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Einladung zum Vortrag

Mars AFM and Nanopipette
MEMS-based Instruments for Science and Technology

von

Prof. Dr. Urs STAUFER

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ORT: Hörsaal EI 2, Gußhausstraße 25, 2. Stock,

ABSTRACT

Micro Electro-Mechanical Systems [MEMS] have components, which move in the nanometer scale range and measure with atomic precision, while users have access to macroscopic parts. Operating and communication with the system is comparable to using standard microelectronics and is usually done via computers. MEMS are therefore ideal interfaces between our macro and the small, sub-micrometer or nano world. Probably the most prominent example to illustrate this is the scanning force microscope or AFM (for atomic force microscope). Systems comparable to AFM can be used as a remote tool or arm of an operator to measure or modify objects which are difficult to access either because they are too small or too remote.

In my presentation I will show two examples to highlight this strength. The first tool is the scanning nanopipette, which is directly derived from the AFM is more tailored towards modifications. It allows dispensing small amount of liquids through a hollow cantilever and tip, which has a small opening. We have developed a pump that can be integrated into such an instrument, allowing liquids to be quickly exchanged and transferred. This closes a gap in the attempt to build sort of “table-top” nano production tool.

During the second part I will concentrate on science and present the AFM experiments, which we remotely operated on Mars during the NASA mission “Phoenix”. We had investigated soil and dust samples to look for traces of water. Thanks to our high resolution microscope images, we could compose the first particle size distribution from the so called clay to the silt size range, which allowed us drawing unexpected conclusions.

BIOGRAPHICAL INFORMATION

Urs Staufer studied Physics, Mathematics and Philosophy at the University of Basel, Switzerland, where he received a diploma in experimental solid state physics in 1986 and a PhD summa cum laude for a thesis on applying the scanning tunneling microscope for surface modifications in 1990.

He then joined the IBM T.J. Watson Research Center in Yorktown Heights, USA as a post-doc for working on a microfabricated electron column for electron beam lithography applications. After having returned to Switzerland, he stayed at the Univ. of Basel, IBM Rüschlikon Research Laboratory and the Univ. of Neuchatel, where he was leading the group “tools for nanoscience” in the Sensors and Actuators and Microsystems Laboratory. In 2003, he was appointed associated professor in Neuchatel, and in 2007 full professor at the Mechanical Engineering faculty of the Delft University of Technology in the Netherlands, where he is currently heading the Micro and Nano Engineering Laboratory.

Among other accomplishments, he led the atomic force microscope experiment of the Mars Mission “Phoenix” of which he was Co-Investigator, and which successfully conducted the first AFM measurements on micron and sub-micron size particles in planetology. His current interested in applying fundamental knowledge from nanoscience in engineering research.

WEITERE INFORMATIONEN

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