he says. "We've made 12 other things work, since early March but, as far as I know, we don't have ytterbium working." On the other hand, Cava points out that others have been unable to make compounds work that, in his hands, are superconducting. And even when two groups agree that a compound is superconducting at a high temperature, they more often than not disagree on the transition temperature.

Despite Chu's assurances that the typographical error in his papers was purely accidental, the stories that it was not persist. Chu's colleague Pei Hor of the University of Houston says he is upset by these charges. "I've been too naïve. I believed doing science is doing science. It should be fair. It should have dignity. I was very very surprised. I really don't know where this rumor originated, but it hurts a lot," he says.

Cava explains that incidents like this are to be expected when a discovery is as monumental as Chu's. "You have to realize that this is the biggest thing to happen in most physicists' lives. Period," he says. "There are lots of egos around and there are lots of people who are happy to believe something bad about someone just because he did something good." ■ **GINA KOLATA**

Some of the information in this report was contributed by Arthur L. Robinson.

Superconductor Race Heats Up

Who is going to be number one in superconductors? Last week, the House Republican Task Force on High Technology and Competitiveness sponsored a conference titled "Breakthrough in Superconductivity: The Race to Commercialize." Participants were asked what it will take to prevent the revolutionary new high-temperature superconductors from falling into the now familiar pattern of U.S. leadership in research but Japanese domination of the marketplace.

The initial discovery of these wondrous new materials, which are the first to operate in liquid nitrogen and therefore promise to take superconductivity from a largely esoteric technology to a household word, was announced on 16 February. Although the composition of the compound was kept secret until formal publication in a scientific journal (see story p. 663), the Japanese immediately began to marshal their considerable resources, including the establishment of two government-coordinated committees.

One, organized by the Agency of Industrial Science and Technology and made up of leading-edge researchers from a broad spectrum of laboratories, is to plan a research strategy to improve the new superconductors. The other more industrially oriented group, set up by the much-feared Ministry of International Trade and Industry, aims at finding commercial applications for them. "When it comes time to make something out of it," the *Wall Street Journal* quoted Shoji Tanaka of the University of Tokyo, "the Japanese will have the upper hand."

American researchers and federal funding agencies have not been slow to jump on the bandwagon. At a recent meeting of the Materials Research Society, for example, a speaker showed a lengthy list of familiar names from his laboratory and said, "These people are all doing what they have always done, but now they are doing it on superconductors." The Department of Energy (DOE) has redirected some research money into the high-temperature superconductors and now has about $10 million specifically directed toward these materials, although "the figure is changing monthly," according to a report at the conference by Louis Ianiello, the DOE's materials chief.

The National Science Foundation (NSF) has also reacted and in the last 2 months has doubled its superconducting materials budget to $5 million. Moreover, NSF has just initiated two efforts, one that will distribute $1 million to three of the agency's Materials Research Laboratories at the University of Illinois and at Northwestern and Stanford Universities, and one that will distribute $600,000 to researchers with ideas for processing the superconductors into useful forms.

Up for discussion at the conference was whether a more coordinated effort along the lines of the Japanese approach would be necessary to keep the United States in the lead. The conference organizer, Representative Donald Ritter (R–PA), clearly thought that it was and that the time available to make a move was short: "Japan is out of the starting block and we are going to have to hit our stride in our own way, and hit it soon, if we are going to be a factor in the global race."

Earlier, in response to the Japanese moves, Senator David Durenberger (R–MN) introduced legislation in late March and Ritter followed in early April with an identical bill to create a national commission on superconductors. The bills would require the appointment of members to the commission by the President within 15 days and a report from the commission within 4 months. The report will recommend ways to speed up the improvement of the superconductors and to expand their use in commercial and defense applications. Specifically included on the list of items for the commission to consider is the partial exemption of private companies from antitrust laws to allow them to coordinate research and product development.

At the conference, which was chaired by Ritter, Durenberger explained his thinking, "Many people believe we should not 'copy' Japan and develop a coordinated government, industry, and university approach to developing superconductors," but "I am convinced we must have a national strategy to encourage the development of this important new technology."

The conference itself included presentations by two panels of researchers from academic, industrial, and government laboratories. The most forceful statement came from H. Kent Bowen, a ceramic materials expert from the Massachusetts Institute of Technology. Bowen has watched as the Japanese have taken over leadership in advanced ceramics for both structural and electronics applications, despite most of the advanced ceramics science having come from the United States in the last two decades. He fears the story will be repeated in the high-temperature superconductors, which are themselves ceramics.

Bowen specifically proposed an immediate $100-million—"the price of one airplane"—initiative that would last 2 years. About $25 million would go to university centers for both basic and applied research, while the largest part would be dedicated to the support of manufacturing implementation, including pilot plants, at selected companies. Robert Laudise, a research director at AT&T Bell Laboratories, also underscored the importance of ceramics processing. He noted that the difference between success and failure in the past has often been the extent to which an industry paid close attention to the science of materials processing. ■ **ARTHUR L. ROBINSON**