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U.S. Faces Global Competition in Nanotechnology

In a hearing on nanotechnology held on June 29, the U.S. House of Representatives' Subcommittee on Research was told by a top presidential advisor and a panel of industry leaders that the United States is facing increasing competition in nanotechnology from international competitors. The subcommittee held the hearing to examine the findings and recommendations of the recent assessment of the National Nanotechnology Initiative (NNI) by the President's Council of Advisors on Science and Technology (PCAST) and to hear from the nanotechnology community on how U.S. research and business activities in nanotechnology measure up to those of international competitors.

The witnesses, who included Floyd Kvamme, the co-chair of PCAST, offered broad recommendations to improve the NNI. Among their recommendations, the witnesses urged a greater investment in math and science education and training to develop a nanotechnology workforce; more research on nanotechnology environmental, health, and safety issues; and a strengthening of federal investment in

goal-oriented and fundamental research in nanotechnology.

"Nanotechnology is already changing the products we use and has the potential to revitalize our manufacturing base," said subcommittee chair Bob Inglis (R-S.C.). "It promises to impact virtually every field—with applications from energy to defense to health care to transportation. Just yesterday [June 28], we rolled out the House Hydrogen and Fuel Cell Caucus, with the ultimate goal of leading us to a national hydrogen economy. I'm excited to hear that efforts are already under way to use nanotechnology to improve hydrogen production, storage, and fuel cells. The development of this technology is truly amazing and holds great promise."

PCAST recently completed a review of the NNI. While the report indicates the strength of the U.S. nanotechnology effort, Kvamme testified that "the data also show that other countries are aggressively chasing this leadership position, both in terms of ramping up coordinated national programs—many of which are modeled directly on the NNI—as well as in focusing investments to areas of existing national economic strength."

The PCAST report identified aspects of

the NNI to be strengthened or improved, including facilitating technology transfer from laboratories to the marketplace, expanding the understanding of the environmental and health implications of nanomaterials, and focusing on the education and workforce needs of the nanotechnology industry. These recommendations were echoed by the industry leaders who also testified at the hearing in June.

Reiterating the need to strengthen the U.S. nanotechnology work force, Jim O'Connor, Motorola's vice president of intellectual property incubation and commercialization, said, "Simply put, we must have a well-educated talent pool to survive. Therefore, Motorola supports the PCAST report's recommendation that the NNI establish relationships with the Departments of Education and Labor to develop education and training systems to improve the nation's technical proficiency in areas related to science, technology, engineering, and math."

Matthew Nordan, vice president of research at Lux Research Inc., testified that regulatory uncertainty regarding the environmental and health implications of nanomaterials is stifling the industry. "To move forward, the EPA [Environmental Protection Agency], the FDA [Food and Drug Administration], and NIOSH [National Institute for Occupational Safety and Health] must issue clear guidance to industry on how they plan to approach nanoparticles," Nordan told the subcommittee. "Based on our contact with individuals driving nanotech initiatives at America's largest corporations, it's clear to us that ambiguity surrounding EHS [environmental, health, and safety] regulation of nanoparticles is hampering commercialization—firms do not want to play a game whose rules may change at any time."

Citing a "valley of death" between the founding of a nanotech company and that company's eventual ability to attract investment, Sean Murdock, executive director of the NanoBusiness Alliance, urged a greater investment on the part of the government to fund fundamental basic research and bridge the "valley of death" gap. "Most nanotech innovations require significant investment and 'platform' development before any revenues can be generated, because they are based upon fundamental breakthroughs in basic research at universities and federal labs," Murdock said. "VCs [venture capital firms] have been shying away from 'platform' technologies without well-understood commercialization processes and end-market economics."

The PCAST report, released in May,

U.S. State Department Announces 2005–2006 Jefferson Science Fellows

U.S. Secretary of State Condoleezza Rice announced on May 24 the 2005–2006 Jefferson Science Fellows, who will begin working at the State Department in September 2005. This year's fellows are **William Hammack** of the Department of Chemical and Biomolecular Engineering at the University of Illinois at Urbana-Champaign; **James Harrington** of the Ceramic and Materials Engineering Department at Rutgers University; **Alexander King**, head of the School of Materials Engineering at Purdue University; **Michael Prather**, who holds the Fred Kavli Chair in Earth System Science at the University of California, Irvine; and **Edward Samulski**, Cary C. Boshamer Professor of Chemistry in the Chemistry Department at the University of North Carolina, Chapel Hill.

The Jefferson Science Fellows program was established in 2003 by former Secretary of State Colin L. Powell to continue elevating the role of science and technology in U.S. foreign policy. It brings together five tenured professors each year from U.S. universities for one-year assignments at the Department, followed by a five-year consultancy after returning to their academic careers. The program is supported by generous grants from the MacArthur Foundation and the Carnegie Corporation on a three-year pilot basis, in addition to financial support from participating U.S. universities. A broad range of professional societies and organizations have also endorsed the Jefferson Science Fellows program.



Jefferson Science Fellows for 2005–2006 (left to right): William Hammack, University of Illinois; James Harrington, Rutgers University; Condoleezza Rice, U.S. Secretary of State; Alexander King, Purdue University; Michael Prather, University of California, Irvine; and Edward Samulski, University of North Carolina.

recommends continued robust funding for the NNI. In addition, the report calls attention to two areas that would augment the existing suite of activities and enhance commercialization of research results. PCAST recommends an increase in federal–state coordination and an improvement in knowledge management and access to NNI assets.

States perform a vital role in fostering economic development through business assistance programs, tax incentives, and other means, the PCAST office said. In addition, the states are collectively spending substantial amounts in support of nanotechnology research and development and commercialization. The report recommends improving federal–state coordination in order to increase practical application of NNI-funded research results, improve workforce development, and achieve other national benefits.

In the second area of improvement, NNI assets include user facilities and instrumentation available to outside researchers, research results, and derivative intellectual property. Through mechanisms such as publicly available and searchable databases, the NNI can—and should, according to the PCAST report—improve infrastructure utilization and the transfer of technology to the private sector.

“This report is a thoughtful and highly informative assessment on the current status of the United States’ research programs for nanotechnology,” said presidential science advisor John H. Marburger III when the report was released. Marburger, who directs the president’s Office of Science and Technology Policy, said, “PCAST and its Technical Advisory Group are performing an important service in monitoring federal programs in this exciting field.”

France to Host ITER

During a ministerial meeting held in Moscow on June 28, the six parties participating in the ITER international nuclear fusion project agreed to build the facilities in Cadarache in southern France, with branch offices in the territories of each party to the ITER agreement. The six international parties cooperating to develop ITER are China, the European Union (EU), Japan, Russia, South Korea, and the United States. The negotiations take place under the auspices of the International Atomic Energy Agency (IAEA). The EU (which includes France) will contribute 50% of the construction costs, and the other five parties will each contribute 10%.

Cadarache, which is located ~60 km from Marseille in the Provence-Alpes-Cote d’Azur region, already hosts the supercon-

ducting fusion experiment Tore Supra at the CEA Cadarache Research Center, one of the largest civil nuclear research centers in Europe.

According to EUROPA, the science news source of the European Commission, the *European* commissioner for science and research, Janez Potocnik, visited the site on July 3. In the company of representatives of the French government and the European fusion research community, Potocnik saluted the cooperation among all European players in fusion that had made it possible to achieve this outcome.

“ITER is not just a large international research project but has great importance for this region, for the EU, and for the whole world,” he said during his visit. “We’ve seen with our visit to Tore Supra today how far we’ve come already in fusion research. I am optimistic that ITER will allow us to go even further down the road to safe, clean, abundant energy.”

Also present during the visit were the French minister for research, Francois Goulard, former European commissioner for research Philippe Busquin, and former French ministers for research Francois d’Aubert and Claudie Haigneré, as well as the chief administrator of the French Atomic Energy Commission, Alain Bugat and the high commissioner for atomic energy, Bernard Bigot.

Raymond L. Orbach, director of the Office of Science at the Department of Energy, represented the United States at the ministerial meeting in Moscow. Orbach said, “The United States supports the decision of the parties to the ITER negotiations to conduct the international fusion reaction experiment at Cadarache, France, and the U.S. looks forward to getting ITER construction there under way as soon as practical....Fulfilling the promise of ITER will require continued international collaboration and cooperation such as that demonstrated by the six parties to the ITER talks in arriving at today’s decision.”

In response to the site agreement, U.S. Secretary of Energy Samuel W. Bodman said, “Plentiful, reliable energy is critical to continued worldwide economic development. Fusion technologies have the potential to transform how energy is pro-

duced and provide significant amounts of safe, environmentally friendly power in the future. The ITER project will make this vision a reality.”

India and Canada to Sign Agreement on Science and Technology

India’s Ministry of Science and Technology announced in May that India and Canada will sign a comprehensive agreement on science and technology this year to give a boost to the research activities taking place in both countries and to help the transfer of technologies from laboratories to the marketplace. During a joint press conference with Kapil Sibal, India’s Minister of Science and Technology, the Canadian high commissioner to India, Lucie Edwards, said that this is the first time in 25 years that her country has signed such an “umbrella agreement” with another country. She said that the agreement will encompass a wide range of areas from research to design, production, and innovation, and will include close interaction between academia and industry.

The collaborations will focus on five themes: biotechnology, health research, and medical devices; next-generation information and communications technologies including quantum computing; nanoscience and nanotechnology; environmental and climate change technologies and alternative fuels; and earth sciences and disaster mitigation. Edwards also disclosed that the recently released Canadian International Policy Statement “paid significant attention to India as well as science and technology and suggested key initiatives to support partnerships in this sector with key markets, like India.”

Furthermore, Sibal announced that Canada will be the partner country in this year’s Technology Summit and Technology Platform, to be held in New Delhi September 21–22 and jointly hosted by the Confederation of Indian Industry (CII) and the Ministry of Science and Technology. He said that some of the best research institutions in Canada will participate at this summit and seek partnerships with Indian organizations. Sibal said that in this era of globalization, the role of the government is increasingly changing from that of a regulator to a facilitator. □

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