Argonne NATIONAL LABORATORY

Helmut Dosch

"X-Rays at Solid-Liquid Interfaces"

Helmut Dosch received his doctorate in physics from Munich University. He has served as a Visiting Professor at Mainz University (1992-19933); as a Full Professor at Bergische University Wuppertal (1993-1997); and is currently Managing Director of and Scientific Member at the Max Planck Institute for Metals Research (since 1997) and a Full Professor at the University of Stuttgart. His research interests are in collective phenomena and self-organization processes at surfaces and interfaces, in thin films, multilayers, and nanostructures, and in the development of a microscopic understanding of how the presence of interfaces and nanoconfinement geometries modifies cooperative phenomena and instigates ordering and disordering phenomena. He is the author of *Critical Phenomena at Surfaces and Interfaces* and co-editor of *European Whitebook on Fundamental Research in Materials Science*. He is a member of the Senate Committee of Helmholtz Association, co-editor of *Europhysics Letters*, a member of the Scientific Policy Committee at Stanford Linear Acceleration Center, and Vice-chair of the Council of the European Synchrotron Radiation Facility.

Solid-liquid interfaces play an important role in many areas of current and future technologies, and in our biosphere. They play a key role in the development of nanofluidics and nanotribology, which sensitively depend on our knowledge of the microscopic structures and phenomena at the solid-liquid interface. The detailed understanding of how a fluid meets a wall is also a theoretical challenge. In particular, the phenomena at repulsive walls are of interest, since they affect many different phenomena, such as water-repellent surfaces or the role of the hydrophobic interaction in protein folding.

Recent x-ray reflectivity studies of various solid-liquid interfaces have disclosed rather intriguing phenomena, which will be discussed in this lecture: premelting of ice in contact with silica; liquid Pb in contact with Si; water in contact with hydrophobic surfaces. These experiments, carried out with high-energy x-ray microbeams, reveal detailed insight into the liquid density profile closest to the wall.

A detailed insight into atomistic phenomena at solid-liquid interfaces is also a prerequisite in the microscopic control of electrochemical reactions at interfaces. Recent x-ray studies show the enormous future potential of such non-destructive analytical tools for the *in situ* observation of (electro-) chemical surface reactions.

This lecture will review recent x-ray experiments on solid-liquid interfaces.

Wednesday, May 2, 2007
3:00 p.m.
Bldg. 402, APS Auditorium • Argonne National Laboratory

APS Colloquium