International Meeting on AFM in Biology and Medicine (AFM BioMed)

International Meeting on AFM in Biology and Medicine (AFM BioMed): Atomic force microscopy (AFM) is gaining recognition as a powerful tool for life science researchers wanting nanoscale imaging and manipulation to study cells, molecules, and forces. At the first AFM BioMed conference, held in Barcelona, Spain, 19-21 April 2007, only 50 attendees were expected, but the response to the conference announcement was overwhelming: 220 researchers attended, with many of the pioneers in the development of AFM and of its use in biology giving talks. Topics covered cellular interactions, single-molecular recognition, affinity, unfolding force measurements, high-resolution imaging, protein-membrane interactions, and more.

Pierre Parot (Atomic Energy Commission, France) chaired the organising committee. "The conference, which was standing room only, exceeded our expectations in its first year, effectively linking hundreds of international academic and industrial experts in life sciences involved in AFM and related techniques in medical/biological studies," he said. "The wide variety of applications evidence the potential of AFM technology in biomedical research. "Michael Horton (Life Sciences Director at the London Centre for Nanotechnology) gave the closing address. "This conference emphasised the need to set up cross-disciplinary collaboration up front," he commented. "Now that AFM has a relatively firm footing in the life sciences, biologists are becoming innovators in the use and applications for AFM as much as physicists have been. The next step is to connect nanoscale research to clear biomedical needs."

One of the early adopters, or, as Gerd Binnig (inventor of AFM) put it in his Nobel lecture, "believers" in the use of this new technology was Paul Hansma of the University of California at Santa Barbara, USA. Professor Hansma went on to become an important innovator in several aspects of AFM development. He gave the keynote address at the AFM BioMed conference and looked ahead towards clinical applications. "Back when we were developing AFM for biological applications, we were hoping that AFM would one day contribute to quality of life, like the light microscope and the electron microscope have in the past," he said.
"I look forward to the day when you will send me the picture of the first person who was healed because of the use of an AFM."

**Walk Like A Myosin**

Toshio Ando (Kanazawa University, Japan) pioneered high spatial-resolution imaging in aqueous solution with enhanced scan speed. He presented a video showing the hand-over-hand movement of myosin V along actin filaments and said that "high-speed AFM is useful for studying proteins' dynamic actions, and will open new ways of elucidating the mechanism of protein function."

"You can see molecules moving," said Simon Scheuring (Curie Institute, Paris) afterwards. "I mean, would anyone have ever expected to see how myosins walk - an individual myosin molecule walking along an actin filament? This is really one of the breakthroughs." Dr. Scheuring chaired the session on high-resolution imaging. The sense of wonder he expressed was one of the recurring themes of the conference. Whichever talk you attended, whichever researcher you spoke to during the breaks, even whichever of the regular exhibits you visited in the CosmoCaixa science museum that was the site of the conference - there was a real buzz, the kind of wonder and excitement that you would imagine is behind every scientist's motivation to "do" science.

**Integration of AFM and Light Microscopy**

Veeco Instruments and Leica Microsystems, two of the co-sponsors of the conference, unveiled their new life-science product collaboration during the conference: an integration of Veeco's BioScope II AFM with one of Leica's DMI series of inverted optical microscopes.
Edward H. Braun, Chairman and CEO of Veeco, said, "Our sponsoring of this conference is part of our initiative to bring instruments that we have developed for materials sciences and semiconductor technology to the life science market as biologists and life scientists reach for the same advanced resolution and performance for their research already existing in information technology. Our vision is to apply what we have learned to deliver new, innovative high-performance solutions for biological research applications." Werner Kampe, Marketing and Sales Manager of Leica Microsystems' Life Science Research Division, added, "As Veeco's technology and marketing partner, we are pleased to jointly develop a system that combines AFM with optical fluorescence and confocal microscopy. After officially announcing our cooperation at this conference, our vision is to take these technologies to the next step of innovation and integration."

Liz Adams uses a combination of optical and atomic force microscopy in her research at the Delaware Biotechnology Institute, University of Delaware, USA. "AFM is a really powerful technique, as it is able to complement data generated from a range of different methods, which helps us learn a more complete story, not just from one angle," she said. "At the Bioimaging Center we cover everything from chemical engineering to biological sciences. In my own research, we're interested in looking at immunological cells and how they respond to different stimuli. For example, by using a fluorescent probe with the confocal microscope, it's possible to locate specific molecules. By combining the AFM, we are then able to relate this to topography, which makes it possible to see how these structures are interrelated and how they change over time. That's why we are moving toward combining these techniques."

‘AFM BioMed’ was created by a scientific organising committee including: Pierre Parot and Jean-Luc Pellequer (CEA/DSV, Life Science division of the Atomic Energy Commission, France) and Daniel Navajas (University of Barcelona); and the session chairs, Yves Dufrêne (Catholic University of Louvain, Belgium), Peter Hinterdorfer (Johannes Kepler University, Austria), Simon Scheuring (Curie Institute, France), and Christian Le Grimellec (INSERM, France). The conference was co-sponsored by Veeco Instruments Inc., a provider of instruments for nanotechnology, Leica Microsystems, a designer and manufacturer of optical microimaging systems, and Telstar Instrumat.
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