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Features

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Ramping Up Failure Analysis

In no small way, the role of microscopy within the semiconductor and nanotechnology industries has evolved to become a critical component for conducting failure analysis and validating physical dimensions. The Multiscan AFP (Atomic Force Probe), engineered by a research team at Multiprobe Inc., Santa Barabata, Calif., is a response to this trend. Designed within the framework of the 90- and 65-nm development nodes, this system features multiple atomic force microscopy tips in close proximity, enabling simultaneous high-resolution, nanoprobng of four sub-100-nm contacts.



Current and voltage (IV) curves from ultra-small transistors can now be readily taken without the risk of damage, thereby simplifying transistor failure

analysis. These properties are further bolstered by a factor of four reduction in system cost. Additional features such as the use of synchronized scan wave forms to drive multiple tips forward and a proprietary software to control all of the AFPs in concert, will appeal to researchers in a variety of fields.

The primary application for this system is in the electrical testing of semiconductors, but also reaches into static random access memory cell work, novel conductive polymer

Bait & Map



Within the highly competitive world of drug discovery, speed and efficiency have become more important than ever. Yet, significant challenges remain in optimizing the drug discovery process, with pharmaceutical labs looking toward new instrumentation and hardware in order to gain a competitive edge. This is the framework behind the development of the **PicoTREC: Topography and REcognition System**, created by researchers at Molecular Imaging Corp., Tempe, Ariz. Without the use of fluorescent markers, this system offers users the ability to simultaneously detect and map recognition or molecular binding events with single molecule sensitivity, while generating topographic images all in real-time.

The detection scheme is carried out by the inclusion of a specific ligand molecule attached to an atomic force microscope (AFM) cantilever, which recognizes target molecules or features in a sample. Working side-by-side with the PicoPlus AFM, PicoTREC then processes the cantilever deflection signal to identify changes characteristic of a successful antibody-binding event. The microscope continues to operate at full scanning speed, maintaining resolution. Finally, the PicoTREC output signal is fed to a second image to plot the

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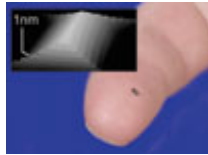
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device development, and testing of
microelectromechanical prototypes.

>>More info: www.multiprobe.com

Nanotech Takes a Step Forward

The complexity of dealing with nanoscale structures has placed a unique demand on instrument providers to develop cost-effective machinery to perform on this scale and beyond. As important are the benchmarks by which this instrumentation is measured against.



A group of engineers at the NASA Glenn Research Center, Cleveland, Ohio, have addressed this need in the area of scanning probe microscopy (SPM). The **Nanometer Step Height Standard** (Nanometer SHS) is a calibration standard with atomically flat steps of 0.5 and 1 nm heights, for use in SPM applications on nano and sub-nm scale features. Previously available calibration standards had minimum steps of 8 nm; an order of magnitude larger than the features now requiring analysis.

The structures are fabricated from single crystal silicon carbide (SiC) and represent the only known structures with subnanometer scale features that are quantifiable to a fixed physical property—the crystal structure of SiC. Since the step height on the Nanometer SHS is fixed, every Nanometer SHS standard has identically sized steps. This repeatability alleviates the need for sample standards to be sent for NIST certification, cutting down costs and boosting user appeal.

>>More info: www.grc.nasa.gov

location of the binding events simultaneously with the acquisition of high-resolution topographical images. The insight and speed gained by this approach will also prove useful in a variety of other applications, namely in semiconductors (mask-making) and wafer fabrication, data storage including DVDs, CDs, and hard drives, and polymer research.

>>More info: www.molec.com

Maximizing Mine Safety

U.S. coal companies produce over 1 billion tons of coal per year, with about half that amount originating from underground mines. But the human and production costs due to a loss of mine integrity is the pervading factor behind the **RIM-IV** (radio imaging method) **Imaging System**, engineered by researchers at Stolar Research Corp., Raton, N.M. Harnessing the frequencies of radio waves, the RIM-IV facilitates the identification and location of anomalies within coal seams, ore bodies, or down boreholes at depths down to 365 m.

Similar to the principles found in seismic systems, the RIM-IV's use of magnetic dipole antennas (transmission and receiver) give users the ability to survey changes in attenuation rates and phase shifts, enabling mine owners and managers to make better informed decisions on overall mine integrity and ensure continuous coal production without costly shutdown scenarios. Three dimensional imaging capability (3-D RIM) with enhanced resolution and improved transmission and range to survey larger blocks of coal (especially important for super panels in longwall mining) are also noted features which have contributed to its adoption in the U.S. and Australia.

>>More info: www.stolarhorizon.com