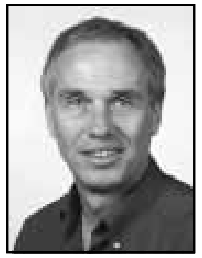
Helmut Dosch

Helmut Dosch is internationally known for his research in solid-state interfaces and nanomaterials with synchrotron radiation. A native of Bavaria, he obtained his doctorate at Ludwig Maximilian University in Munich. He worked as a scientist at the high-flux reactor at the Institute Laue-Langevin in Grenoble, France. After receiving the Feodor-Lynen Fellowship of the Alexander von Humboldt Society, he joined Boris Batterman at Cornell University in 1985. They carried out the first Bragg scattering experiments with evanescent X-ray wave fields.



Dosch went on to teach at the University of Mainz and later at the University of Wuppertal before becoming director of the Max Planck Institute for Metals Research in 1997. He is currently the chair of experimental solid-state physics at the University of Stuttgart and this month became chair of the directorate of the research center Deutsches Elektronen-Synchrotron (DESY).

Dosch's current interests encompass metastable and low-dimensional material systems, epitaxial alloy films, structure formation at metal surfaces, and the use of synchrotron radiation and neutrons. He has been published in more than 200 refereed journals and has coauthored several books.

Jerome B. Cohen Lecturers

2000 William D. Nix, Stanford University
2001 Edward J. Kramer, University of California, Santa Barbara
2002 Mildred S. Dresselhaus, Massachusetts Institute of Technology
2003 George W. Scherer, Princeton University
2004 Frans A. Spaepen, Harvard University
2005 Alex Zunger, National Renewable Energy Laboratory
2006 Yves Bréchet, Institut National Polytechnique de Grenoble, France
2007 Sharon C. Glotzer, University of Michigan

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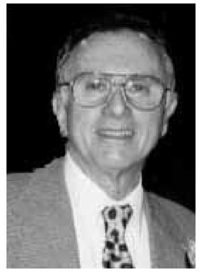
Jerome B. Cohen, 1932–1999

Jerome Cohen joined the Northwestern faculty in 1959 as an assistant professor of materials science in what is now the Department of Materials Science and Engineering. He was promoted to associate professor in 1961 and full professor in 1965 and was named Frank C. Engelhart Professor of Materials Science and Engineering in 1974 and the first Technological Institute Professor in 1984. He served as department chair from 1973 to 1978 and as dean of the Robert R. McCormick School of Engineering and Applied Science from 1986 to 1999.



Dean Cohen's research centered on measurements of residual stress, thermodynamics, ordering, clustering of defects, and phase transitions. The consummate materials scientist, he included metals, ceramics, and polymers in his studies. While dean, he continued to carry out research on the role of X-ray diffraction in allowing scientists and engineers to understand material structure and its relationship to properties and performance. He was a major contributor to the effort to build the Advanced Photon Source (APS) at Argonne National Laboratory and initiated the discussions with E. I. DuPont de Nemours and later Dow Chemical Company to establish the DND-CAT, one of the leading experimental research facilities at the APS.

Dean Cohen received SB and ScD degrees in metallurgy from Massachusetts Institute of Technology and an honorary doctorate from Linköping University in Sweden. His awards included the 1981 Howe Medal of the American Society for Metals (ASM) and the 1992 Acta Metallurgica Gold Medal. In addition to being elected to the National Academy of Engineering in 1993, Dean Cohen was a fellow of ASM International and the Minerals, Metals, and Materials Society (TMS) and an honorary member of the Japan Institute of Metals.

NORTHWESTERN
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Jerome B. Cohen Distinguished Lecture Series in Materials Science and Engineering

March 9–11, 2009

Presented by
Helmut Dosch
Director, Deutsches Elektronen-Synchrotron
Professor, University of Stuttgart

Robert R. McCormick School of
Engineering and Applied Science
Northwestern University

X-ray Light at Ice and Water Interfaces

Monday, March 9, Room L211, Technological Institute
Lecture 4 p.m.; reception to follow

Ice-solid and water-solid interfaces are omnipresent two-dimensional structures in our environment that play a vital role for many biological, technological, and environmental processes. This lecture will focus on the microscopic understanding of

• *the stability of ice in contact with silica interfaces:* X-ray reflectivity studies disclose premelting of ice at amorphous SiO_2 interfaces and show the emergence of a superdense interfacial water layer.

• *hydrophobic interfaces:* X-ray data could be obtained from water in contact with OTS-functionalized SiO_2 surfaces, giving a first high-resolution insight into the so-called "hydrophobic gap."

Synchrotron experiments performed at the beamline ID15A at the European Synchrotron Radiation Facility exploit high-energy X-ray microbeams and a novel Max Planck HEMD diffractometer that allows precision experiments at liquid interfaces.

Binary Alloys in Confinement

Tuesday, March 10, Room L211, Technological Institute
Lecture 4 p.m.

In one future vision for advanced mutlicomponent materials, their structural properties can be modeled accurately, allowing the controlled design of materials architectures with tailored functions. The ideal test beds for our current understanding of multicomponent systems are binary alloys, which include all aspects of interest and are simple enough to be handled with current experimental and theoretical tools. Of particular future interest is the microscopic understanding of the influence of interfaces and of the finite size on the phase behavior of a binary system. Both aspects control the properties of nanomaterials. The lecture will review synchrotron X-ray studies of binary alloys that shed light on these issues.

Grand Challenges for Megafacilities

Wednesday, March 11, Room 1421, Frances Searle Building
Lecture 4 p.m.

The most demanding challenges in science and the technologies of tomorrow can be mastered only by the bold exploration of the nanospace. The treasure quest in nanoscience encompasses vexing open problems, such as: What is the nature of dark matter and the origin of dark energy? Do we understand complex systems? Can we successfully combine concepts from physics and biology?

It is also accepted nowadays that little happens in industrialized countries without the use of high-tech nanomaterials, which are the building blocks of all modern technologies, ranging from information, communication, health, and energy to environment and transport. The detailed investigation of these various areas of the nanoworld often requires large-scale facilities that provide the necessary high-tech "microscopes" with the proper spatial and temporal resolution.