OSTP's Materials Technology Subcommittee Reconstituted

"MatTec" is back. About a year after it was disbanded, the Materials Technology subcommittee of the National Science and Technology Council's Committee on Technology, part of the White House Office of Science and Technology Policy (OSTP), has been re-authorized. Its double mission is to track materials research policies and spending within the federal government, and help build stronger ties between materials and other research communities.

The subcommittee was a casualty of last year's OSTP reorganization, upon which oversight of materials research issues was scattered among other agencies and departments, primarily the National Institute of Standards and Technology (NIST) and the Department of Energy (DOE).

The elimination was short-lived, however. Before he left office this past April, former OSTP Director John Gibbons reauthorized the Committee on Technology. Its new chair is Mortimer Downey, who also is Deputy Secretary of Transportation. Soon thereafter, several former MatTec members petitioned incoming OSTP head Neal Lane (former director of the National Science Foundation) to resume the subcommittee's activities. They argued that MatTec was both useful and necessary because (1) the government's investment in materials research is substantial, amounting to about $2 billion in FY 1994, the latest year for which such information is available; and (2) despite that sizable commitment, there is no overriding agency for materials research policy.

Lane accepted the argument, and the newly reconstituted subcommittee met during the last week of May. Its dozen members are from agencies with materials research interests. Two representatives from NIST were chosen to run the subcommittee: Leslie Smith, chair, and Stanley Dapkunas, secretary. One of its first tasks will be to compile an updated survey of federal spending on materials research. That is an important responsibility, according to Smith, who also is director of NIST's Materials Science and Engineering Laboratory. "Materials research in itself is seldom a mission end," he said. Yet it is a critical component of many other research areas.

It is also critical to update federal materials research funding levels, according to Dapkunas. "By all accounts, they have remained static for the past five years." Funding may even have declined slightly. So the subcommittee plans to complete a draft report by August, obtain a review by the Committee of Technology in September, and release a final version in October.

MatTec also will attempt to strengthen the ties between the materials research community and other disciplines. The goal, Smith said, is to increase awareness of the need to keep the various national materials research facilities funded and running. The Department of Defense is a good example, he said. If a military project involves materials research, the research likely has civilian applications. "Military agencies tend to stay focused on their own missions," according to Smith. They may not explore the potential of sharing new, unclassified discoveries because there is no organizational framework for them to do so. MatTec could provide that framework.

An even riper candidate for improved cooperation is biomedical research, which has become a large user of materials testing facilities, such as the synchrotron and neutron sources. "If we examine who's using these facilities, we can see there is a lot of biomedical research," Smith said. "So we're going to try to make clear to policymakers that those facilities won't be there in the future without support from the outside." A similar approach will be taken with research related to environmental issues, such as catalysts and biodegradable and recyclable materials. "We want to forward the connection with health care and the environment," Smith said. "We want to aid public debate on these issues and promote awareness of the contribution of materials research."

That view is shared farther up the organizational ladder by Arthur Bienenstock, newly confirmed associate director of OSTP. Bienenstock established an interagency working group that is looking at ways to improve how structural biology research is conducted at the light and neutron sources, now that such activities account for as much as one-third of facility time. "The synchrotron facilities have become important to structural biology but are funded by the materials-related portion of the DOE budget," said Bienenstock, a former director of the facility at Stanford University.

PHIL BERARDELLI

NRC Report Predicts Optics Revolution

A report by a committee of the National Research Council (NRC) has predicted that harnessing the properties of light will lead to a technology revolution having a pervasive impact on life in the next century. Charles V. Shank, director of the Lawrence Berkeley National Laboratory, chaired the NRC Committee on Optical Science and Engineering (COSE), which produced the report, *Harnessing Light: Optical Science and Engineering for the 21st Century*, due for publication this month. *Harnessing Light* describes optics as a critical enabler for technology that will revolutionize the fields of communications, medicine, energy, efficiency, defense, manufacturing, and the frontiers of science into the next century. Recommendations in the report include the following:

- Congress should challenge industry and the federal regulatory agencies to ensure the rapid development and deployment of a broadband fiber-to-the-home infrastructure.
- The importance of optical science in biomedical research aimed at understanding human disease should be recognized by establishing a National Institute of Health (NIH) study section dedicated to this area. NIH should raise the priority for funding innovative optical technologies for medicine and medical research. An initiative should be launched to identify the optical signatures of human biological processes and substances for application to noninvasive monitoring.
- The Department of Energy, the Environmental Protection Agency, the Electric Power Research Institute, and the National Electrical Manufacturers Association should coordinate their efforts to create a single program to enhance the efficiency and efficacy of new lighting sources and delivery systems, with the goal of reducing U.S. consumption of electricity for lighting by a factor of two over the next decade, thus saving about $10–20 billion per year in energy costs.
- The Department of Defense should stress investment in research and development on key optical technologies such as photonics, sensors, and high-power tunable lasers to gain maximum defense competitive advantage. Special attention should also be given to investment in low-cost manufacturing of precision aspheric, diffractive, and conformal optics.
- Participation in the Defense Advanced Research Projects Agency (DARPA)-sponsored Precision Laser Machining Consortium should be extended to other optically assisted manufacturing areas by establishing a test facility in a service center scenario.
- Progress in materials science and engineering is critical to progress in optics. DARPA should therefore coordinate and invest in optical research on new materials and material processing methods with the goal of maintaining a stream of materials breakthroughs.

The report can be ordered through the National Academy Press, 2101 Constitu-

tion Ave. NW, Lockbox 285, Washington, DC 20055; 800-624-6242; website http://www.nap.edu/newbooks/index.html.

DOE Lab Directors Highlight Pathways to Reduce Greenhouse Gas Emissions

The United States has many options for reducing greenhouse gas emissions through new, cleaner energy technologies, the directors of 11 of the Department of Energy's national laboratories conclude in a study released in April. The directors' report, *Technology Opportunities to Reduce U.S. Greenhouse Gas Emissions*, outlines nearly 50 technology pathways that could eliminate the emissions of hundreds of millions of tons of carbon per year. These include such near-term practical technologies as electric hybrid vehicles, high-efficiency lighting, super-insulating windows, and passive solar heating and cooling of buildings. They also include mid-term to longer term technologies that need further development, such as fuel cells for transportation, microturbines, broad use of biomass fuels, and hydrogen-fueled energy systems.

The laboratory directors recommend that the federal government lead a vigorous national push to develop energy technologies during the next three decades to achieve a major reduction in the risk of global warming.

The study is at website http://www.ornl.gov/climate_change. The files are in PDF format and can be read in Acrobat Reader.

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PUBLIC AFFAIRS FORUM

An analysis of public policy issues and how they affect MRS members and the materials community...

NRC Forum Aims to Narrow Gap Between Government-Funded Basic Research and Industry's Need for "Ready" Materials

The Academy Industry Program of the National Research Council (NRC) sponsored a two-day Forum on "The Promise and Dilemma of New Materials" on May 28–29, 1998 at the Arnold and Mabel Beckman Center in Irvine, CA. This Forum brought together technologists and practitioners with experience in new materials development for the purpose of mutually informing one another and creating new knowledge and ideas. A primary objective was to achieve cross-fertilization among individuals working across technical and applications boundaries in industry, academe, and the federal government. The Forum was organized by a program committee of outstanding academic researchers and senior industrial research managers under the chairship of Jaques A. Bodelle, Vice President Research and Development, Elf Aquitaine, Inc.

The "promise" is the use of new materials (e.g., electronics grade Ge-Si, polymeric structural elements for automobiles and aircraft, and catalysts) to generate new products and hence economic growth. The "dilemma" is the long development cycles for products embodying new materials, and hence the increasing reluctance of industry to invest in developing new materials to the point of economic utility. Moreover, this reluctance is occurring at precisely the time that the federal government is significantly curtailing its investment in advanced development of materials for defense and other applications. The development of new materials for medical applications encounter an extra barrier in the lengthy Federal Drug Administration approval process. Thus, a gap has opened between government-funded "basic" research on materials and commercial firms' increasing insistence on sourcing "ready" materials technologies for their products. This Forum was designed to explore the origins of that gap and approaches to narrow it.

Within the context of exploring the promises, hurdles, and pitfalls in the development of new materials, the Forum reviewed several frontiers in materials science, specifically surface materials, new forms of carbon, adhesives, bioengineered materials, intelligent materials, and thin-film magnetic materials. Gabor Somorjai presented his MRS 1997 Von Hippel address "From Surface Materials to Surface Technologies" (*MRS Bulletin*, May 1998, p. 11). Several case histories of new materials innovation were examined in detail, including the pursuit of Si-Ge thin films for fast Si-based microelectronics, the development of polymeric materials for drug delivery and tissue generation, the commercialization of Surlyn™ and Kevlar™, efforts to commercialize high-temperature superconductors, nickel metal hydride batteries, Xerographic materials, thin-film magnetic memories based on the exploitation of the giant magnetoresistance effect, and the selection of materials for the Mars Pathfinder.

Breakout sessions were held to stimulate discussion of several central questions in new materials commercialization: How can the interface between the basic research in materials and the needs of industry be improved? What lessons can be learned from the way familiar materials have been upgraded to provide greater functionality and/or lower cost? How does one speed up the empirical process of finding new materials and expedite their development, manufacturability, and commercialization?

Special events included a preview of the forthcoming NRC report on the *International Benchmarking of U.S. Materials Science and Engineering Research* (a prepublication copy can be found at website http://www.nap.edu/readingroom/) and an entertaining after-dinner presentation by Ivan Amato on his recent book *Stuff: The Materials the World is Made Of.*

While the gap between the promise and dilemma of new materials was not resolved, the Forum did highlight some amazing economically significant commercialization successes in microelectronics, rotating memories, specialty polymers, and Xerographic materials. It also drove home the significant and increasing gap in U.S. policy between the concensus on government support of basic research and the globalization-induced disinvestment of many if not most commercial firms in the advanced development needed to convert the fruits of that basic research into commercially viable new products. Many of the success stories examined at the Forum were judged to be improbable if not impossible in today's political and economic climate. Dealing effectively with this gap is likely to be an essential ingredient in turning the amazing U.S. jobs machine into a comparable machine for increasing the productivity of the U.S. workforce.

CHARLES B. DUKE

Charles B. Duke *is Vice President and Senior Fellow, Xerox Corporate Research and Technology. He delivered a presentation at the NRC Forum on the central role of new materials innovation in the commercial successes of Xerographic devices for copying and printing.*