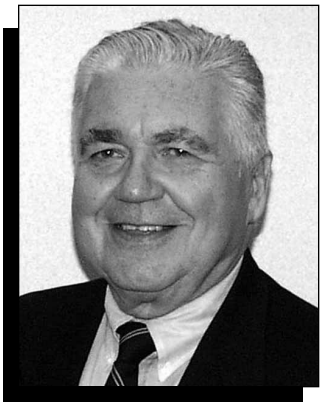
Howard K. Birnbaum to Receive 2002 Von Hippel Award for Contributions to Understanding Hydrogen in Metals, Defects, and Plasticity

The Materials Research Society's highest honor, the Von Hippel Award, this year will be given to Howard K. Birnbaum, professor emeritus at the University of Illinois at Urbana-Champaign. The citation states, "Through innovative use of a wide range of novel experimental tools, Howard K. Birnbaum has made seminal contributions to our understanding of intrinsic point defects, hydrogen in metals, and grain-boundary segregation, especially as these effects relate to mechanical properties. He has also stimulated, directed, and influenced interdisciplinary research throughout the materials community." The Von Hippel Award is given annually by MRS to an individual in recognition of outstanding and sustained contributions to interdisciplinary research on materials.

Birnbaum began his scientific career as a doctoral student with T.A. Read, receiving his doctorate from the University of Illinois in 1958 for his work on twinning mechanisms in the AuCd system. Since then, his work has focused on how mechanical deformation and plastic flow in materials derive from the complex interaction of point, line, and planar defects. In his work, he has employed a wide range of experimental techniques, often modifying them to address emerging and challenging scientific questions. He was the first to employ low-field, time-dependent magnetic susceptibility in studying point defects in nickel and nickel alloys. He used radioactive tracers to study pipe diffusion along dislocations in nickel to investigate the nature of the dislocation core, and he pioneered the use of *in situ* experiments in a controlled-environment transmission electron microscope to study hydrogen embrittlement mechanisms.

Birnbaum's early work demonstrated the relationship between point defects and yield effects, provided insight to dislocation core structures, determined interaction energies of point defects and obstacles, and showed that hydrogen diffusion at low temperature occurred by quantum tunneling. His later work focused on hydrogen effects in metals, including hydrogen diffusion, trapping, ordering, and embrittlement mechanisms. Birnbaum's use of the controlled-environment transmission electron microscope provided the first direct evidence that hydrogen enhanced the mobility of dislocations in a wide range of metals. This work resulted in the hydrogen-enhanced localized plasticity (HELP) mechanism and the hydrogen shielding model. In this area, he combined novel experiments and applied mechanics modeling coupled with finite element analysis to provide a basis for the shielding model and HELP mechanism. He later extended his studies on hydrogen-related phenomena to include grain-boundary diffusion and segregation effects. His broad interest in the mechanical properties of materials continued, and his work on deformation mechanisms across grain boundaries yielded a minimum set of conditions for predicting slip transfer.



Howard K. Birnbaum

Beyond his own research, Birnbaum has been an articulate spokesperson for the needs and future of materials science and engineering and has served on numerous committees and panels. He currently chairs the Argonne Advanced Photon Source Program Evaluation Board, is a member of the Argonne Science and Technology Advisory Committee, and is on the Acta Metallurgica Board of Governors. He served as director of the Frederick Seitz Materials Research Laboratory (MRL) at the University of Illinois at Urbana-Champaign from 1987 until 1999. During that time, he built the MRL into a multidisciplinary research center and made it a leading center for materials research.

Recognition for Birnbaum's work includes membership in the National Academy of Engineering and fellowship status in the National Academy of Arts and Sciences; The Minerals, Metals, and Materials Society; the Japanese Institute of Metals; the American Physical Society; the American Society for Metals; and the American Association for the Advancement of Science. He is also a member of the Materials Research Society, where he served on the Council (1994–1996). Among his awards are a Guggenheim Fellowship (1967), the Department of Energy Prize for Outstanding Research in Metallurgy and Ceramics (1984), the Robert F. Mehl Gold Medal (1986), and the Department of Energy Prize for Outstanding Sustained Research in Metallurgy and Ceramics (1988).

Birnbaum received his BS (1953) and MS (1955) degrees in metallurgy from Columbia University, and his PhD degree (1958) in metallurgy from the University of Illinois at Urbana-Champaign. He began teaching at the University of Chicago in 1958, joined the faculty of the University of Illinois as an associate professor in 1961, became head of the Department of Energy Metals and Ceramics Program in the MRL at the University of Illinois in 1984, and subsequently was named director of the MRL. He also spent time at AERE Harwell, Sandia Laboratories, Exxon Research Laboratory, and Kyoto University.

Birnbaum will accept the Von Hippel Award during the Awards Ceremony at the 2002 MRS Fall Meeting on December 4 at 6:00 p.m. in the Sheraton Boston Grand Ballroom. His presentation following the ceremony will be on "Hydrogen Effects on Deformation and Fracture—The Science and Sociology." MRS

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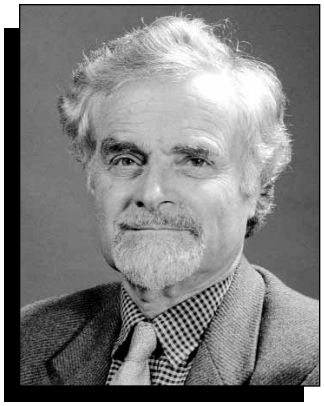
Robert W. Cahn Selected for 2002 David Turnbull Lectureship

The David Turnbull Lectureship recognizes the career of a scientist who has made outstanding contributions to understanding materials phenomena and properties through research, writing, and lecturing, as exemplified by Professor David Turnbull of Harvard University. This year, Robert W. Cahn of Cambridge University has been selected to deliver the 2002 Materials Research Society's David Turnbull Lecture. Cahn is cited "for service to the materials science community through writing, editing, mentoring, and fostering of international understanding, as well as for outstanding contributions to the development of physical metallurgy through research on recovery and recrystallization, rapid solidification, and intermetallic compounds."

Cahn propagated the concept of materials science as an integrating discipline in the early 1960s, forming the first department of materials science at the University of Sussex in the United Kingdom in 1965. In 1966, he was founding editor of the *Journal of Materials Science*. He maintained contact with his large contingent of students even after they left the university, and furthermore, beyond his retirement. He exemplifies the international nature of materials research, with former students distributed around the globe and his own fluency in many languages. His links are particularly strong with scientists in the United Kingdom, the United States, France, India, Germany, China, and Spain. He continues to travel worldwide as an invited lecturer.

Cahn has been, and continues to be, an innovative and distinguished contributor to the primary scientific literature. Beginning with his seminal text *Physical Metallurgy* (North-Holland, Amsterdam, 1996 [1965])—some editions of which he co-edited with Peter Haasen—Cahn has continued to serve as an editor for numerous book series. He is currently one of six editors-in-chief of the new *Encyclopedia of Materials* (Pergamon, Oxford). Cahn was a founding editor of the *Journal of Nuclear Materials* and of *Intermetallics*, and he served MRS as one of the original principal editors of the *Journal of Materials Research*. He is on the editorial board of *MRS Bulletin*, where he energized the book review section, and has been a Visiting Scientist (1997) and Volume Organizer (2002) for the magazine. He has published more than 100 book reviews and has served as book review editor for *European Review*, a quarterly publication of the Academia Europaea. Over many years, Cahn has written commentaries for *Nature*, a hundred of which have been collected under the title *Artifice and Artefacts* (Institute of Physics Publishing, Bristol, 1992). His most recent book, *The Coming of Materials Science* (Elsevier Science, Oxford, 2001), provides a masterly overview of the history of materials research.



Robert W. Cahn

Before he left the confines of a research laboratory to concentrate more broadly on materials education, Cahn made seminal contributions to materials research with his early (now classic) work on recrystallization. He continues to do so in more recent work on crystallography and order in alloys. In recognition of his research, Cahn recently received the Luigi Losana Gold Medal, the highest award of the Italian Metallurgical Association, and the Acta Materalia Gold Medal.

With MA, PhD, and ScD degrees from Cambridge, Cahn has held posts as a research officer in the Atomic Energy Research Establishment in Harwell; dean of the School of Engineering and Applied Sciences at the University of Sussex; professor of physical metallurgy at the University of Paris-Sud, France; and a visiting research fellow at GE Corporate Laboratory in New York. He has been an Honorary Distinguished Research Fellow at Cambridge since 1986.

Cahn is a fellow of the Royal Society; The Minerals, Metals, and Materials Society; and ASM International. He is a member of Academia Europaea and a foreign member of the Göttingen Academy, the Royal Spanish Academy of Sciences, the Chinese Academy of Sciences, and the Indian National Science Academy.

Cahn will deliver his lecture, "Metallurgists and Materials Scientists: Scope for Skepticism?" at the 2002 MRS Fall Meeting in Boston as part of Symposium X on December 12 at 12:45 in the Sheraton Boston Grand Ballroom. MRS

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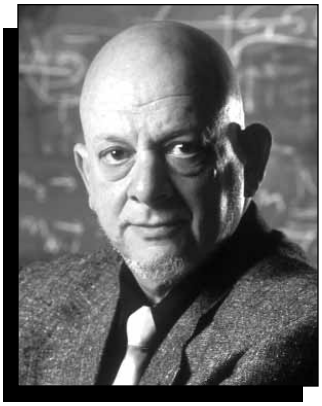
Landman, Lieber Named 2002 MRS Medalists

The Materials Research Society (MRS) has selected two scientists to receive the 2002 MRS Medal Awards, which recognize a specific outstanding recent discovery or advancement that is expected to have a major impact on the progress of any materials-related field. Uzi Landman of the Georgia Institute of Technology and Charles M. Lieber of Harvard University will receive their medals at the 2002 MRS Fall Meeting during the awards ceremony on Wednesday, December 4, at 6:00 p.m. in the Grand Ballroom at the Sheraton Boston Hotel.



Uzi Landman

Charles M. Lieber

Uzi Landman is named MRS Medalist "for molecular-dynamics simulations elucidating the microscopic behavior of solid and liquid interfacial junctions and atomistic processes of tribology." Beginning with his seminal article, "Atomistic Mechanisms and Dynamics of Adhesion Nanoindentation and Fracture" in *Science* in 1990, Landman has demonstrated the capacity of realistic molecular-dynamics simulations to make specific predictions that could be compared to quantitative experiments in the field of tribology. With the investigation reported in 1990, Landman and his colleagues transformed early macroscopic concepts pertaining to the role of interfacial solid junctions as a frictional resistance source in the sliding of contacting materials. This led to discoveries by Landman concerning the mechanical response of nanowires and of shearing dislocationless mechanical deformation mechanisms, as well as investigations of the electronic structure and quantized conductance characteristics in nanowires. In later work, he addressed the relationship between the molecular structure and the ordering processes, dynamics, and rheology of highly confined model lubricants at equilibrium and under shear, and he contributed significantly to the development of friction control methods. In many respects, Landman helped create the field of nanotribology, as he has contributed to both classical and quantum mechanical molecular-dynamics simulation methodologies leading to an understanding of the atomic origins underlying nanoscale tribological processes.

Landman joined the School of Physics at the Georgia Institute of Technology in 1977, where he is currently a Regents' and Institute Professor, the Fuller E. Callaway Chair, and director of the Center for Computational Materials Science. He received his DSc degree in theoretical chemistry from the Israel Institute of Technology (1969), served as editor-in-chief of the *Journal of Computational Materials Science*, and has over 300 publications. He is a fellow of the American Physical Society and has received several honors and awards, including the 2000 Feynman Prize in Nanotechnology.

Landman will give his Medalist presentation, "Small is Different: Hard and Soft Nanotribological Junctions," on December 5 at 12:45 p.m. in the Sheraton Boston Grand Ballroom.

Recipient of the 1993 MRS Outstanding Young Investigator Award, **Charles M. Lieber** has continued his leadership in his field of research as he is named MRS Medalist "for controlled synthesis of nanowire and nanotube materials." His group was the first to demonstrate that carbon nanotubes could be used as well-defined templates for the synthesis of transition-metal and main group carbide nanowires, which opens up access to nanoscale metallic, superconducting, and semiconducting materials. Furthermore, Lieber's studies of nanowire growth mechanisms demonstrated that the general concept of nanocluster-catalyzed growth could be used to synthesize single-crystal silicon and germanium nanowires in a predictable manner. Most recently, Lieber used his synthetic approach to create nanowire superlattice structures, an achievement that enables opportunities for creating novel properties and devices. In a recent series of publications, primarily in *Science*, he has reported on the fabrication of rectifying diodes, transistors, and light-emitting diodes. Lieber has opened up fields in three areas of nanowires: synthesis, characterization of important properties, and assembly for potential use in devices.

After receiving his PhD degree (1985) from Stanford University and serving a postgraduate research fellowship at the California Institute of Technology (1985–1987), Lieber joined the faculty of Columbia University. He joined Harvard in 1991, where he is currently the Mark Hyman Jr. Chair of Chemistry. Lieber has received numerous awards and honors, including, most recently, being named a fellow of the American Academy of Arts and Sciences (2002) and the International Union of Pure and Applied Chemistry (2000) and receiving the 2001 Feynman Prize in Nanotechnology. He serves on several editorial and advisory boards and has over 200 publications and 18 patents.

Lieber's Medalist presentation, "Nanowires as Building Blocks for Nanoscale Science and Technology—Building a Big Future from Small Things," will be given in the Hynes Convention Center, Room 311, on December 4 at 1:30 p.m. MRS

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