AT) filed

INVENTORS:
Dominik KOHL
Mathias POIK
Georg SCHITTER

BACKGROUND

Dynamic Atomic Force Microscopy (AFM) imaging modes are powerful techniques for the characterization of surfaces with nanometer resolution. The oscillation of the cantilever is thereby modulated by the interaction forces between the tip and the investigated sample. In state of the art AFM systems, the amplitude and phase of the cantilever oscillation is measured by expensive demodulators, such as Lock-In amplifiers.

TECHNOLOGY

In the developed method, integrated piezoresistive elements detect the oscillation of the cantilever. Applying an AC-voltage at the cantilever resonance frequency to the piezoresistive elements leads to a direct demodulation without additional external components and therefore allows a simplified measurement of amplitude and phase of the cantilever oscillation. The simplified demodulation technique in combination with the integrated piezoresistive deflection measurement will enable the design of AFM systems with significantly reduced complexity and cost.

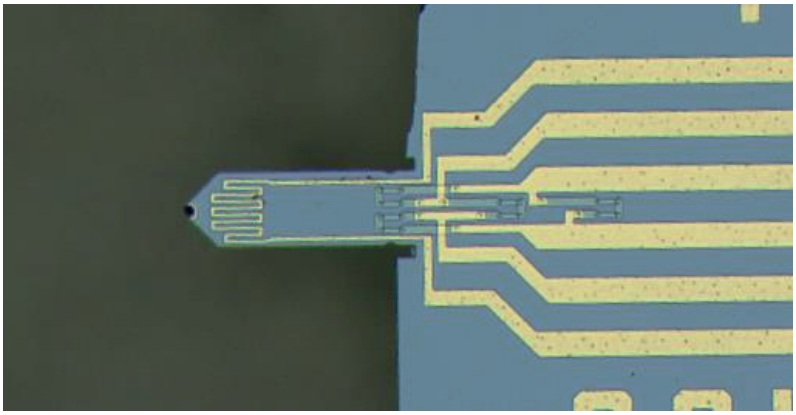

Fig 1: AFM cantilever with integrated piezoresistive elements (SCL-Sensortech).

ADVANTAGES

- Simple and low-cost measurement of cantilever oscillation
- No external demodulator required

CONTACT:

Angelika Valenta
TU Wien
Vienna, Austria
T: +43.1.58801.41538
angelika.valenta@tuwien.ac.at
www.rt.tuwien.ac.at

TECHNISCHE UNIVERSITÄT WIEN