Light Signal Distance in Optical Fibers Increased

AT&T Bell Laboratories engineers have demonstrated the feasibility of transmitting lightwave signals across transoceanic distances without the costly electronic regenerators used in today's systems.

"This means we'll be able to increase the capacity and flexibility of undersea systems and at the same time simplify repeater design," says Neal Bergano of AT&T Bell Labs Undersea Systems Laboratory. He reported low error-rate transmission of a lightwave signal at five gigabits over a distance of 9,000 km (wide enough to span the Atlantic or Pacific).

Bergano and colleagues also demonstrated 2.4 gigabit transmission rates over 21,000 km. Both experiments used a circulating loop of fiber with optical amplifiers (spliced-in segments of fiber containing the rare-earth element erbium). Using these special segments amplifies the optical signal directly, eliminating the need to convert it to an electrical signal, amplify it, and then convert it back to an optical signal.

Soviet, U.S. Scientists to Study Self-Propagating High-Temperature Synthesis

A scientific agreement for the joint study of self-propagating high-temperature synthesis (SHS) with the Institute of Structural Macrokinetics (ISMAN) of the U.S.S.R. Academy of Sciences has been signed with the New York State College of Ceramics, reports the March issue of *CACT Newsletter*, a publication of the Center for Advanced Ceramic Technology, Alfred, New York. Under the agreement, mutual investigations into the general theory of the SHS process for structural macrokinetics will be conducted. Scientists from both institutes will experiment with structural formation dynamics of the final products of the SHS processes; heat and mass transfer during SHS; formulation of mathematical models; and high-temperature superconductors produced by the SHS method. CACT and ISMAN will jointly publish any results produced by their studies.

John P. Hirth Honored with Two Awards

John P. Hirth, professor of mechanical and materials engineering at Washington State University was honored recently with two awards. The Albert Easton White Distinguished Teacher Award, presented to Hirth by ASM International, recognizes long and dedicated service in the teaching of materials science and materials engi-

neering, and the ACTA Metallurgical Gold Medal, presented by The American Society of Metallurgy, honors outstanding ability and leadership in materials research.

Hirth is a principal investigator in research involving the properties of intermetallic materials. Both $NbBe_{12}$ and $MoSi_2$ show high specific strength above 1200°C, but they are brittle, so researchers are examining deformation mechanisms at low temperature to improve ductility. The research involves theoretical work, atomic modeling, and experimental work in collaboration with Battelle Pacific Northwest Laboratories. A second project involves the study of mixed mode fractures, and a third focuses on the fracture of composites. Hirth has also studied dislocations in layered structures. He has published over 300 technical articles in these areas.

Hirth received his doctorate from Carnegie Mellon University after graduating from Ohio State University. A member of the National Academy of Engineering, Hirth joined the faculty at Washington State University in 1988 as Distinguished Professor of Materials Science and Engineering and as Distinguished Scientific Fellow at Battelle Pacific Northwest Laboratories.

APS Announces Awards Recipients

Several materials researchers were among the 28 recipients of prizes and awards presented by the American Physical Society between July 1990 and June 1991:

Francis J. DiSalvo Jr., Cornell University, and **Frederic Holtzberg,** IBM, T.J. Watson Research Center, received the International Prize for New Materials for the discovery and studies of new materials characterized by strong electron correlations and novel excitations. The award recognizes and encourages outstanding achievement in the science and application of new materials, including theoretical and experimental work contributing significantly to the understanding of such materials.

Patrick A. Lee, Massachusetts Institute of Technology, received the Oliver E. Buckley Condensed Matter Physics Prize for innovative contributions to the theory of electronic properties of solids, especially of strongly interacting and disordered materials. The award recognizes and encourages outstanding theoretical or experimental contributions to condensed matter physics.

Richard E. Smalley, Rice University, received the Irving Langmuir prize in Chemical Physics for his seminal discoveries revealing the nature of isolated clusters of refractive materials, especially the discovery that vaporized carbon can condense in the form of spheroidal shell molecules as typified by the very stable truncated icosahedron molecule, C_{60}. The award recognizes and encourages outstanding interdisciplinary research in chemistry and physics in the spirit of Irving Langmuir.

John R. Smith, General Motors Research Laboratory, received the David Adler Lectureship Award in the Field of Materials Physics for pioneering surface and interface calculations, for developing the universal energy relation, and for exceptional clarity in his lectures and writings on materials properties at the atomic

level. The award recognizes an outstanding contributor to the field of materials physics, who is noted for the quality of his/her research, review articles, and lecturing.

Edwin L. Thomas, Massachusetts Institute of Technology, received the High Polymer Physics Prize for outstanding contributions to elucidation of microstructure in polymeric materials through development and applications of innovative electron microscopy techniques. The award recognizes outstanding accomplishment and excellence of contributions in high polymer physics research.

Alice E. White, AT&T Bell Laboratories, received the Maria Goeppert-Mayer Award for experimental skills and originality, recently displayed by pioneering work in the new field of "mesotaxy." In this technique, ion implantation produces buried epitaxial metallic and insulating layers in semiconductors; it is also used for controlled radiation damage to characterize high T_c superconductors, with applications to the fabrication of SQUID devices. Her earlier work on fabricating ultrathin wires and 2-D metallic and superconducting layers, which is also noteworthy, served as a basis for these advances. The award recognizes and enhances outstanding achievement by a woman physicist in the early years of her career, and provides opportunities for her to present these achievements to others through public lectures.

Information on how to nominate candidates for APS prizes and awards is available from: American Physical Society, 335 East 45th Street, New York, NY 10017.

Massey Asks Scientists and Engineers to Help Promote Science and Technology

In his first news conference since becoming director of the National Science Foundation (NSF), Walter Massey called on members of the academic and scientific communities to do more "to bring a better understanding of science and technology issues to decision-makers at state and federal levels." He said colleges and universities need to help get the NSF budget through Congress by inviting decision-makers into laboratories and classrooms to demonstrate the value of research and teaching and by participating in the political process directly. "Members of the science and engineering communities should play a more significant role in our representative democracy," he said.

Massey noted that NSF programs are clearly linked to the nation's economic competitiveness in several ways. First, the agency's programs help maintain the science and technology base that is critical to industry and our quality of life. Second, NSF plays a very strong leadership role in education and human resources. And finally, NSF programs serve as models of university/industry cooperation. Recently returned from a six-month sabbatical in Europe, Massey said officials of other countries have told him that American science still sets the standard for the world.

The NSF "will continue to give very high priority to supporting individual investigators," Massey said. "Yet, there also is a need for group-oriented research to address problems that require collaboration,

including partnerships between the academic and industrial sectors," he said. Massey believes the agency is heading in the right direction, and said it is important that NSF maintain its flexibility and responsiveness to new initiatives from the scientific community and to national needs.

U.S. to Negotiate on Joint International Fusion Work

The Department of Energy announced that the U.S. government will negotiate with Japan, the Soviet Union, and the European Community to seek an agreement to continue joint engineering design work, research and development on the proposed International Thermonuclear Experimental Reactor (ITER). Conceptual design work for the magnetic fusion energy facility has been completed, and discussion is under way on a detailed design and associated R&D.

Engineering design activities are estimated to last six years and cost $1 billion, shared equally by the four parties. About a fourth of the cost will be for design work and the remaining three-fourths for R&D. The four parties would also equally share the design work and R&D.

Negotiations on engineering design began in Vienna, Austria in February with good progress, and a second meeting was scheduled for April 18-19 in Tokyo. Approval of the joint work is expected in the near future.

ASTM Begins Standards Review for Membrane Switches

The American Society for Testing and Materials' Committee F-1 on Electronics is soliciting participants for a new voluntary standards development effort for membrane switches. These switches are passive electronic components used, for example, in flat keyboards and touchscreens. A broad range of individuals, companies, and organizations closely involved with the membrane switch industry is invited to participate.

As membrane switches become more technologically linked with advanced active electronics hardware, higher performance and reliability for the switch product makeup are required. This may become especially critical when the liability of failure is considered in market applications such as medical operation, diagnostic, and monitoring equipment.

For more information, contact Ronald McBride, Lucas Duralith Corp., 525 Orange St., Millville, NJ 08332-5002, phone (609) 825-6900, or Wendy Dyer, 1916 Race, St., Philadelphia, PA 19193, phone (215) 299-5526.

National Educators' Workshop Seeks Materials Lab Experiments

For the sixth year, the National Educators' Workshop (NEW) is gathering experiments and demonstrations for use in materials laboratory courses. The experiments will be reproduced and distributed at a workshop, NEW: Update 91, which will be held November 12-14, 1991, at Oak Ridge National Laboratory in Tennessee.

This year's workshop will focus on experiments related to newer materials developments for which little is presently available for faculty. Engineers, technicians, scientists, and educators in industry, government, and education are invited to submit abstracts of experiments or demonstrations by **June 1, 1991,** on new and evolving topics in engineering materials, science, and technology.

The workshop's long-range objective is to gather a solid collection of demonstrations and experiments that will be reproduced in a manual available to educators. Experiment titles from previous years have been in listed NASA and NIST publications. Last year's experiments and demonstrations included such titles as "Materials Processing Laboratory Instruction: Structure-Property-Processing Relationships," "Unconventional Impact-Toughness Experiments," "Adapting Archimedes' Method for Determining Densities and Porosities of Small Ceramic Samples," and "Dielectric Behavior of Superconductors at Microwave Frequencies."

The workshop is supported by a wide range of groups, including Norfolk State University, the U.S. Department of Energy, NASA, and NIST.

For information or to submit an abstract, contact: James A. Jacobs, NEW: Update 91, School of Technology, Norfolk State University, 2401 Corprew Avenue, Norfolk, VA 23504; phone (804) 683-8109/8712.

Alfred University to Research New Materials in Glass Manufacturing Process

A $701,642 contract from the Gas Research Institute will fund an Alfred University research project investigating a new technology in glass manufacture. Head researcher, Robert Speyer, assistant professor of ceramic engineering at the New York State College of Ceramics, will look for a more fuel-efficient way to melt glass and a way to reduce environmental emissions.

Since high temperatures are needed to fuse glass, the melt is contained in a heat-insulated glass-melting tank. Such a tank prevents heating from below, so traditionally, a high-temperature flame heats from above, causing reduced efficiency. Additional heat comes from electric boosting, placing a high-voltage charge between two electrodes in the tank causing an electric current in the molten glass.

The Gas Research Institute (GRI) believes that using closed-end immersion tubes will reduce emissions and increase efficiency with immersed gas-fired combustion. Thermal energy released from a flame inside the tube would radiate through the tube into the molten glass.

The tube material must have a high ther-

mal conductivity so the heat can easily radiate from the tubes into the glass tank. The material must also have high thermal shock resistance and corrosion resistance, but remain affordable to manufacturers.

As prime contractor, Alfred will integrate proposals for the development of tube materials, working with Inex, Inc. and a joint DuPont/Lanxide Composites venture.

The Alfred team will chiefly do theoretical modeling and analytical testing. During the theoretical phase of the research, the team will create models of corrosion and of gaseous reactions with the composites. Speyer explained that a ceramic composite, because of its ability to withstand corrosive conditions, is the logical choice for a tube material. Speyer's team will develop and optimize composites jointly with the subcontractors.

Carol Jantzen is ACerS Vice President

Carol M. Jantzen, secretary of the Materials Research Society and a ceramist at the Westinghouse Savannah River Company, will serve the American Ceramic Society as one of six vice presidents for the coming year.

As vice president of member development, Jantzen will lead the Society's endeavors to enhance the ceramics profession. She will be responsible for ensuring the availability of educational resources to all ACerS members, developing joint programs with the National Institute of Ceramic Engineers, supporting the continued development of local and student sections, and attracting new members. She will also foster Society interactions with the media and work with the Public Relations Committee to achieve media coverage of Society activities.

Jantzen holds BS and MS degrees in geology/geochemistry and a PhD in materials science. Her current research interests include high-temperature and sol-gel glass fabrication, glass dissolution mechanisms, and glass decomposition mechanisms. She developed the glass and many of the process models to be used in the first full-scale U.S. demonstration of nuclear waste vitrification. Her other research interests include optimization of physical and mechanical properties of materials, and also rapidly quenched materials and thermally induced phase transformations.

She is an active member of several societies, including the National Institute of Ceramic Engineers and the Mineralogical Society of America, and is a member of several ASTM subcommittees. Jantzen, who has been an MRS member since 1979, has served MRS as a symposium organizer, meeting chair, and secretary. She has also chaired several MRS committees. □