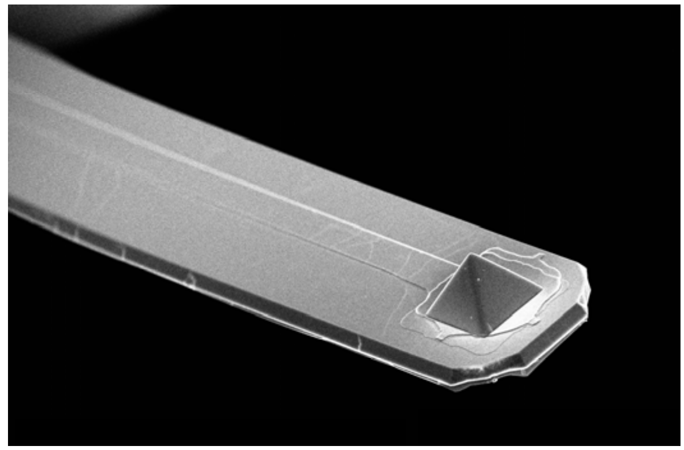
APPNANO

Manufacturer of Innovative SPM Probes and Accessories

INTRODUCES

VertiSense™



VertiSense™ Thermal Imaging Probe

Scanning Thermal Microscopy Module and Probes

- **Accurate nanoscale temperature measurement**
- **Ultra high thermal spatial resolution (up to 20 nm)**
- **High local temperatures (up to 700 °C) with minimal bending**
- **Thermal conductivity contrast and temperature contrast mapping**
- **Supports contact and tapping thermal scanning modes**

VertiSense™ Thermal Imaging Amplifier

INTERFACE

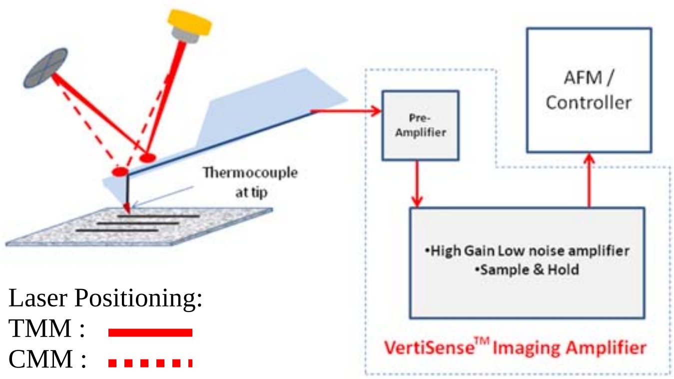
- Compatible with most commercial AFMs
- Real-time temperature display
- Ultra low noise, high speed amplifier
- Built-in sample and hold amplifier for imaging pulse heated samples

INNOVATION

The patent pending innovative design of the **thermal probe** has the following features to provide unprecedented ultra high resolution temperature and conductivity mapping of samples at the nanoscale:

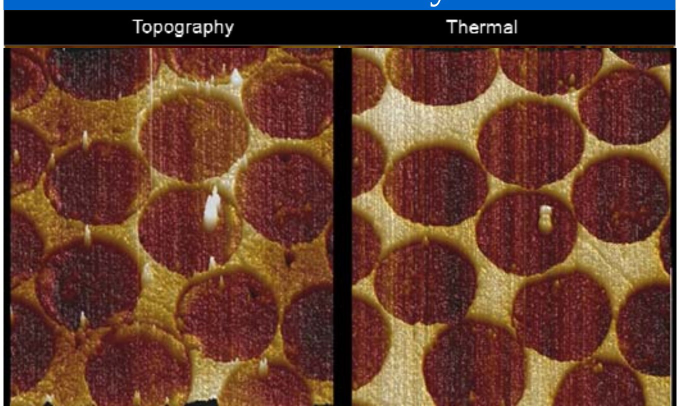
- The nanoscale **thermocouple sensor** is located at the apex of the tip.
- Embedded thermocouple enables **longer probe lifetime** without altering thermal sensitivity or calibration.
- Material surrounding tip sensor is **thermally insulating** to prevent heat loss from the tip to the cantilever and substrate.
- **Embedded metal contacts** minimize heat losses from the sample to the thermal probe.
- Remotely located **cold junction** allows for true temperature measurement.

Versatility

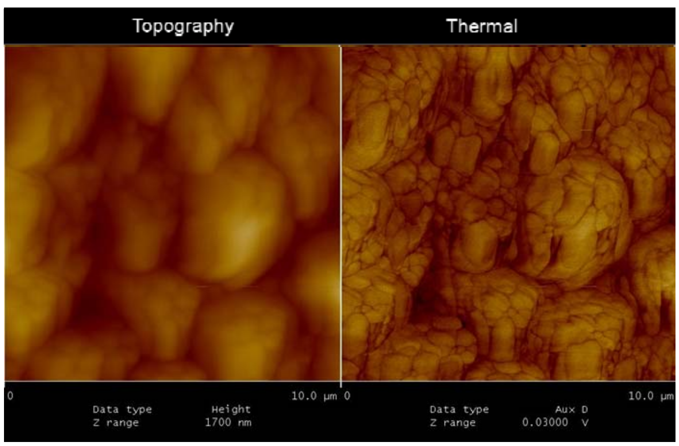


An easy positioning of the laser deflection spot on the cantilever enables Temperature Mapping Mode (TMM) or Conductivity Mapping Mode (CMM).

Thermal Conductivity Contrast



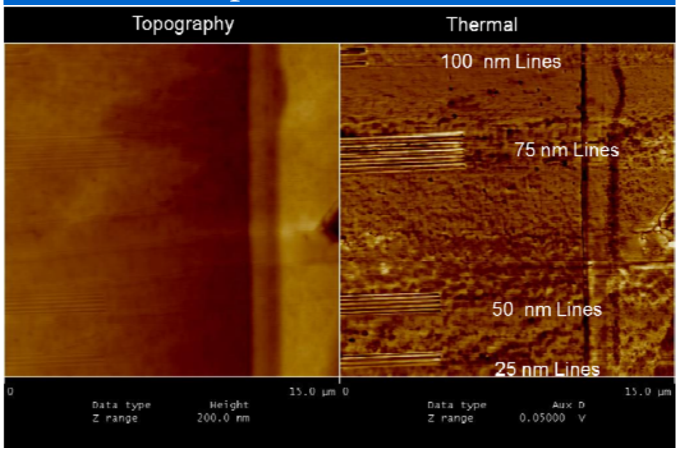
Thermal conductivity contrast image from a sample consisting of vertical carbon fibers embedded in epoxy. The sample was sectioned and polished flat. The image is 25 x 25 μm.



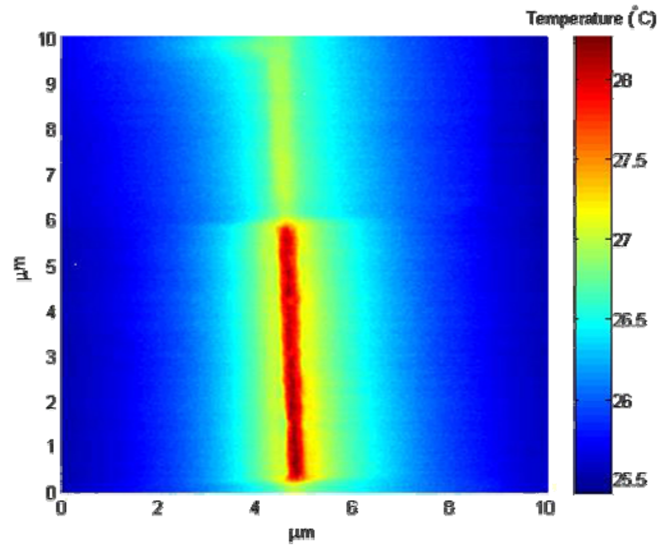
Bi_2Te_3: carbon nanocrystalline films prepared by co-sputtering method. The contrast in the thermal image (right) signifies the difference in the thermal conduction in the crystallites and at the grain boundaries.

Sample and image analysis courtesy of Ms. Khushboo Agarwal and Prof. B.R. Mehta, Thin Film Lab, IIT Delhi, India.

Temperature Contrast



Temperature contrast image from an ion implanted silicon heater. A thin layer of thermal oxide (10 nm) was grown and ion beam milled to create separate lines of oxide to study the thermal resolution of the probes. The heater was powered to raise the temperature of the sample.



Temperature contrast mapping of a sub-micron aluminum heater embedded in silicon dioxide.

Image courtesy of Woosung Park, Dr. Taka Kodama, and Prof. Kenneth Goodson, NanoHeat Lab, Stanford University, Stanford, USA.

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