6310 Hollister Ave.
Santa Barbara
California, 93117

805-696-6466 Voice
805-696-6444 Fax
www.AsylumResearch.com

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*Z*therm™ Modulated Thermal Analysis Wins 2010 R&D100 Award

July 13, 2010 (Santa Barbara, CA): Asylum Research, Oak Ridge National Laboratory (ORNL), and R&D Magazine have announced that the new *Z*therm Modulated Local Thermal Analysis Option for Asylum's MFP-3D™ and Cypher™ Atomic Force Microscopes (AFMs) has been awarded the R&D100 Award for 2010. *Z*therm provides highly localized heating with sensitivity to $\leq 10^{-22}$ liter (sub-zeptoliter) materials property changes, more than an order of magnitude improvement in volume over that previously available with commercial systems. A standing problem with existing AFM-based thermal analysis systems is thermally induced bending of the cantilever that results in spurious deflection signals and variable loads being applied during heating. Asylum and ORNL have developed a patent-pending cantilever compensation and control solution that corrects this problem, providing constant-load detection of thermally induced melting (Tm), phase transitions (Tg) and other morphological and compliance effects for materials studies and material identification – with 10nm spatial resolution and ultimately at the single molecule level. The R&D100 Award will be presented to the Asylum Research/ORNL team at the awards banquet in Orlando in November 2010.

"The recent results I've seen from Asylum's *Z*therm Modulated Thermal Analysis are the highest resolution thermal measurements by anyone to date. Truly impressive," commented Dr. William King, University of Illinois, Urbana-Champaign.

In addition to standard thermal analysis capabilities, the *Z*therm package can also be used to evaluate contact stiffness and dissipation as a function of temperature with advanced techniques such Dual AC Resonance Tracking (DART) and Band Excitation (BE). The contact stiffness and dissipation – measured at the cantilever resonance – are much more sensitive to temperature dependent properties, including surface melting and transition temperatures, than static deflection of the probe as is conventionally measured in AFM. In addition, integrated piezo actuation allows high resolution AC imaging of samples for surface topographical mapping before and after thermal measurements.

Dr. Roger Proksch, Asylum Research President commented, "Our new *Z*therm option is the most powerful thermal analysis package on the market today, with sensitivity, resolution and capabilities beyond anything else available. We believe *Z*therm will enhance existing research avenues and open up new directions for analysis of thermal effects and material identification on scales previously impossible."

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Said Dr. Maxim Nikiforov of ORNL, "Ztherm's unprecedented resolution opens new horizons for the development of new types of plastics, as well as better understanding of failure mechanisms for existing materials. It has already proven useful for many types of materials ranging from bio-polymers to electrically-active polymers, and is applicable across many industries, including healthcare, energy materials, construction materials and others."

Added Dr. Jason Cleveland, Asylum Research CEO, "For the third year in a row, our research and development efforts have been validated by the R&D100 Award. We are proud and gratified to have been acknowledged once again for our technology leadership in scanning probe and atomic force microscopy."

Figure Caption:

Heat interrogation of polymers: from nanoscale to macroscale.

*Z*therm is an atomic force microscope-based technique which measures temperature-dependent mechanical properties of the sample with 10nm spatial resolution, in addition to mapping surface topography. *Z*therm integrates a nanoscale heat source with a new detection method that lowers the probed volume of material to the zepto-liter level (10^{-24} liters). The inset figures show nanoscale measurements made with Ztherm of a phase transition in a SEBS copolymer before (top) and after (bottom) *Z*therm measurements. Scale the experiment up one million times (soldering iron + egg will do the trick) and the human eye can detect a polymer phase transition (denaturation of bio-polymer albumen which is the main component of egg white) changes in the material after heating.

About R&D Magazine and the R&D100 Award

The winning of an R&D100 Award provides a mark of excellence known to industry, government, and academia as proof that the product is one of the most innovative of the year. Winners are selected by an independent judging panel of technology experts and editors of R&D Magazine. Since its founding in 1959 as *Industrial Research*, *R&D Magazine* has served research scientists, engineers and technical staff at laboratories around the world, providing timely, informative news and useful technical articles that broaden readers' knowledge of the research and development industry. *R&D Magazine* is a publication of Advantage Business Media (www.advantagebusinessmedia.com). Since 1963, the R&D 100 Awards have identified revolutionary technologies newly introduced to the market. Many of these have become household names, helping shape everyday life for many Americans. These include the flashcube (1965), the automated teller machine (1973), the halogen lamp (1974), the fax machine (1975), the liquid crystal display (1980), the printer (1986), the Kodak Photo CD (1991), the Nicoderm antismoking patch (1992), Taxol anticancer drug (1993), lab on a chip (1996), and HDTV (1998).

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About Asylum Research

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Asylum Research is the technology leader in atomic force and scanning probe microscopy (AFM/SPM) for both materials and bioscience applications. Founded in 1999, we are an employee owned company dedicated to innovative instrumentation for nanoscience and nanotechnology, with over 250 years combined AFM/SPM experience among our staff. Our instruments are used for a variety of nanoscience applications in material science, physics, polymers, chemistry, biomaterials, and bioscience, including single molecule mechanical experiments on DNA, protein unfolding and polymer elasticity, as well as force measurements for biomaterials, chemical sensing, polymers, colloidal forces, adhesion, and more. Asylum's product line offers imaging and measurement capabilities for a wide range of samples, including advanced techniques such as electrical characterization (CAFM, KFM, EFM), high voltage piezoresponse force microscopy (PFM), thermal analysis, quantitative nanoindenting, and a wide range of environmental accessories and application-ready modules.

Asylum's MFP-3D set the standard for AFM technology, with unprecedented precision and flexibility. The MFP-3D is the first AFM with true independent piezo positioning in all three axes, combined with low noise closed-loop feedback sensor technology. The MFP-3D offers both top and bottom sample viewing and easy integration with most commercially-available inverted optical microscopes.

Asylum's new Cypher AFM is the world's first new small sample AFM/SPM in over a decade, and sets the new standard as the world's highest resolution AFM. Cypher provides low-drift closed loop atomic resolution for the most accurate images and measurements possible today, rapid AC imaging with small cantilevers, Spot-On™ automated laser alignment for easy setup, integrated thermal, acoustic and vibration control, and broad support for all major AFM/SPM scanning modes and capabilities.

Asylum Research offers the lowest cost of ownership of any AFM company. Ask us about our industry-best 2-year warranty, our legendary product and applications support, and our exclusive 6-month money-back satisfaction guarantee. We are dedicated to providing the most technically advanced AFMs for researchers who want to take their experiments to the next level. Asylum Research also distributes third party cantilevers from Olympus, Nanoworld/Nanosensors, and our own MFM and iDrive™ tips.

For additional information, contact Terry Mehr, Director of Marketing Communications, or Monteith Heaton, EVP, Marketing/Business Development, Asylum Research, 6310 Hollister Avenue, Santa Barbara, CA 93117, 805-696-6466x224/227, Terry@AsylumResearch.com, Monte@AsylumResearch.com, www.AsylumResearch.com.

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