Helmut Dosch received his doctorate in physics from Munich University. He has served as a Visiting Professor at Mainz University (1992-1993); 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 nanorobotics, 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: premetting 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.
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