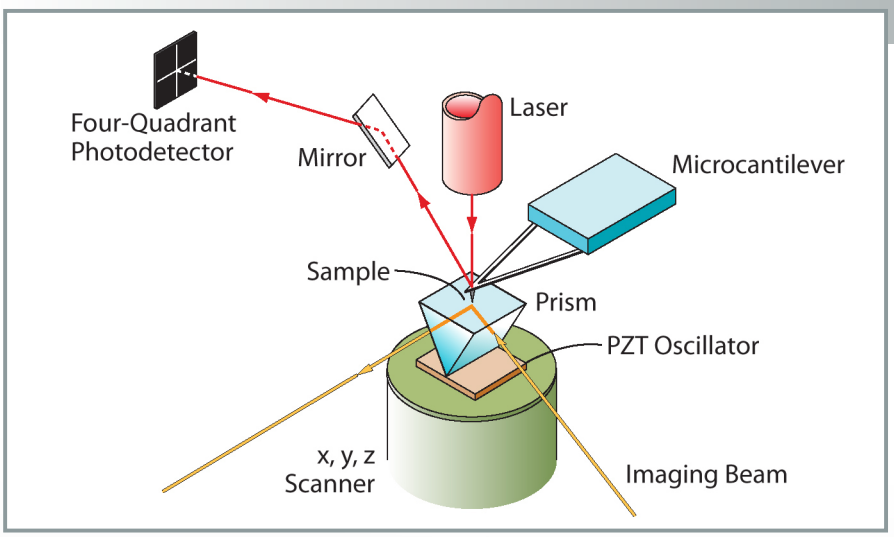
Scanning Probe Microscopy with Spectroscopic Molecular Recognition

UT-B ID 200802174



Technology Summary

ORNL researchers developed an innovative imaging method that possesses the imaging capability of scanning near-field ultrasound holography and the chemical specificity of reverse photoacoustic spectroscopy. This imaging method can achieve chemical differentiation with nanometer resolution.

Atomic force microscopy is a well established technique for imaging surface features of a nanometer or less. In conventional methods, a cantilever has a tip capable of making a nanometer sized contact. However, any small variation in distance between the probe and the sample surface can result in a large change in the contact force between the probe's tip and the sample.

To address this challenge, the invention includes two independent oscillators and is able to distinguish the frequencies of the two acoustic waves applied to the probe. In addition, electromagnetic energy is applied to the sample, causing a change in phase of the second acoustic wave. The device can also be used for determining chemical characteristics of a sample by applying different acoustic waves.

Advantages

- Subsurface topography
- Nanometer spatial resolution capable of 5 nm
- Chemical differentiation of surface features

Potential Applications

- Atomic force microscopy to study biological and chemical samples
- Chemical differentiation and imaging with nanometer resolution

Patent

Ali Passian, Laurene Tetard, Thomas G. Thundat, Brian H. Davison, and Martin Keller, *Scanning Probe Microscopy with Spectroscopic Molecular Recognition,* U.S. Patent Application 12/726,118, filed March 17, 2010.

Lead Inventor

Ali Passian
Measurement Science and Systems Engineering Division
Oak Ridge National Laboratory

Licensing Contact

Renae Speck
Technology Commercialization Manager, Biological and Environmental Sciences
UT-Battelle, LLC
Oak Ridge National Laboratory
Office Phone: 865.576.4680
E-mail: speckrr@ornl.gov

PARTNERSHIPS