



Microcoaxial Probes Made from Strained Semiconductor Bilayers

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a microcoaxial probe tip that incorporates atomic force, scanning tunneling and microwave microscopy into one instrument to more quickly provide a high resolution image.

Overview

Atomic force microscopes (AFM), scanning tunneling microscopes (STM) and scanning microwave microscopes are three different instruments used to create images of nano-structures. Currently, the three instruments are used independently, and the data is combined to give an image with high spatial and temporal resolution.

The Invention

A UW-Madison researcher has developed a microcoaxial probe tip that incorporates atomic force, scanning tunneling and microwave microscopy into one instrument to more quickly provide a high resolution image. A strained semiconductor bilayer with a conducting strip patterned to the inner surface is attached to a supportive layer. When the supportive layer is removed, the strain causes the bilayer to coil about the conducting strip, creating a tube with an atomically sharp tip. The conducting strip serves as a channel for STM, the bilayer can be attached to a cantilever for AFM, and the tube also serves as a microwave resonator, thus providing three probes on one microcoaxial tip. One computer can collect information from all three probes at once and quickly compile it into a more accurate graphic image.

Applications

- Imaging nanostructures

Key Benefits

- Speed of image acquisition is increased by performing three operations at once
- May be sharpened to a single atom point during or after tube formation
- Semiconductor bilayer may be made of Si, SiGe, InGaAs or GaAs
- Bilayer incorporates at least two conducting channels, which provide a conducting shield
- Microcoaxial probes can provide improved spatial and temporal resolution in surface imaging
- Tubes may be fabricated with diameters as small as 10 nanometers
- May be used as a scanning tunneling microscope, atomic force microscope, scanning microwave microscope, or any combination thereof

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• [Analytical Instrumentation, Methods & Materials](#)

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For current licensing status, please contact Jennifer Gottwald at jennifer@warf.org or 608-960-9854



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