

Conductive Trilayer Cantilever Probes

Silicon Nitride-Polymer AFM probes: for KPFM/C-AFM

General description

The Trilayer Cantilevers (TLC) feature a unique structure of silicon nitride films and a polymer core, enabling increased thickness without excessive stiffness. This significantly amplifies force sensitivity ($\mu\text{V}/\text{nN}$), surpassing standard single-crystalline Si cantilevers by a factor of 4. Due to the low Q-factor of less than 250 (even in a vacuum). The TLC enables scanning speeds up to 10x faster than those achievable with Si or SiN-CL.

Additionally, the electrical insulation of electronic sensors within the SiN/Polymer interface ensures robustness and reliability even in harsh conditions. The tip is coated with 100 nm Pt metal and connected to an external signal enabling the use of TLCs for conductive AFM (C-AFM) and KPFM applications.

Applications:

- Kelvin Probe Force Microscopy (KPFM).
- Conductive AFM (C-AFM) and electrical probing.
- Integration on standard AFM scanner, high-speed AFM.
- Force or deflection measurements

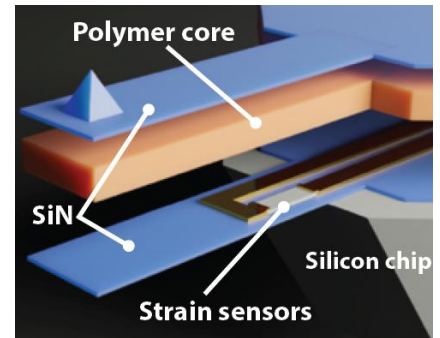
What about your application?

Contact us!

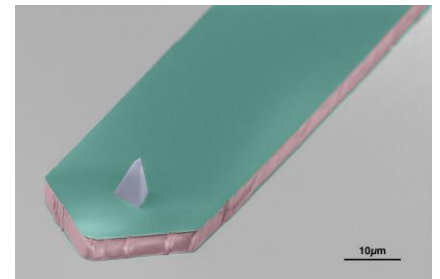
Specifications			
Model	TLC-L220-F80-KPFM-PCB		
Material	SiN shell with polymer core		
Tip material	Silicon		
Pt metal coating	on the chip body and on the tip		
Modes	static and dynamic modes		
Dimensions	Nominal Res. Freq.	Nominal spring const.	Deflection sensitivity*
($\mu\text{m} \times \mu\text{m} \times \mu\text{m}$)	(kHz)	(N/m)	($\mu\text{V}/\text{nm}$)
220 x 40 x 4	81	2.5	1.5
Deflection sensing	on-chip piezoresistive bridge		
Actuator	external shaker (or upon request: on-chip heater)		
Electrical connections	bonded to small PCB with connector (counter part PCB available) or delivered as bare chip (bonding pads on-chip)		

* not amplified (signal direct at the chip), 1 V bridge supply

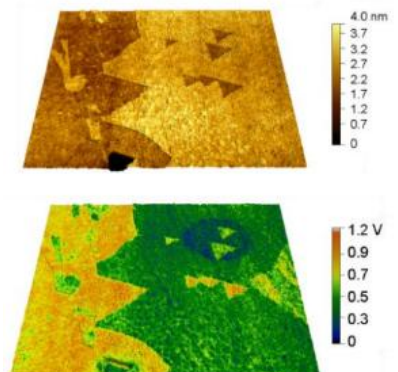
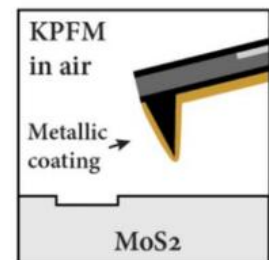
References: Hosseini et al., Nature Electronics, 2024
<https://www.nature.com/articles/s41928-024-01195-z>



Schematic of the trilayer cantilever



SEM image of the TRI-CL (top-view)



KPFM measurements on layered MoS2: Measurement principle (metal-coated tip), Topography measurement and line profile, Superposition of topography and surface potential map

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