

High Aspect Ratio (> 5:1, Tilted 13°) - Non-Contact / Tapping Mode - High Resonance Frequency - Reflex Coating

NANOSENSORS™ AR5T-NCHR sensors are designed for non-contact mode or Tapping Mode AFM (also known as: attractive or dynamic mode). This sensor type combines high operation stability with outstanding sensitivity and fast scanning ability.

For measurements on samples with sidewall angles approaching 90° **NANOSENSORS™** produces specially tailored AFM tips. These AFM tips are FIB (Focused Ion Beam) milled to achieve a high aspect ratio portion at the end of the common silicon AFM tip. This subtractive method of producing the high aspect ratio needle offers the advantage of high lateral stiffness and rigidity of the AFM tip.

On the model **AR5T** the last 2 µm of the AFM tip are tilted 13° to the center axis of the AFM cantilever. With this feature the tilt angle of the AFM cantilever caused by the mount of the AFM head (commonly 13°) will be compensated. Now, nearly vertical sidewalls can be measured offering a symmetrical scan.

The AFM probe offers unique features:

- length of the high aspect ratio portion of the AFM tip > 2 µm
- typical aspect ratio at 2 µm in the order of 7:1 (when viewed from side as well as along AFM cantilever axis)
- high aspect ratio portion of the AFM tip tilted 13° to the center axis of the AFM cantilever
- half cone angle at 2 µm of the high aspect ratio portion typically < 5°
- guaranteed AFM tip radius of curvature < 15 nm
- highly doped silicon to dissipate static charge
- high mechanical Q-factor for high sensitivity

The reflective coating is a 30 nm thick aluminum coating on the detector side of the AFM cantilever which enhances the reflectivity of the laser beam by a factor of about 2.5. Furthermore it prevents light from interfering within the AFM cantilever. As the coating is nearly stress-free the bending of the AFM cantilever due to stress is less than 2 degrees.

This AFM probe features alignment grooves on the back side of the holder chip. These grooves fit to the **NANOSENSORS** Alignment Chip.

Cantilever data:

| Property | Nominal Value | Specified Range |
|---------------------------|---------------|-----------------|
| Resonance Frequency [kHz] | 330 | 204 - 497 |
| Force Constant [N/m] | 42 | 10 - 130 |
| Length [µm] | 125 | 115 - 135 |
| Mean Width [µm] | 30 | 22.5 - 37.5 |
| Thickness [µm] | 4 | 3 - 5 |

Order codes and shipping units:

| Order Code | AFM probes per pack | Data sheet |
|--------------|---------------------|---------------|
| AR5T-NCHR-10 | 10 | of all probes |
| AR5T-NCHR-20 | 20 | of all probes |
| AR5T-NCHR-50 | 50 | |
| AR5T-NCHR-W | 370 | |