

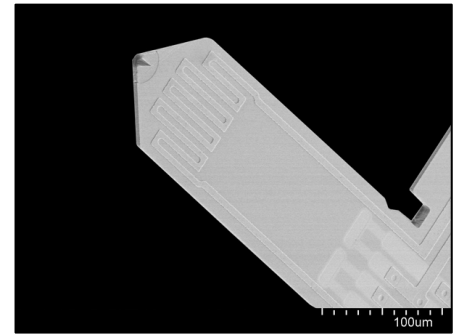
PRSA-L300-F50-SCD-PCB

Silicon piezo-resistive sensing cantilevers

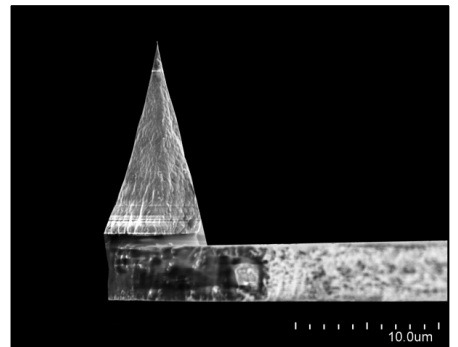


General description

Piezo-Resistive Sensing Active (PRSA) probes are silicon cantilevers with a long-life single crystal diamond tip (SCD). Integrated piezo-resistors and a heater are used for self-sensing and self-actuating the cantilever deflection. The piezo-resistors are integrated into a matched Wheatstone bridge to raise the sensitivity and compensate environmental thermal drift. Self-sensing readout technology makes laser adjustment obsolete and saves time during a cantilever change. The free space above the cantilever enables new applications and combination of AFM with various instruments. The SCD tip exhibits low surface energy, which prevents contamination when imaging sticky or biological samples. The cantilever chip is bonded to a small printed circuit board (PCB) with a small connector to enable a quick cantilever change. A counter part PCB for the cantilever PCB can be connected to a low-noise pre-amplifier with a flat flex cable.



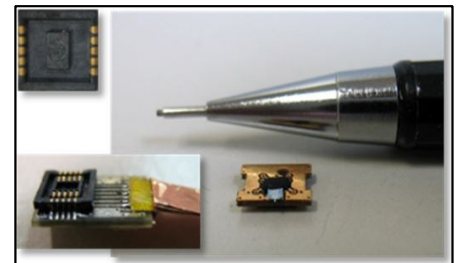
PRSA-L300-F50-SCD cantilever with Al tracks for reading out the sensor signal



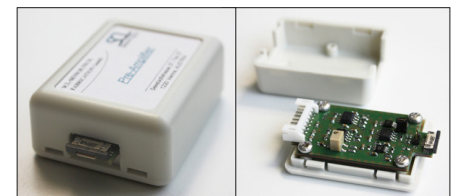
Side view of a SCD cantilever tip

Specifications	
Model	PRSA-L300-F50-SCD-PCB
Tip radius (apex) / height	<15 nm / 12...16 μm
Tip material	Long life Single Crystal Diamond (SCD) <100> along tip axis
Glue between tip and cantilever	non-conducting temp-stability: up to 70°C
Resonant frequency	30..65 kHz
Spring constant	1...15 N/m
AFM mode	contact, non-contact
Sensitivity*	1...2 μV/nm
Force sensitivity*	0.5...56 nN/μV
Length, width	300 ±5 μm, 110 ±3 μm
Material	silicon cantilever, boron doped 1k Ohm piezo resistors, aluminium tracks
Deflection sensing	on chip piezo-resistive bridge
Actuator	external shaker or on chip heater (20-45 Ohm)
Electrical connections	bonded to small PCB with connector (counter part PCB available) or optional bonding pads on chip
Chip dimensions (h, w, l)	0.3 / 1.2 / 2.5 mm

* not amplified (signal direct at the chip), 2.048 V bridge supply



Cantilever is bonded to a 6 x 4.5 mm PCB (height with connector 1.6 mm, with CP-PCB: 2.5 mm); left: counter part PCB



Hardware for amplified readout:
Low-noise pre-amplifier (45x35 mm)

Applications:

- Integration in a standard AFM scanner or high-speed AFM
- Force sensing within a SEM, TEM, etc.; nano-indentation
- Scratching and imaging of high aspect ratio sample features

What about your application? Contact us!

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