

Ultra-Short-AFM-Cantilevers

Next generation of AFM Probes for High Speed Scanning

Concept

- development of very short, narrow and thin cantilevers with Electron Beam Deposited (EBD) tip for High Speed Scanning applications for present and future AFM systems
- different cantilever materials are evaluated:
Si (poly/single crystal/111), SiN, New Material ("NM")
- joint development between NanoWorld AG and nanotools GmbH



Description of Ultra-Short-AFM-Cantilevers (USC) made of New Material

Cantilevers

- different prototypes of Ultra-Short cantilevers have been developed and fabricated resulting in different mechanical properties:

calculated values	Resonance Frequency [kHz]	5000	2000	1500	330	1300	1250	500
	Force Constant [N/m]	30	3.0	0.6	0.3	1.2	7.8	0.75
	CB length [µm]	10	10	7	20	10	20	20
	CB width [µm]	5	5	3	10	5	10	10
	CB thickness [nm]	680	280	100	190	190	680	280

Highlighted are the versions considered for commercialization in a first step

Tip

- nanotools® High Dense Carbon (HDC) tip with the following dimensions:
Height: > 2.0 µm (typically 2.5 µm)
Tip radius: < 10 nm
Aspect ratio: approx. 1:5
Tilt compensation: 8±1 deg

Support chip

- dimensions of the Si support chip are very reproducible (1.6 mm x 3.4 mm)
- etched and lowered corners of the Si support chip avoid contact between the Si support chip and the sample

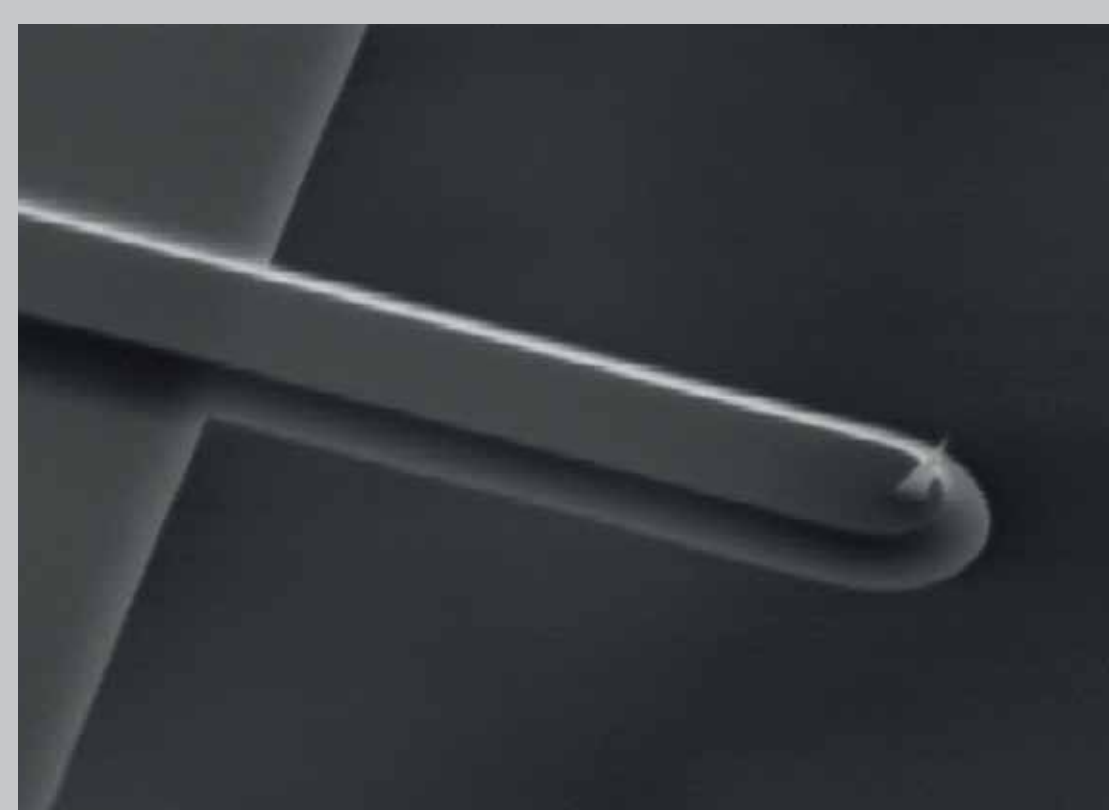
Coating

- 30 nm Gold reflex coating on both sides of the cantilevers (tip uncoated)

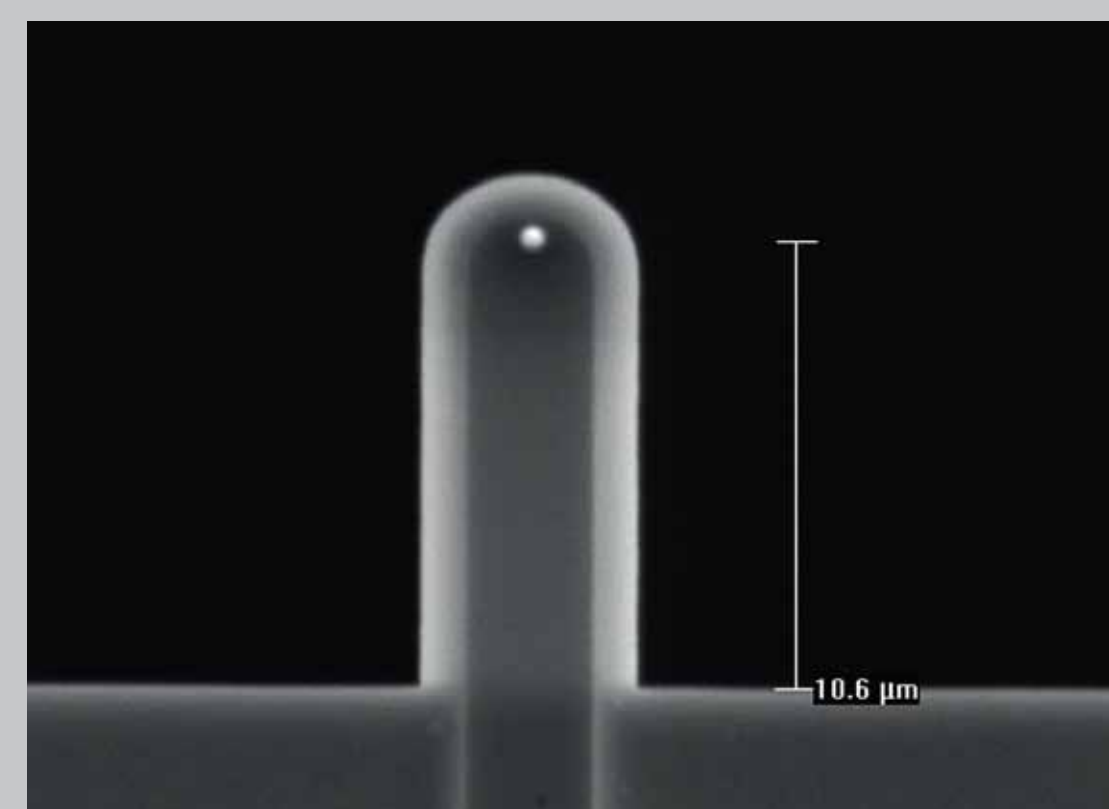
Status

- prototypes available (have been validated by external tests)
- pre-production status: more than 50 wafers have been fabricated
- ongoing beta testing

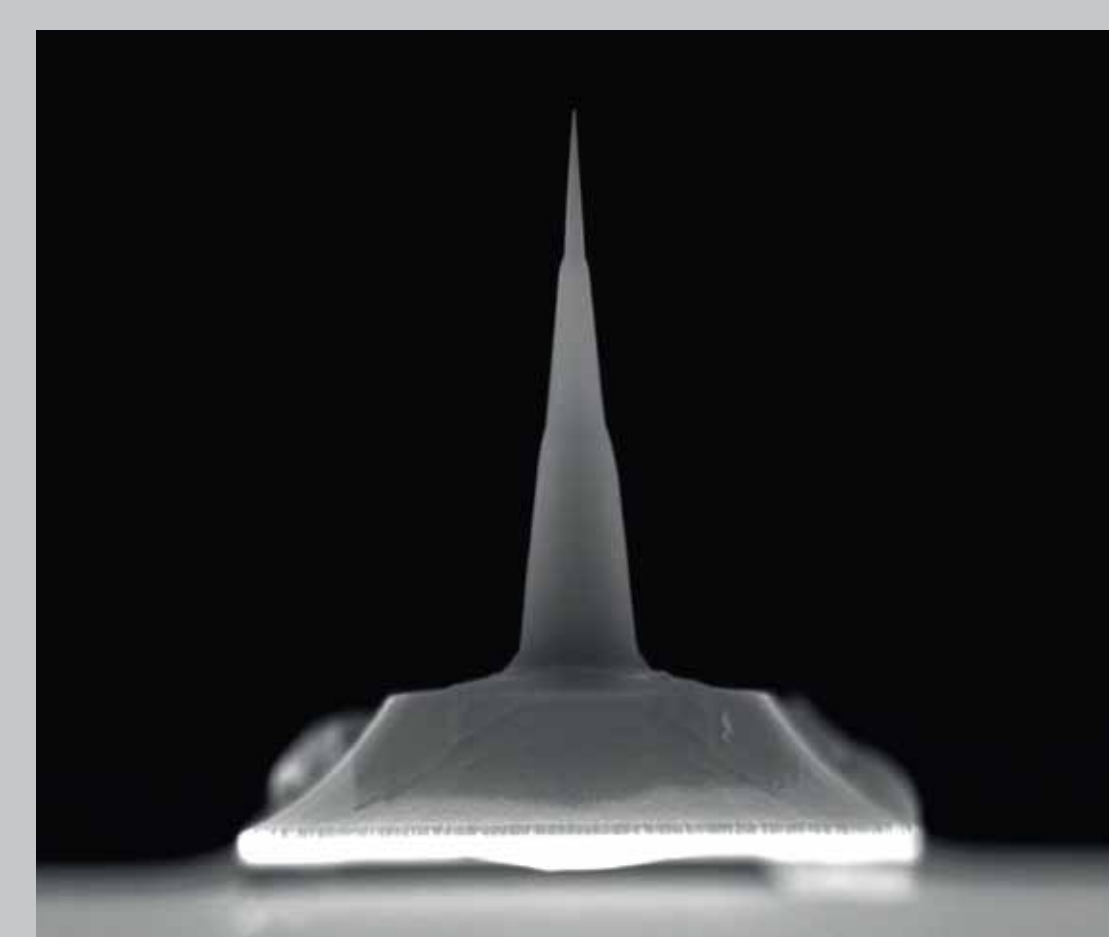
More information on www.highspeedscanning.com



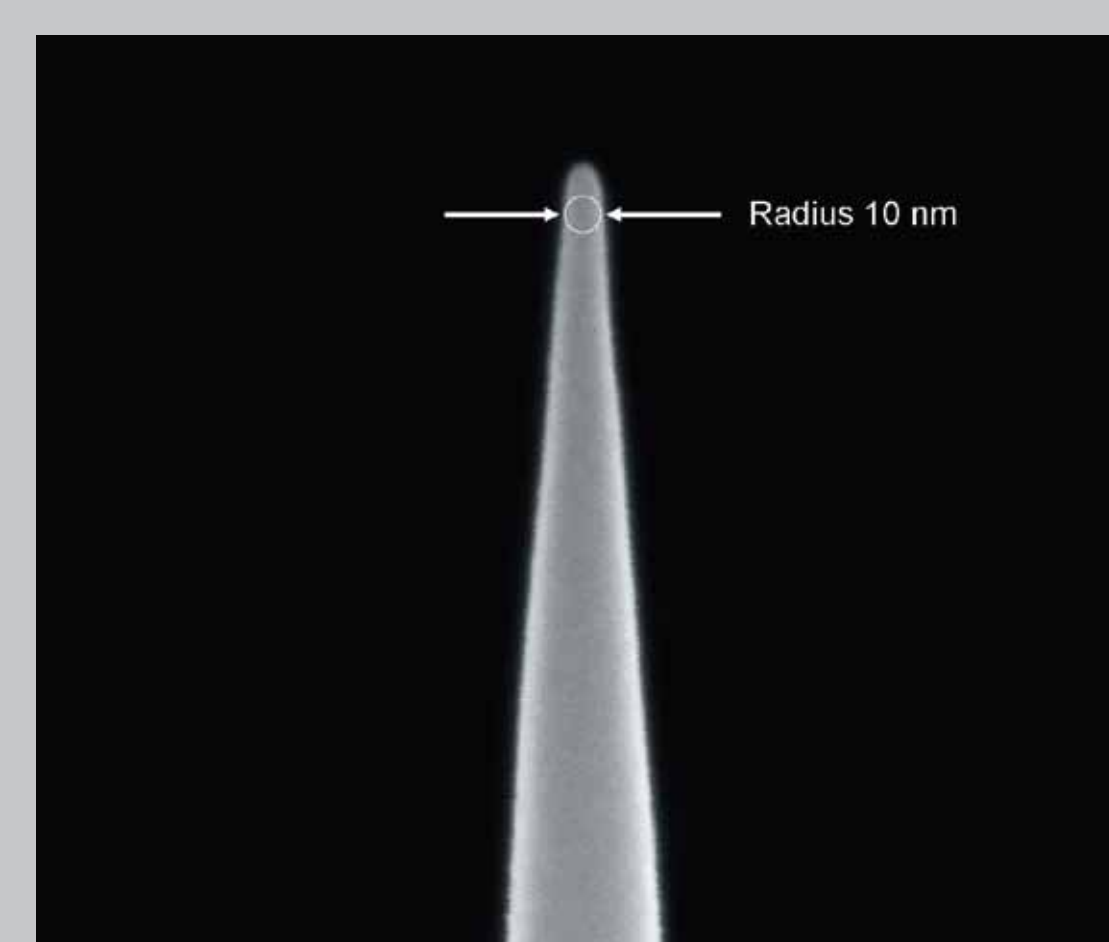
Cantilever 3D View



Cantilever Top View



Tip Front View



Tip Detail



Support Chip 3D View