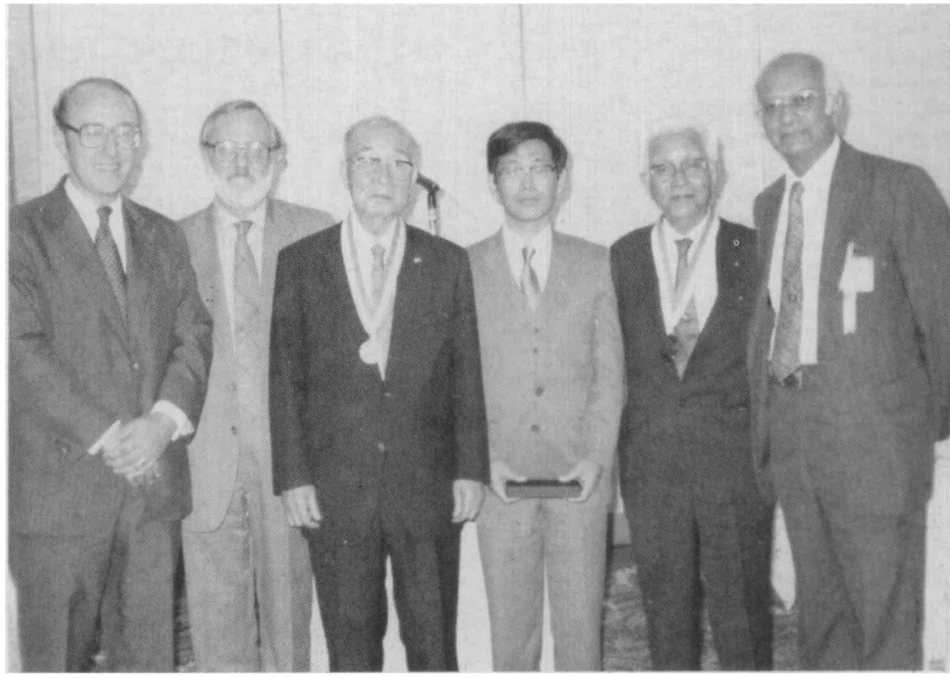
Penn State Launches International University-Industry Initiative

The Pennsylvania State University's Materials Research Laboratory (MRL) used the occasion of the 1st International Conference on New Materials in Osaka, Japan, October 16-19, 1986 to launch an initiative coupling its research with Japanese industries. According to Prof. Rustum Roy, founding director of the Materials Research Laboratory, since the laboratory is one of the world's largest for basic ceramic materials research, and since the Japanese companies dominate the technological position in this field—the interaction promises to be mutually beneficial.

At the conference, Prof. Roy, Prof. L. Eric Cross, the present MRL director, and Dr. William C. Richardson, provost of Penn State, hosted a luncheon for honorary materials research alumni and research directors of major Japanese industries. Over 100 Japanese materials scientists—among them many national leaders—have spent one to two years at Penn State. Richardson presented "Pioneer Bridge-Builder" medals to three of these prominent honorary alumni: Prof. Toshiyoshi Yamauchi, former president of Tokyo Institute of Technology and founding director of the National Institute for Research on Inorganic Materials (NIRIM); Prof. Toku Watanabe, a renowned crystallographer and formerly professor of physics at Osaka University; and Prof. Tokiti Noda, formerly dean of Nagoya University and president of Mie University. Roy delivered the conference's opening plenary address, and Cross gave one of the invited papers.



Penn State representatives and recipients of the Pioneer Bridge-Builder medals (left to right): W.C. Richardson, L.E. Cross, T. Yamauchi, S. Noda (representing his father, T. Noda), T. Watanabe, and R. Roy.

Since its inception, Penn State's Materials Research Laboratory has pioneered many precedents in interdisciplinary materials research. The faculty maintains an emphasis on inorganic materials and a concentration on innovative materials synthesis. Also pursued are vigorous programs to transfer the results of research to the scientific community (through the Materials Research Society), to policymakers (through the National Colloquy on Materials), to students (through Educational Modules for Materials Science and Engineering and its *Journal of Materials Education*), and to industry (through various ways, including its Industrial Coupling Program).

Over a 25-year period, the Materials Research Laboratory has developed a wide spectrum of working arrangements with industry. Reflecting a firm, long-term interaction with industry is that approximately 30% of the laboratory's budget—one of the largest in the United States—comes from industry. In addition to single-company grants and contracts, the laboratory has four separate consortia with a large core of government funding. These consortia, built around areas of the laboratory's strengths, include: the National Dielectric Center, the Chemically Bonded Ceramics Center, the Wave-Material Interactions Center (operated jointly with the Penn State Department of Engineering Science and Mechanics), and the Diamond and Related Materials Center (just being formed).

M. Cima Joins MIT Faculty

Dr. Michael Cima has joined the Department of Materials Science and Engineering at the Massachusetts Institute of Technology (MIT) as IBM Assistant Professor of Materials Science and Engineering. His general research interest is in applying chemical principles to ceramics processing and powder synthesis. With the assistance of two graduate students, he has begun investigating the chemical and transport phenomena involved in solvent and binder removal from ceramic greenware. Cima's research will be conducted through the Ceramics Processing Research Laboratory, and he will also work closely with Prof. Dietmar Seyferth's group in the Chemistry Department.

Cima earned a BS in chemistry in 1982 (Phi Beta Kappa) and a PhD in chemical engineering in 1986, both from the University of California at Berkeley. From 1980 to 1986 he was a technical and research assistant for the Materials and Molecular Research division of Lawrence Berkeley Laboratory. He is a member of the Electrochemical Society and the Materials Research Society.

Research Leads to Better Understanding of Brittle Material Crack Damage

Sandia National Laboratories researchers have taken a significant step toward achieving the best understanding yet of the complex processes that govern stress-induced crack damage in brittle materials by producing a detailed "picture" of a damage surface believed to exist but not positively identified in controlled experiments. By analyzing the intensity and frequency of weak sounds emitted as microcracking occurs in britle material specimens, the researchers have produced "pictures" of a test sample's damage state as the sample is being stressed.

The researchers used acoustic emissions to detect damage surfaces and to establish how they change as stresses increase. Laboratory tests involve instrumenting a brittle material specimen with transducers and then placing the sample in a device that squeezes it. As stresses increase, minute cracks appear. "If the crack is large enough," explained David Holcomb of Sandia's Geomechanics Division, "it produces a sound that generally has a frequency between 0.1 to 1 MHz. Instrumentation detects those acoustic emissions, or nanoearthquakes."

The procedure then calls for stresses,

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which created the initial cracking, to be released. When they are reapplied, additional sounds occur only if stresses increase past the initial level (the original damage surface) so that they generate new cracks or enlarge existing ones. A detailed damage surface picture emerges for a test specimen only after it has been squeezed from many different directions and the acoustic emissions produced during each experiment have been analyzed.

Besides providing first-time experimental proof for existence of damage surfaces, the work is adding much-needed detail about other material behavior traits, including the tendency of cracks to grow even if stress is held at a constant level instead of being increased. Said another member of the team, "Specifics about the speed that this subcritical crack growth occurs—in both brittle and nonbrittle materials—are very important to our ability to accurately predict material lifetimes."

Synchrotron X-Ray Source Planned for Argonne

In November 1986, three hundred academic, industrial, and national laboratory scientists met at Argonne National Laboratory to plan the uses of a new x-ray source hundreds of times brighter than any in the world today. Construction of the proposed $370 million synchrotron x-ray source planned for Argonne could begin as early as 1988 at the laboratory site near Chicago, Illinois.

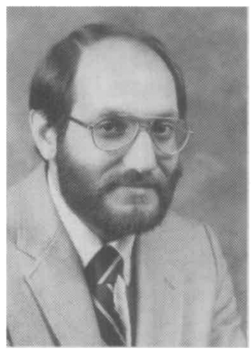
"This project is going to provide a brand new source of x-rays of a very high quality that will enable experiments to be done that have never been done before," said Louis Ianiello. U.S. Department of Energy deputy associate director for basic energy sciences. The new facility, he added, will be particularly useful to materials scientists who are looking to strengthen the metals, ceramics, and alloys of today to make them suitable for the high technology of the future.

The synchrotron x-ray source will include an accelerator to raise particles to energies of seven billion electron volts, and a storage ring in which the particles will circulate at nearly the speed of light. The particles will be used to produce the world's brightest x-ray beams for materials research. The storage ring will include multiple x-ray beams so that as many as 100 scientific tests can be carried out at the same time.

The synchrotron x-ray source will be available to researchers nationwide, said Ianiello. "We're going to build it as a user facility so that everyone in the country can come here and use it." In addition to Argonne scientists, it is anticipated that 300 researchers from industry, universities, and other national laboratories will be on-site at all times to use the x-ray source.

The versatility of the x-ray source is an advantage in the funding process, according to Judith Bostock, budget examiner with the Office of Management and Budget in Washington, DC. "This has something for the industrial community, the federal national laboratories, and the academic community," said Bostock.

E.N. Kaufmann Named Leader of Materials Division at Livermore Lab



Elton N. Kaufmann has been named leader of the Materials Division of the Chemistry and Materials Science Department at Lawrence Livermore National Laboratory effective December 1, 1986. The newly constituted division includes groups working on materials joining; powder metallurgy; metal-matrix, ceramic, and polymer composites; surface modification and deposition processes; physical and mechanical metallurgy; plutonium processing; and actinide metallurgy. These activities, already ongoing within the Chemistry and Materials Science Department, have been consolidated under the new division structure. The Materials Division comprises about 120 scientists, engineers, and support personnel.

Kaufmann, who joined the laboratory in 1981, has been acting section leader of the Physical and Process Metallurgy Section in the Chemistry and Materials Science Department since June 1986. His recent research has centered on surface processing and metastable phase formation using laser, electron, and ion beams.

Kaufmann holds a BS in physics from Rensselaer Polytechnic Institute and a PhD in physics from Caltech. Before moving to Livermore, he spent 13 years at Bell Laboratories (Murray Hill, NJ) working in hyperfine interactions and in particle-solid interactions. He is an editor of the journal *Hyperfine Interactions*, and serves on several other journal editorial boards. He has published over 100 technical articles, coedited two books, and is a member of The Metallurgical Society, The American Physical Society, the American Association for the Advancement of Science, and the Materials Research Society.

President of MRS in 1985, Kaufmann has also served the Society as symposium chair, meeeting chair, and committee chair. Currently he is chairman of the MRS BULLETIN Editorial Board.

MIT Research Team Increases Sensitivity of NMR Spectrometer

Researchers at the Massachusetts Institute of Technology (MIT) have discovered a way to increase the sensitivity of the nuclear magnetic resonance (NMR) spectrometer so that it is 10,000 times more sensitive than present instruments of its kind. The researchers, headed by Dr. John S. Waugh, think their method can make the NMR spectrometer sensitive enough to study surface molecules that give solid catalysts their activity and metal atoms that play a vital role in the functioning of enzymes.

The basic approach requires cooling a sample to temperatures lower than one hundredth of a degree above zero. To obtain temperatures this low, the MIT researchers used a super-cooling refrigerator based on the properties of isotopes of liquid helium. This does not, however, sufficiently cool the atomic nuclei within the sample. The MIT team is trying to speed the cooling process at the surface of the solid by placing it in contact with the rare isotope, liquid helium-3.

Surface area is critical to this cooling process—the more surface area, the faster the cooling. Finely powdered samples present no problem because they are almost all surface. This is not true for enzymes, and the team is trying to create powders in which each particle consists of a single molecule. When extraordinarily fine powder cannot be made, the research team is studying spin diffusion. In this process cold nuclei at the surface communicate with the interior of the solid step-by-step, one nucleus passing energy to its neighbors.

Groundbreaking for NAS/NAE Beckman Center

On October 7, 1986 the National Academy of Sciences (NAS) and the National Academy of Engineering (NAE) hosted a groundbreaking ceremony for the Arnold and Mabel Beckman Center in Irvine, California. The Beckman Center will serve as a West Coast study center for the Academies, supplementing current facilities in Washington, DC and Woods Hole, Massachusetts. The center will be the setting for national and international conferences, symposia, and other activities of the Academies, the National Research Council, and the Institute of Medicine. The building is scheduled for completion in early 1988.

The planned 45,000 ft^2 building will be located on a seven-acre site donated by the Irvine Co., principal developer of the

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master-planned city of Irvine. The property borders the Irvine campus of the University of California.

Construction of the Beckman Center was made possible by a gift of $20 million dollars from the Arnold and Mabel Beckman Foundation. Arnold Beckman is the founder and chairman of the board of directors of Beckman Instruments Inc., Fullerton, California. The company, a subsidiary of the SmithKline Beckman Corporation, is a major manufacturer of scientific instrumentation and related technical products.

Applications Due for SPIE Educational Grants and Scholarships

SPIE—The International Society for Optical Engineering—will award more than $58,000 in grants to educational institutions and scholarships to individual students in 1987. According to Warren J. Smith, chairman of SPIE's Education Committee, the awards will range from $500 to $5,000 each. Grants to educational institutions are for academic use, including student travel and equipment purchases. Individual scholarship awards are for education, with final selection based on the student's potential contributions to optical or optoelectronic applied science and engineering.

Applications for 1987 awards will be accepted through May 4, 1987 and are available from Warren J. Smith, SPIE Education Committee, P.O. Box 10, Bellingham, WA 98227-0010; telephone (206) 676-3290.

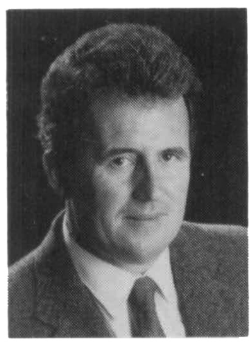
Instron to Use ORNL-Developed Ceramic Tester

Instron Corporation (Canton, MA) has acquired use of an Oak Ridge National Laboratory (ORNL)-developed device to test the tensile strength of advanced ceramics. The ceramic tester, a self-aligning grip assembly, provides accurate specimen alignment and requires no special operator training or specimen preparation. Eight interconnected hydraulic pistons uniformly distribute a tensile load through the center of a test sample. The device can easily be water-cooled to make it compatible with induction heating or small furnaces which permit higher temperature testing of ceramic samples.

According to William W. Carpenter, vice president for technology applications at Martin Marietta Energy Systems, which negotiated the contract, "This agreement successfully transfers to commercial use an ORNL technology which will have an important impact on the ceramic research community. The use of this unique device in research laboratories should greatly enhance further development of these materials."

Harold Hindman, Instron's board chairman, noted that "The agreement is an important step in enhancing Instron's role as preeminent manufacturer of testing instruments used for research in the rapidly growing advanced ceramics industry."

D.A. Payne Named Department Head at University of Illinois



Dr. David A. Payne has been made head of the Department of Ceramic Engineering at the University of Illinois, Urbana-Champaign. A native of England, he holds a BSc in ceramic science from the University of Leeds, an MS in physics from Williams College, and a PhD in solid state science from Pennsylvania State University.

Payne has held positions with Northern Electric Company, Sprague Electric Company, and Erie Technological Products, Inc. He joined the University of Illinois faculty as an assistant professor in 1974 and was promoted to professor in 1981. He has taught courses in microscopy, dielectric materials, and ceramic processing; and he is well known for his research in dielectrics. He received the Xerox Award in 1982 for his research as an associate professor in the College of Engineering, and he is the 1986 American recipient of the Fulrath Award.

Payne's credits include more than 60 publications and five patents. He is a Fellow of the American Ceramic Society, a Fellow of the Institute of Ceramics in the United Kingdom, and a member of the Materials Research Society.

J.A. Switzer Joins University of Pittsburgh

Dr. Jay A. Switzer has joined the Materials Science and Engineering Department at the University of Pittsburgh (Pennsylvania) as an associate professor. His research interests include electroceramics, chemical processing of ceramics, electrochemistry, and conducting ceramic/semiconductor interfaces. Switzer was a senior research chemist at the Science and Technology Division of Unocal Corporation in Brea, California for eight years prior to his appointment at the University of Pittsburgh.

G. Kordas Appointed Associate Professor

Dr. George Kordas has been appointed associate professor in the Department of Ceramic Engineering at the University of Illinois at Urbana-Champaign. He will teach courses in glass technology, physical chemistry, and magnetic materials and conduct research on electronic and magnetic ceramics.

Kordas earned his BS in physics in 1971, his MS in nuclear physics in 1974, and his PhD in materials science in 1979, all from the University of Erlangen in West Germany. Prior to joining the University of Illinois, he held positions with Vanderbilt University and Erlangen University. He is a member of the Glass and Basic Science Divisions of the American Ceramic Society, and he is a member of the Materials Research Society.

L.C. Feldman and W.F. van der Weg Are Co-Editors of Applied Surface Science

Applied Surface Science, a journal formerly known as *Applications of Surface Science*, now has two editors as successors to Dr. Robert L. Park. Dr. Leonard C. Feldman, head of the Materials and Interfaces and Ceramics Research Department at AT&T Bell Laboratories in Murray Hill, NJ, will receive manuscripts from the Americas, Japan, and Australasia. Dr. Werner F. van der Weg, professor of physics at the University of Utrecht, the Netherlands, will receive contributions from Europe, the Middle East, Africa, and Asia (except Japan). The co-editors hope to facilitate and encourage the international scope of the journal, which is concerned with the use and development of the tools and knowledge of surface science to study the microscopic phenomena which determine the synthesis and behavior of surfaces and interfaces.

The journal covers the following subjects:

Solid State Chemistry at Surfaces—catalysis, corrosion and oxidation, surface electrochemical processes, surface etching (chemical, plasma, ion-induced).

Thin Film Growth—deposition, growth, adhesion; epitaxy; atomic clusters; multilayer structures.

Surface Analysis and Processing—metals, semiconductors, glasses, ceramics; surface and thin film analysis techniques.

Both editors are members of the Materials Research Society. Van der Weg is involved with MRS-Europe, and Feldman is a Councillor for MRS. Feldman has also served MRS as a symposium organizer,

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chairman of the Education Committee, and as a member of the Awards and Program Committees. He is also an instructor for the MRS short course on Surface and Thin Film Analysis.

For information, contact either editor at the following addresses: Dr. L.C. Feldman, Room 1D-145, AT&T Bell Laboratories, Murray Hill, NJ 07974; Prof. W.F. van der Weg, Department of Technical Physics, Utrecht State University, P.O. Box 80.000, 3508 TS Utrecht, The Netherlands.

Purdue Receives Grants for Electron Microscopes

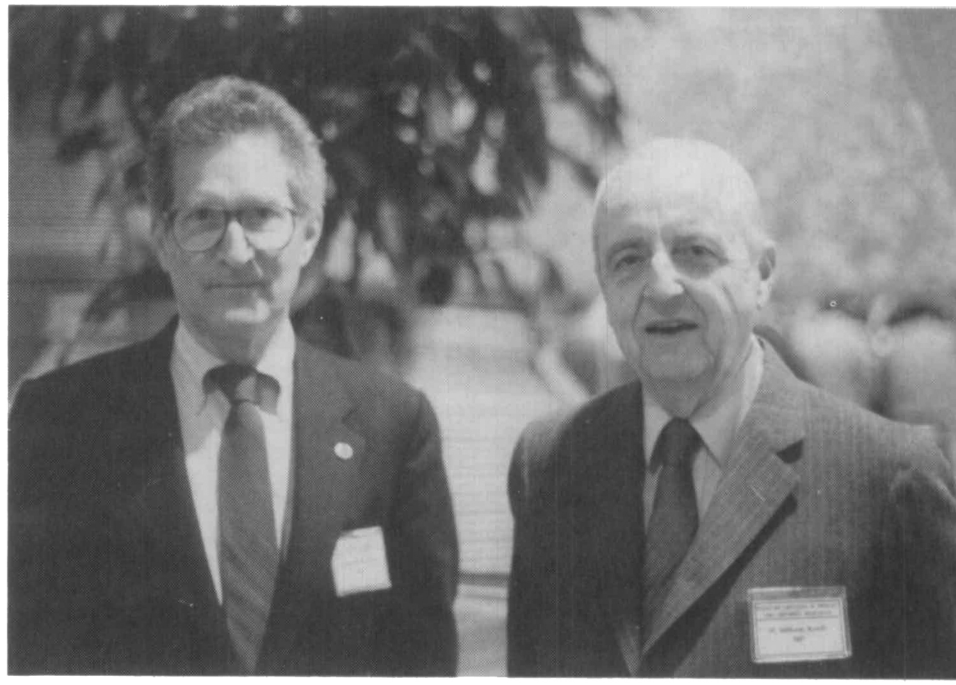
Grants from the National Science Foundation (NSF) and the U.S. Department of Defense will allow Purdue University to buy two new electron microscopes. The NSF awarded Purdue's Microstructural Analysis Facility in the School of Materials Engineering $280,000 toward the purchase of an analytical transmission electron microscope from JEOL Ltd.

The Department of Defense grant will completely fund the purchase of an ultrahigh resolution transmission electron microscope. This instrument will be used primarily to study atomic arrangements in a new generation of artificially layered semiconductors, said Gerald Liedl, head of the School of Materials Engineering.

Contracts Expand Brimrose Corporation Research

Brimrose Corporation of America, a Baltimore, MD based R&D laboratory has recently received four contracts which will expand its research horizons. The Strategic Defense Initiative Organization (SDIO) awarded Brimrose $100,000 in Phase I Research funds to develop a 2-D GaAs acousto-optic light deflector for high-power Nd:YAG (1.06 μm) laser applications without the use of mirrors. The Defense Advanced Research Projects Agency (DARPA) awarded Brimrose $500,000 in Phase II Research funds for further development of a real-time x-ray topography system for the rapid characterization of epitaxial films of GaAs, GaAlAs, and HgCdTe on various substrates. This system is envisioned as a quality control method for the instant evaluation of films or substrates in production environments.

The Department of the Army awarded Brimrose $53,000 in Phase I Research funds to study the correlation between microlattice strains and the sensitivity of propellants (RDX/HMX). A sophisticated nondestructive x-ray characterization technique, DARC topography, will be used to quantify dislocation density in propellant composites. Other real-time x-ray techniques will also be used to evaluate constituent phase composition and lattice parameters in dynamic experiments. The Office of Naval Research awarded Brimrose $100,000 in Phase I Research funds to use IR imaging to characterize hot spot activities in a co-rotating twin screw propellant extruder.



K.W. Ford (left) and H.W. Koch

K.W. Ford Named AIP Director

Dr. Kenneth W. Ford will succeed Dr. H. William Koch as chief executive officer of the American Institute of Physics (AIP) in March 1987. AIP is a not-for-profit scientific organization made up of ten member societies. Its main activities involve scientific publishing and marketing of physics journals, books, conference proceedings, and *Physics Today* magazine. *Journal of Materials Research* is published six times a year for MRS by the American Institute of Physics.

Ford received a BS in physics, summa cum laude, from Harvard University and a PhD in theoretical physics from Princeton University. He has held faculty positions at Indiana University, Brandeis University, University of Massachusetts, and University of California at Irvine, where he was the first chairman of physics. He has been president of the New Mexico Institute of Mining and Technology, executive vice president of the University of Maryland, and president of Molecular Biophysics Technology, Inc. in Philadelphia, PA. He currently serves as Education Officer of The American Physical Society (APS), AIP's largest member society.

Ford's publications experience includes numerous papers on nuclear physics, several physics text books, and a book on elementary particles for the general reader. He has also written articles for several physics magazines.

Recipient of numerous honors and awards, Ford has also served as president of the American Association of Physics Teachers and chairman of the APS Forum on Physics and Society. He has served on the board of editors of *Physical Review* and has chaired the panel of judges for AIP's Science Writing Award. He presently chairs the APS Committee on Education and serves on the APS Council. Ford is a Fellow of APS and the American Association for the Advancement of Science.

SURTSEY Chamber Simulates Nuclear Power Plant Molten Fuel Accidents

Sandia National Laboratories has begun operation of SURTSEY, a test chamber designed to simulate the high-pressure ejection of molten core debris, gases, and steam through the bottom of a failed reactor pressure vessel and into a plant's containment building. The ejected material would be between 3500 and 4500°F. Researchers will use SURTSEY to determine if thermal and chemical energy contained in the ejected material could increase pressures enough to damage the containment building.

Named for a one-square-mile island just south of Iceland, SURTSEY is a 34-foot-tall, 12-foot-diameter steel chamber with rounded, domelike ends. The chamber

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will allow tests on a 1/10 scale, larger than the 1/30 scale normally used. The chamber can also trap reaction products so they can be more accurately measured and analyzed. "Having as realistic a scale as possible is very important in getting a true picture of molten debris and aerosol behavior," explains Bill Tarbell, the project leader. "In addition, the large volume provides the opportunity for the debris to more typically transfer its energy to the atmostphere," he continued.

The first SURTSEY test involved pressurizing the simulated reactor pressure vessel to 600 psi and heating its 44-lb fuel melt simulant (55% iron and 45% aluminum oxide) to almost 4000°F.

Preliminary analysis shows that existing computer models accurately predict the amount of thermal and chemical energy transferred from the debris to the vessel's atmosphere. However, significantly more molten material formed an aerosol than was expected. "This may be important if it is confirmed in our continuing experiments because it could have an impact on radioactive source terms," said Tarbell. During the next two years researchers will conduct a series of 11 tests involving simulated molten debris pools weighing up to about 180 lb. Results of the tests will be integrated into existing computer codes designed to accurately predict the sequence of events that could be realistically expected during severe nuclear power plant accidents.

Panel Calls for "Symmetrical Access" to U.S./Japan High-Tech Resources

Calling on their respective governments to "avoid unwise, unilateral" actions involving advanced technology trade, a group of American and Japanese science, technology, and business leaders has urged the two countries to alleviate economic tensions by accepting a new concept—"symmetrical access" to all elements necessary for the commercialization of new technology. This concept of symmetrical access refers to the availability of equivalently valued basic research, technology development, product markets, and financing.

These conclusions were voiced at the Second U.S.-Japan Conference on High Technology and the Environment, held November 9-11, 1986 in Kyoto, Japan. The meeting was sponsored by the U.S. National Academies of Sciences and Engineering and the Japan Society for the Promotion of Science. Participants included top executives of large U.S. and Japanese high-technology corporations, as well as senior faculty of major research universities. The U.S. delegation was headed by Harold Brown, former U.S. Secretary of Defense and chairman of the Foreign Policy Institute of Johns Hopkins University.

"We believe this concept of symmetrical rather than identical access to a broad range of high technology resources is what has been missing in previous discussions of U.S./Japan trade matters, which have concentrated heavily on markets," said Brown. "For example, the best Japanese scientific and technological research takes place in federally supported institutes and industrial cooperative ventures that have not, in the past, been readily accessible to American researchers," he said. "In contrast, much of our forefront high technology research takes place in association with open research universities and is published in widely read journals. The answer is not to limit access at U.S. facilities, but to get symmetrical access to the best Japanese research results."

The conference group, which met earlier in Santa Barbara, California in August 1985, has planned the following future actions:

...A study of about six forefront research fields to identify "the best institutions and people in both countries" and to recommend specific ways for fostering symmetrical access to research results in these fields.

...Bilateral workshops on topics such as access to research institutions, new technology for accelerating scientific communication, the effect of macroeconomic policies on technology development and commercialization of products, and management of research and development by individual firms.

...Discussions with their respective governments about raising the priority of advanced technology trade issues at the General Agreement on Tariffs and Trade and Economic Summit meetings.

...An examination of "common problems and opportunities" for dealing with newly industrialized countries of the Pacific Rim, such as Korea and Taiwan.

Technology Transfer Society Plans 12th Annual Meeting and International Symposium

"Technology Transfer, the Competitive Edge—National and International Issues and Directions" is the theme of the Technology Transfer Society's 12th annual meeting and international symposium to be held in Washington, DC, June 22-25, 1987. The symposium will highlight industrial technology and stress the vital role of technology transfer in maintaining economic strength in the competitive international economy. There will be industry roundtables, workshops, and concurrent panels.

One session will focus on "Improving Outreach to Industry—Current Federal Laboratory Initiatives." Session leaders will invite input from industry attendees on how the federal government can improve interactions with industry. Other sessions will focus on what Washington is doing and how it affects industry. Discussions will be held on how R&D partnerships are affected by the new tax laws, on the federal government's privatization concerns, on changes in defense funding and its effect on technology transfer, and on how state governments are assisting industry.

Part of the symposium will feature international technology transfer techniques, with discussions of such key issues as exporting defense weapons, security problems, ethics, the "Asian miracle," and related issues.

New Radioactive-Waste Treatment Removes Transuranic Elements

In an article in *Logos* magazine (Vol. 4 No. 3, 1986, Argonne National Laboratory, p. 6-9), E. Philip Horowitz explains how a new solvent extraction process removes transuranic elements (TRUs), the most toxic and long-lived radioactive elements, from nuclear wastes. The resulting TRU wastes are reduced 100 to 1,000 times in volume, with most remaining non-TRU wastes safe enough to be stored above ground. Tests so far have shown that transuranic concentrations can be reduced to less than 10 nCi/g—one tenth the level required for waste to be classified as nontransuranic and suitable for above ground storage. In the near future, the U.S. Department of Energy will require that all liquid waste containing more than 100 nCi/g be converted to glass and buried in a geological repository.

Horowitz, a senior chemist in Argonne National Laboratory's chemistry division, headed the team that developed the TRUEX (transuranium extraction) process.

The ingredient that makes the TRUEX process work is the new chemical extractant "octyl(phenyl)-N,N-diisobutylcarbamoylmethylphosphine oxide"—abbreviated CMPO. This chemical can selectively extract the transuranic elements from most of the fission products and inert constituents present in nuclear waste.

CMPO contains a unique chemical structure that enables it to efficiently extract transuranics in the trivalent, tetravalent, and hexavalent oxidation states from both concentrated nitric and hydrochloric acids. It is the only known extractant with this capability. Since it also has good

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chemical stability in the acidic and radioactive environment encountered in waste processing, CMPO possesses all the properties needed for an extractant in processing nuclear waste streams.

CMPO was the result of four years of basic research funded by the U.S. Department of Energy's Office of Basic Energy Sciences. The discovery trail, however, goes back to the 1960s and 70s to exploratory work on bifunctional extractants at the Savannah River Laboratory, South Carolina. The work was discontinued but eventually revived at Argonne to lead to the first formulation of CMPO in 1981.

Yet another discovery was needed, though, before CMPO could be used in solvents suitable for fuel reprocessing. During the winter of 1982-83, the research team discovered that the properties of CMPO could be favorably modified by using it in the presence of a large concentration of a simple, inexpensive monofunctional extractant, such as tributyl phosphate (TBP). By combining it with TBP, CMPO can be dissolved in normal paraffinic hydrocarbons (NPH). TPB in NPH is the standard solvent used around the world in the PUREX process for isolating and separating uranium and plutonium from spent nuclear fuel. In other words, the extractant mixture used in the TRUEX process is simply the extractant used in the PUREX process combined with a small concentration of CMPO. This means the TRUEX process can be used in existing nuclear processing facilities.

Rockwell Hanford Operations in Washington state and Los Alamos National Laboratory in New Mexico are sponsoring Argonne's development and testing of the TRUEX process. They are also testing the process on waste streams from their own plants. In addition, the U.S. Department of Energy's Office of Defense Waste and Byproducts is funding further development of the process.

West Germany Honors S. Sōmiya

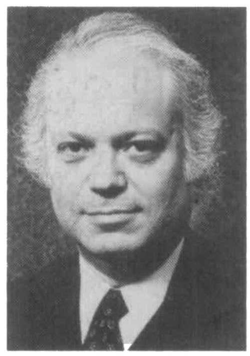
West Germany's Ambassador Dr. Hans-Joachim Hallier presented Prof. Shigeyuki Sōmiya of the Tokyo Institute of Technology with the Officer's Cross of the Order of Merit of the Federal Republic of Germany in a brief ceremony held at the ambassador's residence in Tokyo. With this decoration the President of the Federal Republic of Germany honored a respected Japanese materials scientist and his efforts in fostering German-Japanese relations.

For many years Sōmiya has been in contact with his German colleagues, primarily at the Max-Planck-Institute for Metal Research in Stuttgart. In particular he has paved the way to Japan for many German scientists.

A member of the Materials Research Society, Sōmiya is a principal editor for *Journal of Materials Research*.

(Reported in the Asahi Evening News, November 5, 1986.)

University of California Appoints L.H. Nosanow Vice Chancellor of Research



The University of California, Irvine has announced the appointment of Dr. Lewis H. Nosanow as vice chancellor for research and dean of graduate studies. Nosanow will be the first person to hold the newly created position of vice chancellor of research, which incorporates and expands the duties of the former dean of graduate studies and research. Nosanow will also serve as a professor of physics.

Nosanow's 10 years of experience at the National Science Foundation (NSF) uniquely qualify him for the new research post. In his most recent capacity, he was in charge of distributing a budget of $105 million a year in the form of 800 research grants to 1,150 chemists, physicists, and engineers. During a 1981 leave from the NSF, he served as associate provost and professor of physics at the University of Chicago. Previous to his NSF service, he was a professor of physics at the University of Minnesota. Nosanow received a BA in chemistry from the University of Pennsylvania and a PhD in chemical physics from the University of Chicago. His specialty is theoretical physics with a focus on liquid and solid helium. Nosanow is a member of the Materials Research Society.

The creation of the new vice chancellorship is an indication of the importance of research to the University of California, Irvine. The position as dean of graduate studies and research was formerly a half-time post. Nosanow will be responsible for research policy development and oversight, allocation of campus research and graduate fellowship funds, and supervision of related administrative functions.

"The magnitude of responsibility for the person in charge of research has grown," said associate executive vice chancellor William Parker. "The new vice chancellorship will elevate the issues of research in the administrative structure."

MRS

NSF Announces Discovery of New High Temperature Superconductor

At a December 30, 1986 news conference in Houston, Texas, the National Science Foundation announced the discovery of a material that becomes superconducting at temperatures twice as high as any previously known. The new material, lanthanum-barium-copper-oxide (LaBCO), becomes a superconductor at about 40 K. "The discovery of a material with a transition temperature this high was totally unexpected and it raises the possibility of applications that could revolutionize our society," said Lewis H. Nosanow, director of NSF's Division of Materials Research.

The discovery was made by Prof. Paul C.W. Chu and a group at the University of Houston. Chu, a professor of physics at the university, is currently on assignment as a program director at the NSF. Chu's group had been working for several years to raise the superconducting transition temperature.

Encouraged by a recent Swiss report that superconductivity at about 30 K may exist in a not-yet-defined LaBCO system, Chu demonstrated that superconductivity does exist in LaBCO by examining the magnetic field effects on the material. He then chemically varied the compositions of the material and physically fine-tuned the parameters of the material by subjecting it to a pressure of a few hundred thousand pounds per square inch. This exploratory work not only proved that LaBCO can become a superconductor, but raised the transition temperature to 40.2 K.

Chu believes that a transition temperature above 50 K is within reach and that a temperature above 77 K is now a realistic goal. Liquid hydrogen, which boils at 20.3 K, can be used to cool the perfected LaBCO to a superconducting state, explains Chu. When a transition temperature above 77 K is obtained, inexpensive liquid nitrogen, with a boiling point at 77 K, can be used as a coolant. Applications will then broaden dramatically, Chu says.

Chu's paper describing his work is scheduled for publication in the January issue of *Physical Review Letters*. Chu is also one of the invited speakers for the 1987 MRS Spring Meeting symposium on superconductors.

Plan to attend Symposium S on Superconductors with T_c over 30 K at the MRS Spring Meeting.
See "Preview: 1987 MRS Spring Meeting" in this issue.

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