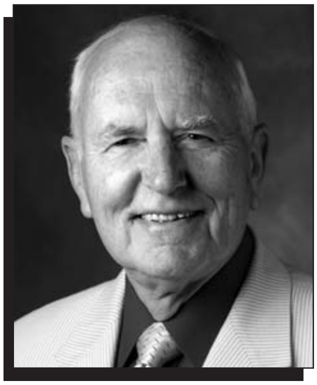
William D. Nix to Receive 2007 Von Hippel Award

The 2007 Von Hippel Award, the Materials Research Society's highest honor, will be presented to William D. Nix, the Lee Otterson Professor of Engineering emeritus in the Department of Materials Science and Engineering at Stanford University. Nix is being recognized for "original contributions on the deformation and failure of materials, particularly in the areas of thin films, small volumes, and high-temperature alloys; for pioneering mechanical test methods; and for educating and mentoring future generations of materials scientists." Nix will accept the honor during the awards ceremony at the 2007 MRS Fall Meeting in Boston on Wednesday, November 28, at 6:00 p.m. in the Grand Ballroom at the Sheraton Boston Hotel, where he will then present his award lecture.



William D. Nix

Nix has focused his research career on understanding the link between material microstructure and mechanical behavior. Beginning in the early 1960s, he studied and elucidated the high-temperature mechanical behavior of structural materials and then expanded his research into thin films, strain-gradient plasticity, and small-scale structures.

Early in his career, Nix earned a reputation as one of the world's leading authorities on dislocation theory and creep mechanisms. His insightful models for the high-temperature deformation of metals led to a quantitative and rational treatment of many high-performance metallic alloys that was not previously possible. One outstanding example is the scientific explanation of the creep mechanisms in oxide-dispersion–strengthened (ODS) superalloys, which are still among the metallic materials with the highest temperature capability.

In the late 1980s, Nix recognized the potential of thin-film mechanical science for advancing microelectronics technology. Among Nix's most prominent contributions to the development of new materials has been his fundamental research on defect processes in metallic and semiconductor films of submicron thickness. Nix's work on defect processes in thin films resulted in the publication of a model to calculate yield stress as a function of film thickness. This highly acclaimed model has become the benchmark for subsequent theories and simulations of thin-film strength. Another important contribution was his work on the development of nanoindentation techniques for studying the mechanical properties of materials in small volumes.

Together with his co-workers, Nix has made further substantial contributions in the area of small-scale mechanics. These include clarification of the supermodulus effect, finite element calculations of thermal stresses in interconnect lines, plasticity in multilayers, stress voiding and electromigration in metal interconnects, and crystalline coalescence during film deposition. In 2005, Nix and his co-worker J.R. Greer studied size-dependent plasticity in submicron gold pillars and developed an explanation of that effect in terms of a dislocation starvation concept.

Generations of Stanford students have benefited from Nix's skills as a teacher. Of the 75 students he has advised in the doctorate program, about a third of them have become successful academics at major research universities across the country and around the world.

In addition to publishing more than 420 scientific articles, Nix is co-author of the popular undergraduate textbook *The Principles of Engineering Materials* (Prentice Hall), and he was principal editor of the *Journal of Materials Research* from 1990 to 1993.

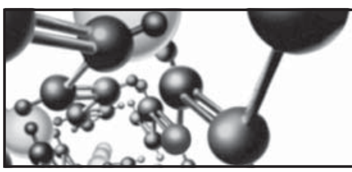
Nix has been the recipient of numerous honors. He was awarded the Bradley Stoughton Award for Young Teachers from the American Society for Metals (1970); the Champion Herbert Mathewson Gold Medal from the American Institute for Mining, Metallurgical, and Petroleum Engineers (1979); the *Acta Metallurgica* Gold Medal (1993); and the ASM Gold Medal (1998). He was also co-recipient of the Max Planck Research Prize (1990–1994). Nix is a fellow of ASM (1978), the Metallurgical Society of AIME (1988), and the American Academy of Arts and Sciences (2002); he was elected as a member of the National Academy of Engineering in 1987 and the National Academy of Sciences in 2003.

He has served on committees and advisory boards for U.S. government agencies including the National Science Foundation and the Department of Energy. Nix has also been a valuable member of a number of professional societies, serving on the organizing committees of national and international conferences and symposia, both as a member and chair.

Nix has acted as a consultant for leading industrial corporations including Union Carbide, IBM, Exxon, Intel, and Liquidmetal Technologies. He has also consulted for Oak Ridge and Los Alamos National Laboratories.

Nix obtained his doctorate degree in materials science from Stanford University in 1963. He was appointed assistant professor in the Department of Materials Science at Stanford in 1963, associate professor in 1966, and professor in 1972. During this time, he was also director of Stanford's Center for Materials Research (1968–1970). Nix served as associate chair of the department from 1975 to 1986 and chair from 1991 to 1996. He held the appointment of Lee Otterson Professor of Engineering from 1989 until his retirement in 2003.

The MRS Von Hippel Award includes a $10,000 cash prize, honorary lifetime membership in MRS, and a unique trophy—a mounted ruby laser crystal, symbolizing the many-faceted nature of materials research. The award recognizes those qualities most prized by materials scientists and engineers—brilliance and originality of intellect, combined with vision that transcends the boundaries of conventional scientific disciplines, as exemplified by the life of Arthur von Hippel (http://vonhippel.mrs.org).



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Ramamoorthy Ramesh Selected for 2007 David Turnbull Lectureship for Complex Oxide Materials

The Materials Research Society's 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 David Turnbull. This year, Ramamoorthy Ramesh of the University of California, Berkeley, and Lawrence Berkeley National Laboratory has been selected to deliver the 2007 David Turnbull Lecture. Ramesh is cited for "pioneering contributions to the materials science of complex oxide heterostructures and nanostructures, including multiferroics, ferroelectrics and magnetoresistive oxides, and his enthusiasm and leadership in conveying the excitement of this field to a broad audience." Ramesh will be presented with the award during the awards ceremony at the 2007 MRS Fall Meeting in Boston, November 28, at 6:00 p.m. in the Grand Ballroom at the Sheraton Boston Hotel. He will present his lecture in the same location on November 27 at 5:05 p.m.

Ramamoorthy Ramesh

Ramesh is best known for his contributions on electrode and integration issues in ferroelectric thin films, which helped enable the concept of ferroelectric-based memory devices to become a reality. Although the promise of ferroelectric memories was recognized in the late 1950s, their commercial application was hindered by a seemingly intractable problem, referred to as "polarization fatigue"; after it had been reversed about a million times, the remnant polarization in ferroelectric thin films was found to be considerably reduced. The technology lay dormant for 30 years until, in 1991, when it was discovered that the solution to the problem was to use conducting oxide electrodes. Ramesh first demonstrated his technique using epitaxial conducting oxide electrodes, but soon found that his solution applied to polycrystalline conducting oxide electrodes, which established the commercial viability of the method. "Smart cards" have been in commercial production for several years, and high-density embedded ferroelectric random access memories (FeRAMs) are about to enter the market.

The solution to the fatigue problem was only one of many contributions Ramesh has made to the science and technology of ferroelectric thin films. He developed a method to orient PZT ferroelectric films in the direction maximizing their switched polarization. This method, which he called "templating" was developed for polycrystalline films and is highly relevant to device technology. He also developed materials solutions enabling improved integration of ferroelectrics with underlying Si-based semiconductor devices.

Through his pioneering work in the area of colossal magneto-resistance (CMR), Ramesh, in collaboration with Sungho Jin, helped launch a new wave of oxide thin film research. Their early article on the effect of manganite thin films has been cited more than 2000 times. Of the three major perovskite research thrusts since the discovery of high-temperature superconductivity 19 years ago, Ramesh was a significant contributor to the first (high T_c), one of the most important contributors to the second (ferroelectrics), and a pioneer in the third (CMR).

Ramesh has continued to open new fields in complex oxide materials, with a specific focus on multiferroics where he has made highly innovative and groundbreaking contributions to the field. Multiferroics are materials that exhibit more than one order parameter (e.g., ferroelectricity and anti-ferromagnetism). Such materials are currently of great interest because of their complex behavior. In a recent publication, Ramesh and coworkers considered materials which are both ferroelectric and magnetic. Using hetero-epitaxy as a means to control phase stability, his group was able to demonstrate the intrinsic ferroelectric polarization in bismuth ferrite.

Ramesh is admired by his colleagues for his remarkable energy and creativity and his ability to inspire others with enthusiasm for his work. His ability to recognize diverse talents and build multidisciplinary teams has played an important role in furthering his own research, as well as obtaining financial support for his faculty.

Ramesh was elected as Fellow of the American Physical Society in 2001 and Fellow of the American Association for the Advancement of Science in 2006. His many awards and honors include the K.K. Mullick Gold Medal in Metallurgy (1983), the Earl R. Parker Fellowship from the American Society for Metals (1987), the ISIF Award for Outstanding Achievement in Integrated Ferroelectrics (2000), the Humbolt Senior Scientist Prize by the Alexander von Humbolt Foundation (2001), and the Ikeda Award from the Ikeda Memorial Foundation (2006).

After completing his doctorate program in materials science at the University of California, Berkley in 1987, Ramesh was a postdoctoral associate, NCEM, at Lawrence Berkley Laboratory in California. In 1989, he joined Bell Communications Research in Red Park as a member of the technical staff, and in 1995 he was appointed associate professor at the University of Maryland, College Park, where he was promoted to Distinguished University Professor in 1999, before returning to the University of California, Berkley as professor in 2004.

Ramesh has published more than 300 papers, with a total of 13,000 citations and he has issued 26 patents. He has served on the editorial board of the *Journal of Applied Physics* and *Applied Physics Letters* (1998–2001) and he is currently a member of the editorial boards of the *Journal of Materials Research*, *Integrated Ferroelectrics*, and *Journal of Electroceramics*. He has been a member of the organizing committee of a number of national and international conferences and symposia, many as chair or co-chair. He has also been actively engaged as a consultant for industrial corporations such as Bellcore, Motorola, and Canon.

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Omar M. Yaghi Named 2007 MRS Medalist

The Materials Research Society has selected as the 2007 MRS Medalist Omar M. Yaghi of the University of California, Los Angeles, for "pioneering work on the synthesis, structure, and theory of metal-organic frameworks." Yaghi will be recognized during the awards ceremony at the 2007 MRS Fall Meeting in Boston on Wednesday, November 28, at 6:00 p.m. in the Grand Ballroom at the Sheraton Boston Hotel. He will also give his Medalist talk at the meeting.

The results of Yaghi's research have firmly established the concept of the use of building blocks for synthesizing new hybrid organic–inorganic crystals by design. The synthesis of chemical compounds by design has a long history in the field of organic chemistry. However, until recently it was not possible to apply this approach to other compounds such as extended chemical structures composed of building units linked together by strong bonds. In a series of seminal papers published during the past 12 years, Yaghi has established design rules and a synthetic approach which are now used worldwide by chemists, materials scientists, and engineers wishing to design and prepare extended structures for a wide variety of applications.

Yaghi's major conceptual advance was to show that cationic metal–oxygen units can be linked by anionic dicarboxylates into extended solids. He showed that these structures possess exceptional thermal stability and high porosity and are amenable to functionalization. Furthermore, he demonstrated reversible adsorption isotherms, and in 1998–1999 he reported the discovery of the iconic material known as MOF-5. A new class of robust materials, with designed pore functionality and metrics, is now being applied to essential chemical processes such as gas storage, separation, sensors, and catalysis.

Omar M. Yaghi

The need for reliable storage of small molecular gases such as methane and hydrogen is continually increasing. Researchers are looking into methane, which is relatively abundant, as a material to replace petroleum for many purposes. MOFs are seen to offer a viable solution to the problem of transporting methane with minimum loss and waste. Yaghi has shown that MOFs can also be successfully used for hydrogen storage.

Yaghi refers to this new chemistry as "reticular chemistry," which he defines as the chemistry concerned with linking molecular building blocks into predetermined extended structures using strong bonds. The results of reticular chemistry have so far elucidated the least dense crystals known and MOF crystals with the highest surface areas.

After completing his PhD degree with Walter G. Klemperer at the University of Illinois in 1990, Yaghi was awarded an NSF postdoctoral fellowship to work with Richard H. Holm at Harvard University. He then held positions at Arizona State University and the University of Michigan, where he was appointed Robert W. Parry Collegiate Professor in the Department of Chemistry. In 2006, he moved to UCLA as Christopher S. Foote Professor in the Department of Chemistry and Biochemistry. His awards and honors include the ACS Exxon Solid State Award (1998), the Graduate College Mentor Award (1999), the 3M Faculty Award (2002), and the Sacconi Medal from the Italian Chemical Society (2004), and he was named as one of *Popular Science* magazine's "brilliant 10" in 2006.

Plenary Speaker Steven Chu to Discuss the World's Energy Problem

Nobel laureate Steven Chu, director of Lawrence Berkeley National Laboratory and a professor of physics and of molecular and cell biology at the University of California, Berkeley, will present the plenary address at the 2007 Materials Research Society Fall Meeting in Boston on Monday, November 26 at 6:00 p.m. in the Grand Ballroom of the Sheraton Boston Hotel. In his presentation, "The World's Energy Problem and What We Can Do About It," Chu will discuss scientific research to address the energy problem.

Across the world, national security is intimately tied to energy security, economic competitiveness, and the environment. At the core of these problems is the need for secure, clean, affordable, and sustainable sources of energy. While great progress can be made on the demand side of the equation, the problem must be solved by science and technology on the supply side of the equation. After briefly describing the energy problem, Chu will spend the remainder of the talk discussing current options and some areas of energy research that may lead to transforming technologies.

Steven Chu

Actively involved in seeking solutions to the current energy dilemma, Chu is co-chairing the InterAcademy Council (IAC) study, *Lighting the Way: Toward a Sustainable Energy Future*. He has recently served on the Augustine Committee that produced *Rising Above the Gathering Storm*, and on the advisory committees to the Directors of the National Institutes of Health and the National Nuclear Security Agency, and the Executive Committee of the National Academy of Sciences (NAS) Board on Physics and Astronomy.

Chu received his PhD degree in physics from UC–Berkeley. He received the 1997 Nobel Prize in physics and has also received 10 honorary degrees and numerous other awards and recognitions. He serves on the boards of the Hewlett Foundation, the University of Rochester, NVIDIA, and the Scientific Board of the Moore Foundation, Helicos, and NABsys.

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MRS Applauds Passage of America Competes Act of 2007

The Materials Research Society congratulates members of the U.S. House of Representatives and Senate and President Bush for passage of the America Competes Act of 2007. The bill, which was signed into law on August 9, 2007, is a comprehensive package of legislation designed to improve U.S. innovation and competitiveness.

The bill is a result of many years of hard work by representatives in U.S. government, business, and the professional scientific community. Throughout this process, the Materials Research Society has been an active participant. The MRS President, in consultation with the Society's Government Affairs Committee (GAC), wrote a number of letters to Congress and the White House. GAC provided support letters on the MRS Materials Voice Web site (www.mrs.org/materialsvoice) for MRS members' use; the MRS Washington Office supported this legislation on the Hill and coordinated with other coalition partners; former MRS Congressional Fellows drafted innovation legislation; and MRS volunteers supported the legislation in person during Congressional visits.

The America Competes Act (HR272) is a major step forward to ensuring that the United States remains at the leading edge of scientific and technological innovation. This legislation puts a needed reemphasis on the importance of math, science, and basic research to the national economy. Investments in these critical areas are investments in the United States' future well-being.

This authorization bill is largely based upon the groundwork laid out by the National Academy of Sciences' report, *Rising Above the Gathering Storm*, as well as the President's American Competitiveness Initiative. Many leaders in Congress and the Administration can rightfully take credit for helping to support a major bipartisan legislation.

Among its highlights, the America Competes Act:

- authorizes the doubling of funding at the National Science Foundation and the Department of Energy's Office of Science over the next seven years, and authorizes the doubling of funding for the National Institute of Standards and Technology over 10 years;
- authorizes $33.6 billion over fiscal years 2008–2010 for science, technology, engineering, and math (STEM) education programs across the federal government;
- establishes the Advanced Research Projects Agency-Energy (ARPA-E) at the Department of Energy;
- establishes the Technology Innovation Program (TIP) at the National Institute of Standards and Technology;
- expands programs to enhance the undergraduate education of the science and engineering workforce;
- increases the number of teachers serving at high-need schools and expands the pool of qualified advanced placement (AP) and International Baccalaureate (IB) teachers;
- establishes the President's Council on Innovation and Competitiveness; and
- directs the President to convene a National Science and Technology Summit.

Before going to President Bush, the House of Representatives' version of the bill was passed by a vote of 367–57, while the Senate's version was passed by unanimous consent.

Information on how individual members of Congress voted can be accessed at Web site http://clerk.house.gov/evs/2007/roll802.xml. Furthermore, the MRS Materials Voice program, which can be accessed at Web site www.mrs.org/materialsvoice, is set up for members to send letters of support to individual members of Congress.

Howard E. Katz
Chair, MRS Government Affairs Committee
Karin E. Pavese
Chair, MRS Grass Roots Subcommittee

MRS Elects Officers, Board of Directors for 2008

Members of the Materials Research Society have elected two officers and five directors to join the 2008 MRS Board of Directors. The board is composed of the officers and up to 18 directors. The officers of the Society are the president, the vice president (who is also the president-elect), the secretary, the treasurer (a position appointed by the Board of Directors), and the immediate past president. The annual election ended September 14, 2007.

Terms of office expire at the end of the year indicated in parentheses. The asterisk (*) designates those who are newly elected.

2008 MRS Officers

President
Cynthia A. Volkert
University of Göttingen

Immediate Past President
Alan J. Hurd
Los Alamos National Laboratory

Vice President (President-Elect)
*Shefford P. Baker
Cornell University

Secretary
*Bethanie J. H. Stadler
University of Minnesota

2008 Board of Directors

Joanna Aizenberg (2008)
Harvard University

J. Charles Barbour (2009)
Sandia National Laboratories

***Ian W. Boyd (2010)**
University College London

***Yves J. Chabal (2010)**
Rutgers University

Susan Ermer (2009)
Lockheed Martin Advanced Technology Center

***Mary E. Galvin (2010)**
Air Products and Chemicals, Inc.

***Gregg S. Higashi (2010)**
Applied Materials, Inc.

Cherie Kagan (2009)
University of Pennsylvania

Thomas P. Russell (2008)
University of Massachusetts, Amherst

James C. Sturm (2009)
Princeton University

***Richard A. Vaia (2010)**
Air Force Research Laboratory

Kazumi Wada (2008)
University of Tokyo

Timothy P. Weihs (2009)
Johns Hopkins University

Ellen D. Williams (2008)
University of Maryland

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