

mapped the electronic wave function at a given energy. They accounted for their measurement with a detailed model of the electronic states of the nanotube peapods, which was constructed by considering how arrays of  $C_{60}$  molecules interacted with the one-dimensional electronic states of the nanotube.

"These calculations showed us how the electronic states of this composite system derive its character from both electronic states of the nanotube and the  $C_{60}$  molecules," said Yazdani.

The researchers speculate that the lessons learned in unraveling the properties of this complex nanostructure also may apply elsewhere.

Luzzi said, "When we first created peapods, it provided the first glimpse of a toolbox of nanomaterials that could provide the same excellent mechanical strength and thermal conductivity of nanotubes but would have other tunable properties—optical, electrical, or catalytic—to provide the diverse functionality needed for integrated and complex nanodevices.

This work confirms that these materials are not peas in a pod but actually peapods, a completely new material."

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**News of MRS Members/Materials Researchers**

**Rudolph Buchheit**, associate professor at the Fontana Corrosion Center at The Ohio State University, has received the **H.H. Uhlig Award** on April 7 from NACE International in recognition of his enthusiastic teaching of corrosion at all levels, involvement of undergraduate and high school students in research activities, and continued promotion of the highest quality of corrosion research and education.

**Robert A. Condrate Sr.**, emeritus professor of spectroscopy at Alfred University, has been made a **Fellow of the**

**Canadian Ceramic Society** recognizing his contributions to the Society in ways that help it meet its mission of advancement of knowledge in ceramic and glass sciences and manufacturing.

**Cees Dekker** (Delft Technical University) has received the **Julius Springer Prize for Applied Physics 2002** for the discovery of the electronic properties of carbon nanotubes and for pioneering work on their application in single-molecule electronic devices. The prize has been awarded since 1998 by the editors of the Springer journals *Applied Physics A (Materials*

*Science & Processing)* and *Applied Physics B (Lasers and Optics)*.

**J. Murray Gibson** (Argonne National Laboratory) has been appointed **Associate Laboratory Director for the Advanced Photon Source (APS)**, effective October 22, 2001. Gibson has been the director of the Materials Science Division at ANL since 1998, where he has strengthened existing programs, and worked to add new areas. In particular, Gibson oversaw ANL's early efforts in nanosciences and fostered the development of the x-ray nanoprobe.

**Lene Hau** (Harvard University) has received a **2001 MacArthur Fellowship** from the MacArthur Foundation in recognition of her insights of the fundamental interactions of light and matter.

**Mietek Jaroniec** (Kent State University) received the **2001 Activated Carbon Hall-of-Fame award** for his innovative, patented "New Porous Carbons."

**Steffen Kaldor** (IBM T.J. Watson Research Center) received the **American Vacuum Society (AVS) 2001 Graduate Research Award** at the Fall 2001 meeting in San Francisco. The award recognizes his graduate research on the analysis of bending shapes in Si and its application to both strain measurements in thin films and microelectromechanical systems. Kaldor served as president of the MRS University Chapter at Columbia University and writes research news for *MRS Bulletin*. He recently joined IBM as an engineer/scientist in the Advanced Semiconductor Technology Center, where he will work in thin-film-process development for microelectronics.

**Lisa C. Klein**, a professor of ceramic and materials engineering in the School of Engineering at Rutgers University, has been selected as a **Fellow in the New York Academy of Sciences** for her breakthrough contributions to engineering, particularly in the area of sol-gel science, a low-temperature process for making ceramic coatings.

**Linn W. Hobbs Awarded Honorary Officer, Order of the British Empire**

Materials science professor **Linn W. Hobbs** of the Massachusetts Institute of Technology has been awarded an honorary OBE (Officer, Order of the British Empire). The honor was presented by British Ambassador Sir Christopher Meyer in a ceremony at the British Embassy in Washington, DC on November 14. Hobbs was awarded the honor in recognition of his services to British-American relations in education through his work on the Marshall Scholarships.

The Marshall Scholarships, established by an Act of the British Parliament in 1953, bring the "best and brightest" of young U.S. graduates to the United Kingdom for degree studies in any subject at the institution of their choice. The scholarship now brings up to 40 students annually for two years of postgraduate study or a second undergraduate degree. Noted past Marshall Scholars include U.S. Supreme Court Justice Stephen Breyer and Duke University president (formerly president of Wellesley) Nannerl Keohane.

Hobbs, an internationally distinguished scientist, has taught at MIT since 1981. He is a past associate chair of the MIT faculty. He is a past councillor of the Materials Research Society; past president of the Microscopy Society of America, and is a Fellow of the American Ceramics Society. He has been a Research Fellow of Wolfson College, Oxford; a visiting professor at Balliol College, Oxford; and has worked at the UK Atomic Energy Research Establishment at Harwell.

Hobbs joined the Boston selection committee for the Marshall Scholarships in 1985 and has served as its chair since 1989. He was a 1966 Marshall Scholar. Hobbs holds a BSc degree in materials science from Northwestern University (and was the university's first Marshall Scholar) and a DPhil degree in Materials from Oxford. He is a past president of the Oxford and Cambridge Society of New England.



*Linn W. Hobbs (left) of the Massachusetts Institute of Technology receives his honorary OBE from British Ambassador Sir Christopher Meyer.*

**Gretchen Kalonji**, Kyocera Chair in the Department of Materials and Engineering at the University of Washington, has been honored with an **NSF Director's Award for Distinguished Teaching Scholars**, which recognizes educators for integrating research into education.

**David J. Lockwood** (National Research Council of Canada) was inducted as **Fellow of the Electrochemical Society (ECS)** at the 200th Meeting of the Society held in San Francisco, September 2–7, 2001. He was elected “for seminal contributions to the understanding of the optical properties of solids and, in particular, the definitive observations of light emission due to quantum confinement in silicon nanostructures.”

**Arashmid Nahal**, assistant professor at the Institute for Advanced Studies in the Basic Sciences, Zanjan, Iran, has received the **2001 ICO/ICTP award** (International Commission for Optics/Commission Internationale d'Optique) which recognizes researchers under 40 years of age originating from developing countries and conducting research in developing countries.

**Brooks Pate** (University of Virginia) has received a **2001 MacArthur Fellowship** from the MacArthur Foundation in recognition of his insights into chemical reactions of excited molecules.

**Fernando Perez Quintián**, assistant professor at the Universidad de Buenos Aires, has received the **2001 ICO/ICTP award** (International Commission for Optics/Commission Internationale d'Optique) which recognizes researchers under 40 years of age originating from developing countries and conducting research in developing countries.

**R. Byron Pipes**, former Rensselaer Polytechnic Institute president, has been selected as the University of Akron's **Goodyear Professor of Polymer Engineering**. Among other responsibilities, he will lead new initiatives in nanocomposite research and he will direct the Akron Global Polymer Academy, a newly created distance learning initiative that will be able to link to area corporations and school districts.

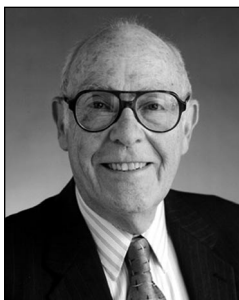
**Bhakta B. Rath** (Naval Research Laboratory) has received the **Federation of Materials Societies (FMS) National Materials Advancement Award** in recognition of his outstanding capabilities in advancing the effective and economic use of materials and multidisciplinary field of

materials science and engineering generally, and for his contribution to the application of the materials profession to national problems and policy.

**H.-E. Schaefer** of the University of Stuttgart, Germany, Institute of Theoretical and Applied Physics, has been awarded the **Tammann Medal 2001 of the German Materials Science Society (DGM)** for outstanding scientific contributions on the application of solid-state measuring

techniques to problems in the field of materials science.

**Jack H. Westbrook** of Brookline Technologies received the **ASM International Albert Sauveur Achievement Award for 2001** for contributions calling attention to intermetallic compounds as a new class of engineered materials and advancing scientific understanding of their behavior, particularly their mechanical properties, constitution, and defect structures.



### John W. Cahn to Receive 2002 Bower Award and Prize for Achievement in Science

Materials scientist **John W. Cahn** of the National Institute of Standards and Technology (NIST) has been selected to receive the 2002 Bower Award and Prize for Achievement in Science from the Franklin Institute for his revolutionary accomplishments in the understanding of the thermodynamics and kinetics of phase transformations. Cahn's lifelong dedication to understanding materials has inspired generations of scientists and engineers and led directly to the creation of new, multifunctional materials based on his ground-breaking theories.

Initially motivated by a desire to place the millenniums-old craft of metal-making on solid scientific footing, Cahn's theories have sprouted productive lines of research not only in metallurgy but also in physics, mathematics, chemistry, engineering, economics, and demography. Early in his career, Cahn was vexed by the failure of prevailing theory to account for the clumping and segregating of atoms during metals processing. With John Hilliard, a colleague at General Electric, he developed a “simple generic equation” to explain the phenomenon known as phase separation.

Since it was first published in 1961, the Cahn-Hilliard equation has become a pillar of materials science and engineering. It has been used to explain occurrences ranging from the simple (such as the curdling of cream in coffee and the formation of frost patterns on windshields) to the complex (such as the clumping of galaxies in the early universe and the evolution of settlement patterns in urban areas). The equation also underpins methods used to improve the sharpness of vague images.

Cahn was a key member of the team contributing to the discovery of “quasicrystals” in 1984 by NIST guest researcher Dan Shechtman. The peculiar symmetrical arrangement, found in a rapidly cooled alloy, was not allowed by long-established laws of crystallography. Skeptics at the time argued that the observed “five-fold symmetry” of quasicrystals was not even allowed by nature.

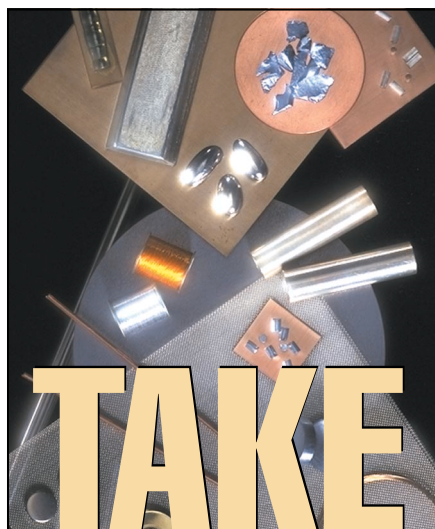
The discovery launched several new fields of investigation. Practical payoffs to date include inexpensive nonscratch, nonstick coatings for cookware and hardening agents for medical instruments.

Over his 50-year career, Cahn has made many significant contributions to the progress of materials and mathematics research. He has published about 250 scientific papers; delivered 400 invited lectures on his work; and received numerous national and international honors and awards, including the National Medal of Science and the MRS Von Hippel Award. He recently served on the MRS Council. Cahn received his PhD degree in physical chemistry in 1953 from the University of California—Berkeley, and two honorary degrees: ScD (hon.) from Northwestern University in 1990 and D. Hon. Causes, from the University Decry, France, 1996.

The award ceremonies are to be held on Thursday, April 25, 2002, at the Benjamin Franklin National Memorial, Philadelphia. The Franklin Institute Awards have recognized preeminent accomplishment in science and technology since 1824, in the spirit of discovery embodied by Benjamin Franklin.

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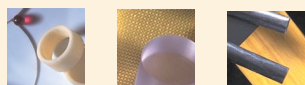
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Circle No. 14 on Inside Back Cover

The American Association of Pharmaceutical Scientists (AAPS) has announced 2001 Awards and Fellows, including:

**Kinam Park** (Purdue University) who received the **AAPS Research Achievement Award in Pharmaceutics and Drug Delivery** for work on the use of various polymers and hydrogels for controlled drug delivery;

**Michael J. Pikal** (University of Connecticut) who received the **AAPS Research Achievement Award in Pharmaceutical Technologies** for contributions to pharmaceutical technology in the field of lyophilization in topics ranging from engineering considerations to protein materials science; and

**Ijeoma F. Uchegbu** (University of Strathclyde, UK), who first demonstrated the formation and use of polymeric glycol chitosan, poly-L-lysine and poly-ethylenimine vesicles for drug and gene delivery, has received the **AAPS New Investigator Grant in Lipids-Based Drug Delivery Systems**.

**Carla M. Caramella** (University of Pavia, Italy), **Susan M. Lunte** (University of Kansas), and **Charles Russell Middaugh** (University of Kansas) are among 13 new Fellows.

The Franklin Institute Committee on Science and the Arts has announced 2002 Benjamin Franklin Medal and Bower Award Laureates.

**Sumio Iijima** (NEC Corp.) received the **Benjamin Franklin Medal in Physics** for his discovery and clarification of the atomic structure and character of multiwall and single-wall carbon nanotubes, which have critically shaped the rapidly growing condensed matter and materials science field of nanoscale science and electronics.

**Shuji Nakamura** (University of California—Santa Barbara) received the **Benjamin Franklin Medal in Engineering** for his fundamental influence in the technology of gallium-nitride; his development of violet/blue laser diodes and high-brightness blue and green light-emitting diodes have improved the current technology and are revolutionizing the lighting industry.

**Alexandra Navrotsky** (University of California—Davis) received the **Benjamin Franklin Medal in Earth Science** for her spectrum of accomplishments in crystal chemistry that have established the identity of materials at hundreds of kilometers of depth in the Earth that otherwise are inaccessible to direct observation.

**Gordon E. Moore** (Intel Corp.) received the **Bower Award for Business Leadership** for his pioneering role and ongoing contributions to the semiconductor industry, and his passionate commitment to community service. Intel co-founder, Moore's technical and entrepreneurial leadership has been characterized by continuous innovation that has transformed the modern world, with enhanced microprocessor speed, miniaturization, and reduced cost.

See separate announcement of **John W. Cahn's** (National Institute of Standards and Technology) **Bower Award and Prize for Achievement in Science** on page 175.

The award ceremonies are to be held on Thursday, April 25, 2002, at the Benjamin Franklin National Memorial, Philadelphia. The Franklin Institute Awards have recognized preeminent accomplishment in science and technology since 1824, in the spirit of discovery embodied by Benjamin Franklin.

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