

Focus on nanoscience and nanotechnology FREE

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Nanopositioning stage for superresolution microscopy

The new P-545 and M-545 PiNano multiaxis stages for microscopy from Physik Instrumente provide highly accurate motion over travel ranges of 200 μm in the (x,y) and (x,y,z) coordinates. The piezocontroller's 24-bit digital-to-analog converter improves resolution by two orders of magnitude over the 16-bit converters that are still widely used. The controller is compatible with all major image acquisition packages and comes with various software drivers and programming examples. For highly stable, closed-loop operation, piezoresistive sensors are applied directly to the moving structure of the stage and precisely measure the displacement of the platform. The very high sensitivity of the sensors provides optimum position stability, responsiveness, and subnanometer resolution. Physik Instrumente LP, 16 Albert Street, Auburn, MA 01501, <http://www.pi-usa.us>

Module for nanomechanical testing

Agilent Technologies has introduced an enhanced version of its dynamic contact module for nanomechanical testing of materials. The Agilent DCM II features 30-mN maximum load capability, easy tip exchange for quick removal and installation of application-specific tips, and a full 70- μm range of indenter travel. With the DCM II option, users of

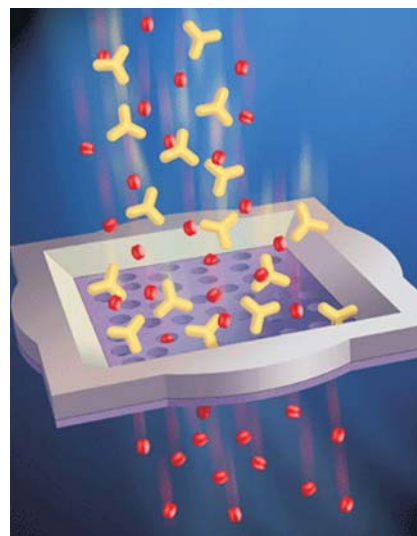
the Agilent nanoindenter G200 and G300 can study the precontact mechanics and the first few nanometers of an indentation in the surface of a material. Using standard methods, Agilent determined that the displacement resolution of the DCM II is 0.2 μm . The noise level is typically $<1 \text{ \AA}$, which ensures optimal indenter resolution. The DCM II indentation head can be configured for new or existing Agilent nanoindenters; the head's flexible mounting bracket provides multiple mounting options for specific applications. Agilent Technologies Inc, 5301 Stevens Creek Boulevard, Santa Clara, CA 95051, <http://www.home.agilent.com>

Atomic force microscopy imaging

Veeco Instruments has announced two patent-pending atomic force microscopy scan modes, ScanAsyst and PeakForce QNM. ScanAsyst, for AFM image optimization, provides reliable nanoscale data. Using intelligent algorithms that continuously monitor image quality and make appropriate parameter adjustments, ScanAsyst delivers fast, automatic, consistent results regardless of operator skill level. It is suitable for a broad range of material and life science applications and can operate in both gases and fluids. PeakForce QNM is an imaging mode that records very fast force response curves at every pixel in the image. It enables quantitative nanomechanical property mapping of both modulus and adhesion on a wide variety of materials while simultaneously imaging sample topography at high resolution. Veeco Instruments Inc, 223 Wilmington, Suite 114, West Chester Pike, Chadds Ford, PA 19317, <http://www.veeco.com>

Cell biology on nanoporous membrane

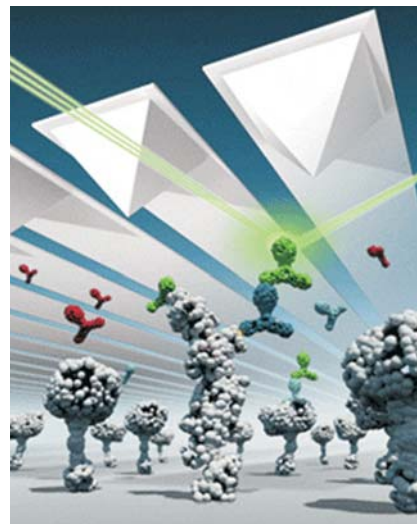
SiMPore has introduced the UltraSM membrane for electron microscopy and cell biology. The pure silicon nanoporous membrane is suitable for studying two cell populations that are physically separated but close enough to easily communicate. Physical separation is important in cellular studies in which one cell type is harvested and isolated after co-culture. To demonstrate the thinness and transparency of the UltraSM membrane, human white



blood cells were plated on its top and bottom surfaces. When the cells are imaged from below and above, the 15-nm-thick UltraSM, unlike traditional co-culture membranes, remains invisible and does not degrade the image quality of the cells on the top. SiMPore and its academic partners are also using UltraSM membranes to investigate improved drug permeability assays and develop tissue engineering platforms. SiMPore Inc, 150 Lucius Gordon Drive, Suite 100, West Henrietta, NY 14586, <http://www.simpore.com>

Nanoscale protein array assay

NanoInk's nano biodiscovery division has launched its first completely configured protein array kit. Based on the company's dip pen nanolithography platform, NanoInk's fluorescent assays enable nanoscale detection of clinically relevant proteins. The inaugural human



inflammation cytokine assay performs DPN-deposited protein arrays by means of a user-friendly protocol that can be conducted on the lab bench without special instrumentation. DPN provides a biologically friendly nanoscale method of fabricating arrays without the splashing that can lead to background noise or subjecting molecules to sheer forces that may disrupt biological function. Additional assays being developed will target proteins implicated in various disease states and toxicological responses. *NanoInk Inc, 8025 Lamon Avenue, Skokie, IL 60077, <http://www.nanoink.net>*

Nanoparticle characterization system

The NS500 system from NanoSight incorporates new hardware and software to deliver particle-by-particle characterization in an automated package. NanoSight's technology, known as nanoparticle tracking analysis, provides a high-resolution particle size distribution. Unlike dynamic light scattering, NTA detects individual particles as small as 20 nm and simultaneously tracks and sizes whole populations in real time. The resulting particle size distribution provides researchers with an overview of their samples that shows everything in the 10- to 1000-nm range. NTA also provides count and concentration; a visual display validates the results. The NS500 adds fluorescence capability with the sensitivity to detect individual quantum dots while eliminating background interference from other particles and media. Standard beads can be used to bind to single particles for optimum study. *NanoSight Ltd, Minton Park, London Road, Amesbury, Wiltshire, SP4 7RT, UK, <http://www.nanosight.com>*

Single-molecule force spectroscopy

The ForceRobot 300 from JPK Instruments provides for the characterization of molecular interactions such as the unfolding forces of single proteins and of a single molecular bond. Force spectroscopy is a single-molecule technique that allows the real-time study of molecular interactions on the nanoscale. It directly addresses the measurement of forces between and within molecules.



The ForceRobot's automated setup and continuous adjustments make data collection more efficient. The integration of optical techniques allows measurements to be targeted to the molecules of interest. Tens of thousands of force curves can be generated and evaluated in a matter of hours. The basic motorized stage provides positioning to better than 1 μm, while the precision mapping stage uses closed-loop control with noise levels to better than 0.3 nm with positioning to ~ 1 nm. *JPK Instruments AG, Bouchéstrasse 12, Haus 2, Aufgang C, 12435 Berlin, Germany, <http://www.jpk.com>*

Linear stage with nanometer accuracy

The Aerotech ANT130-L series stage employs a center-driven, noncogging,

noncontact linear motor and encoder as the driving element. Users may select among eight models with travels from 35 to 160 mm. Since the linear motor is a direct-drive device, there is no backlash, windup, or "stiction" normally associated with a lead- or ball-screw drive. The linear motor drive also offers the advantage of higher speeds and accelerations. The compact linear motor brings the ANT130-L to a peak unloaded acceleration of 1 g and a maximum velocity of 350 mm/s. The result is an accurate device with high dynamic performance and throughput. The company claims the ANT130-L significantly outperforms comparable screw-driven or other stages in its class. With its incremental step size of 1 nm coupled with Aerotech drives and controls, the ANT130-L delivers the precise, small-resolution steps critical to alignment applications. *Aerotech Inc, 101 Zeta Drive, Pittsburgh, PA 15238-2897, <http://www.aerotech.com>*

Microfluidic chip for multiphase flow

Dolomite's glass microfluidic Y-junction chip enables liquid-liquid contact of immiscible fluid streams and investigations into the diffusion of molecules between parallel laminar flow streams. The chip has smooth channel surfaces for uninterrupted flow and a compact size of 22.5 × 15 mm². Wide temperature and pressure ranges combined with chemical compatibility allow for the use of a broad variety of fluids. Excellent spectral transmission facilitates high visibility for quick, easy access with microscopy systems. The chip can be tailored to individual specifications with a range of customized options. Different depths can be etched into the channel, and custom channel layouts can be specified. Since the surface of the channel walls affects

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the fluid, the Y-junction chip is available with hydrophilic, hydrophobic, platinum, or gold coatings. *Dolomite-US, 29 Albion Place, Charlestown, MA 02129, <http://www.dolomite-microfluidics.com>*

Nanoparticle separation tool

The SepCon Spin column from TEMwindows makes it possible to separate nanoparticles that differ in size by 5 nm or less. Designed specifically for nanoparticle separations, it uses parent company SiMPore's ultrathin silicon nanoporous UltraSM membrane. Unlike conventional polymer membranes, SepCon can fractionate nanoparticles between <5 and 40 nm and recover both fractions. It will enable nanoparticle researchers to remove unused reactants from syntheses, purify samples through buffer exchange, and fractionate particles in a mixture according to size. *TEMwindows, 150 Lucius Gordon Drive, Suite 100, West Henrietta, NY 14586, <http://www.temwindows.com>*

Correlative microscope

The ClairScope JASM-6200 from JEOL is a correlative microscopy tool that

combines a light microscope with a high-resolution atmospheric scanning electron microscope. By enabling observation of samples in their native state using both an LM and an ASEM, the ClairScope reduces sample preparation time and allows dynamic observation of real-time processes. The ASEM allows high-resolution observation of wet biological samples such as cultured cells and imaging of material samples in liquids. Life sciences researchers can observe biological processes such as platelet generation, distribution of sugar chains, and microbe growth. Materials scientists will be able to observe and record crystallization, electrochemical reactions, and other phenomena as they occur. *JEOL Ltd, 1-2, Musashino 3-chome Akishima, Tokyo 196-8558, Japan, <http://www.jeol.com>*

Carbon nanotubes

Bayer MaterialScience has introduced Baytubes C 70 P, a new grade of carbon nanotube. Compared with Baytubes C 150 P, the new CNTs have improved dispersibility, making them suitable for use in mechanically sensitive polymers. They require shorter times than their predecessors to disperse the nanotube agglomerates in water and other low-viscosity liquids. Baytubes are agglom-

erated CNTs and offer a very high degree of purity. The agglomerates can be easily and safely handled and efficiently processed. Even small amounts are capable of imparting new properties to dispersions, plastics, metals, and other materials. *Bayer MaterialScience AG, Building K12, Kaiser-Wilhelm-Allee, 51368 Leverkusen, Germany, <http://www.bayermaterialscience.com>*

New literature

The new 15-volume *Encyclopedia of Nanoscience and Nanotechnology* from American Scientific Publishers provides up-to-date coverage of advanced nanotechnology-related research in fields such as chemistry, physics, engineering, and medical sciences. The set contains 300 articles, organized in alphabetical order, and supplements the original 10-volume encyclopedia that appeared in 2004. The 25 volumes together contain more than 22 000 pages, which include more than 700 articles, nearly 150 000 bibliographic citations, and several thousand figures, illustrations, tables, and equations. The encyclopedia will be useful for academic and research laboratories. *American Scientific Publishers, 26650 The Old Road, Suite 208, Valencia, CA 91381-0751, <http://www.aspbs.com/enn15.html>* ■

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