reproduce Taleyarkhan's bubble nuclear fusion results is Kenneth Suslick of the University of Illinois at Urbana-Champaign. He regrets that the investigations did not look into how the science experiments were conducted, commenting that "justice has been done, but not completely."

For his part, Taleyarkhan commented by e-mail that "there is much more to this story than meets the eye, and the full truth will have to come out soon."

The investigation committee was chaired by Purdue's Mark Hermodson, a biochemist. Its six members included three researchers from other universities and one from a national lab. The committee considered 12 allegations and found sufficient evidence to cite Taleyarkhan with research misconduct in two cases.

Both cases deal with the publication of results from an experiment in which Taleyarkhan had been "heavily involved," according to the committee. The research paper was originally submitted to (and rejected by) *Physical Review Letters* with Yiban Xu, a postdoctoral fellow, as the sole author. Despite Taleyarkhan's apparent involvement, the committee concluded that a senior mentor may choose not to have his name appear as an author of a publication for a number of legitimate reasons. The *PRL* reviewer commented that with only one author, the needed cross checks and witnessing of results seemed lacking. Subsequently, the committee reports, "Taleyarkhan with falsifying intent caused" Adam Butt, a master's student of Taleyarkhan's, to be added to the paper as a coauthor. In his statement, Butt asserted that his only contribution was to check that data had been correctly transferred from a spreadsheet and to suggest some minor editorial changes to the manuscript. The paper, with Xu and Butt as coauthors, was published in *Nuclear Engineering and Design* in 2005. The investigation committee concluded that Taleyarkhan had compelled the addition of Butt's name to create an appearance of collaboration between Xu and Butt.

The second instance of misconduct cited by the committee concerned a paper published by Taleyarkhan and his colleagues in *PRL* in 2006, in which they asserted that their 2002 observations of bubble fusion "have now been independently confirmed." The independent confirmation cited was the 2005 *Nuclear Engineering and Design* paper by Xu and Butt. The committee stated that "Dr. Taleyarkhan himself well knew the degree of his direct mentoring, editing and promotion of Dr. Xu's work and the resulting publication." It concluded that the effort to characterize Xu's experiment as "independent" was research misconduct.

Taleyarkhan appealed the investigation's findings but on 21 August the university's appeal committee concluded that the committee had followed due process and had an evidentiary basis for its conclusions. **Barbara Goss Levi**

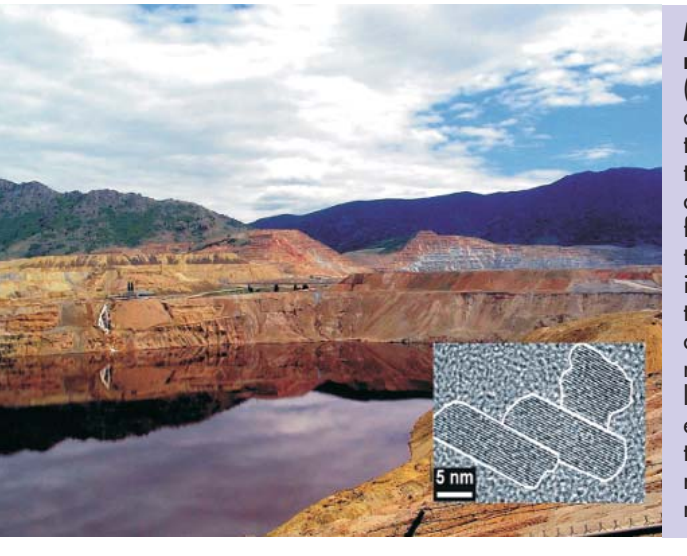
NSF–EPA centers study safety of nanomaterials

With belt-tightening the norm these days, a 17 September announcement by NSF and the US Environmental Protection Agency was especially welcome: The two agencies upped their investment in studying the safety implications of nanotechnology from the intended $25 million to $38 million. That money goes to research in an area for which lawmakers threatened last spring to mandate more spending (see PHYSICS TODAY, June 2008, page 24).

The increase is to create two multicampus, interdisciplinary research centers rather than one. The Center for Environmental Implications of Nanotechnology headed by the University of California, Los Angeles, will get $24 million, and the CEIN spearheaded by Duke University will get about $14 million. "It's unusual that we are funding two and making a much bigger investment [than planned]," says Alan Tessier, a program director in the division of environmental biology at NSF, which is ponying up the additional funding for a total contribution of $33 million. "But the recommendations on both centers were unanimous. The two are complementary in type of science and approach, and environmental health and safety is a priority of the National Nanotechnology Initiative. We saw an opportunity."

The centers' goal, says UC-CEIN director André Nel, "is to establish a scientific basis [for] the safety assessment of nanomaterials through the use of a hard-core predictive science." Adds Mark Wiesner, director of the Duke center, "We are looking from the molecular level up to ecosystems. How have cells adapted over time? What's different about manufactured nanomaterials compared to what's out there in nature? And what are the impacts on the environment? Those are key questions." Although there may be some overlap with existing nanocenters, Wiesner says, the CEINs "are the first to look at physical, biochemical, and ecological issues. Others look at applications of nanomaterials and the social dimensions of nanotechnology." (See the article by Cyrus Mody in PHYSICS TODAY, October 2008, page 38.)

Research at the Duke CEIN—whose main partners are Carnegie Mellon University, Virginia Tech, and Howard University—will center on 32 closet-sized ecosystems, or mesocosms, to be set up in the forests near the Durham, North Carolina, campus. "We can introduce nanomaterials and monitor the mesocosm for a year or more to understand how [the nanomaterials] move and are transformed—through oxidation, reduction, agglomeration, loss of coatings," says the center's deputy director, Greg Lowry of CMU. "We will focus on a metal, a metal oxide, and a carbon nanomaterial." The metal, he adds, will "probably be silver, because it's used in so many commercial products."



MICHAEL HOCHELLA AND KELLY HAUS, VIRGINIA TECH

Mineral nanoparticles (inset) serve as a vehicle for transporting toxic heavy metals downstream from areas near the Berkeley Pit in Butte, Montana. Such interactions of nanomaterials with life and the environment are the focus of two new NSF–EPA nanocenters.

At the UC-CEIN, says Nel, "We will look at the effects of nanomaterials on cells—yeast, bacteria, embryos—to learn which materials are likely to be dangerous. We will look at terrestrial systems, fresh water, sea water. . . . That will allow us to classify and prioritize in terms of safety. From high-throughput interactions, we hope to develop insight into what nanomaterial properties relate to physical hazards." Most toxicological manifestations are the result of perhaps a dozen common biological pathways or mechanisms, Nel adds. "We use the pathway to test a lot of materials at the same time—you can do thousands of these comparisons in one day—and then build a risk assessment system. This is probably one of the most novel pursuits of the UC-CEIN. High throughput is needed because we do not want to end up with 50 000-plus untested compounds as [is the case with] industrial chemicals."

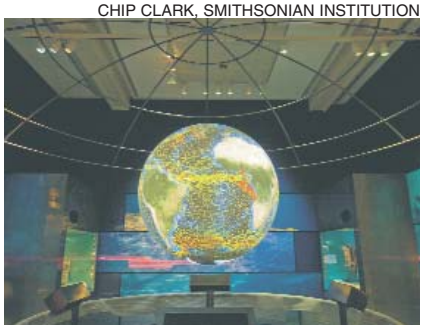
Partners in the California center include several UC campuses, Columbia University, and the University of Texas, El Paso. Both CEINs have international partners that will not receive US funding.

"We are looking at [the centers] as a means to develop nanotechnology responsibly," says Nora Savage, the EPA program officer for the CEINs. "We have had technologies before that resulted in unintended adverse impacts, including CFCs, which are great for refrigeration but ended up doing serious damage to the stratospheric ozone layer, and DDT, which is a great pesticide but ended up causing extensive damage to the ecosystem. So we are trying to understand ahead of time whether potential effects from nanotechnology might arise from a complete life-cycle perspective, and if so, can these be minimized so that we can maximize the benefit of the new technology." **Toni Feder**

news notes

Ocean view. A 45-foot whale replica greets visitors to a new hall at the Smithsonian Institution's National Museum of Natural History in Washington, DC. The 23 000-square-foot Sant Ocean Hall, which opened this fall, contains 674 prehistoric and contemporary marine specimens and models, including a re-created Indo-Pacific reef with about 74 live species. The $49 million project was funded by $15 million from philanthropists Roger and Vicki Sant, $21 million from federal appropriations, and other donors, for what museum director Cristián Samper calls "the most ambitious renovation in the museum's history."

CHIP CLARK, SMITHSONIAN INSTITUTION



Researchers at the National Oceanic and Atmospheric Administration created display software for a 360-degree, six-foot-wide sphere (see figure) that uses animation and narration to show, among other things, how heat and mass transport processes contribute to the ocean's food cycle and how the ocean influences climate change. Interactive exhibits invite visitors to, for example, play the role of an ocean scientist or fisherman or take a virtual underwater dive with a marine scientist.

Mary Glackin, NOAA's deputy undersecretary for oceans and atmosphere, says ocean research and public education are important "if we hope to manage and protect our largely unknown ocean that we rely on for life itself." **JNAM**

Blue Gene by the Red Sea. IBM is building a supercomputer for the King Abdullah University of Science and Technology. The supercomputer—dubbed Shaheen, Arabic for peregrine falcon—is slated to start up in stages at IBM's Thomas J. Watson Research Center in Yorktown Heights, New York, where it will be used for research and training before going online next summer at KAUST's Thuwal, Saudi Arabia, campus.

The 222-teraflop supercomputer is to be a copy of today's sixth most powerful computer, the Blue Gene/P system in Jülich, Germany. Neither KAUST nor IBM will reveal the cost, but other powerful supercomputers have run tens of millions of dollars.

The new supercomputer will be available for research in the university's four thrust areas: Earth and environmental sciences and engineering, life sciences and engineering, math and computer sciences, and physical and chemical sciences and engineering. People "will line up very quickly" to use the supercomputer, predicts Majid Al-Ghaslan, chief information officer for the fledgling KAUST (see PHYSICS TODAY, August 2007, page 33). "This will be a tool to attract the best research minds out there, and it's meant for academic research." IBM is helping KAUST recruit faculty to run and use the supercomputer. **TF**