Electric Self-Sensing Cantilevers: Fast! Easy to use & no need for read-out optics

Self-Sensing Cantilevers
The High-Speed Active probes are silicon cantilevers with an integrated piezo resistor and/or an actuator for self sensing and/or self actuating scanning probe microscopy and nanomanipulation applications. To optimize the sensitivity and reduce noise, the active piezo-resistors are integrated into a matched Wheatstone bridge on the cantilever carrier chip.

Benefits of electric self-sensing cantilevers
- **Usability**: easy & fast cantilever adjustments by electronics only (no laser adjustments necessary!)
- **Bio-AFM imaging in dense liquids** (e.g. blood, medical serum, etc.)
- **Freeing up space** by removing optical read-out

Self-sensing cantilever bonded to small connector printed circuit board and pre-amplifier for low-noise deflection signal amplification

Freeing up space by removing optical read-out

Use of self-actuating and self-sensing cantilevers for imaging bio samples in fluid, Nanotechnology 20 (2009)

Piezo-resistive bridge deflection sensor

Exciitation of resonances of the active cantilever in air and water using external inertial drive and integrated thermal actuator.

Using self-sensing cantilevers with inertial drive and A) optical drive and B) piezo readout

Self-Sensing Cantilever Application - AFSEM™

AFM + SEM = AFSEM

AFSEM™ Prototype (AFM for integration into a Scanning Electron Microscope)

Outlook: NEXT GENERATION Cantilever

Small and soft passivated Bio-Cantilevers
FP7 EU project ALBICAN)