Cold fusion still providing exciting scientific results

More than 90 laboratories in 12 countries have produced effects in a variety of cold fusion experiments, and some have achieved reproducibility upon demand. Marjorie Mazel Hecht reports.

For an experimental field just barely two years old, cold fusion has already amassed more obituaries in prestigious newspapers and journals than most deceased Nobel laureates receive after a lifetime. Fortunately for cold fusion researchers—and for the future beneficiaries of the energy technology it will become when it "grows up"—cold fusion is still very much alive.

The spectacular successes in cold fusion, reproducing the original work of Martin Fleischmann and Stanley Pons in a wide variety of experiments with many different effects, have gone unreported (or misreported) in the U.S. and most of the scientific press. Thus, some of the items noted here may be startling to readers accustomed to reading only the disparaging remarks attached to the words cold fusion—slanders that range from "fraud," "scientifically impossible," "deception," and "pathological science," to the more benign "wishful thinking." Hopefully, this "good news" about cold fusion will help wake up some people, including the government energy officials, industry representatives, and venture capitalists who should be funding this research in its infancy, because of the promise it holds for energy production, as well as its contribution to advancing man's knowledge of the laws of the universe.

Here are just a few of the promising, but little-known developments in the cold fusion field:

- Within 34 days of the original March 23, 1989 announcement of the Fleischmann-Pons cold fusion discovery, Japanese scientists working at the Matsushita Electric Co. filed a European Patent Application for a similar cold fusion device that produced excess heat, tritium, and neutron bursts. This patent has just been made public, after the 18-month waiting time.
- In the first six months of the cold fusion era, several teams of Indian scientists working at the Bhabha Atomic Research Center (BARC) in Trombay were successful in producing nuclear effects from a wide variety of electrolytic cells. This work, which is continuing to develop, is reported in the accompanying interview with BARC fusion scientist M. Srinivasan.
- The Soviet government has reportedly just put 15 million rubles ($25 million) into cold fusion work at 20 different research centers, after a Soviet team was able to produce 150% excess heat (more heat produced than the energy necessary to run the experiment). Reportedly, the successful Soviet experiment shot deuterons (deuterium nuclei) into palladium under a vacuum.
- A U.S. researcher has filed a patent on a similar experimental setup, but nothing is being publicized as yet (probably, as is true in many cases, because the scientist does not want to be exposed to the scientific mafia's sharp-shooter snipers, who have made life miserable for those cold fusion pioneers who dared to go public with their exciting results).
- One of the most recent cold fusion advances was announced in March by a team at the Naval Weapons Center in China Lake, California, headed by Dr. Melvin H. Miles. Using an apparatus similar to the original electrolytic cell set

up by Fleischmann and Pons at the University of Utah, Miles et al. produced excess heat as well as helium-4, one of the expected by-products of a conventional (not cold) fusion reaction. The helium-4 was present in the amounts expected given the particular generation of excess power. In addition, some ionizing radiation was detected, enough to "significantly" expose dental X-rays.

Miles states that the helium-4 is produced "at or near the surface of the palladium electrode rather than deeper in the bulk metal and that the preponderance of the helium escapes from the electrode and resides in the effluent gas."

(It is important to note that this is a government laboratory. One of the favorite lies of the scientific mafia is that "no U.S. national laboratory" has been able to reproduce the Fleischmann-Pons work. In addition to the Naval Weapons Center, more than one group at each of the national laboratories at Oak Ridge, Los Alamos, and Brookhaven have reproduced the Fleischmann-Pons results, plus some variations.)

- A research team at the University of Hawaii, led by Bor Yann Liaw and Bruce E. Liebert, has achieved 16 times energy output compared to the energy required to maintain their experiment. Their cell used a novel molten salt configuration, operating at 370°C.
- Reproducibility has been achieved by several researchers. Electrochemist John O'M. Bockris at Texas A&M, one of the U.S. pioneers in cold fusion, recently catalogued some of these successes: "[Kevin] Wolf in our laboratories can obtain the emission of neutrons from a bank of electrodes more or less on call. Thomas Claytor, who works at Los Alamos, can make tritium reproducibly from a 10-layer sandwich of palladium, saturated with deuterium, and alternating with layers of silicon. At Stanford Research Institute, Michael McKubre and his colleagues have found two electrodes from which they can produce excess heat in their cells at will."
- A veteran nuclear scientist, Dr. Glenn Schoessow at the University of Florida in Gainesville, whose European patent was just made public, is reportedly able to turn on and off his cold fusion setup, which produces both tritium and heat. The experimental device described in the patent comprises a solid cathode with an open top, cup-shaped vessel as an anode, positioned below and encircling the cathode.

Dr. Schoessow has not published his work and still will not talk to the press about it, because he wanted to avoid the distractions of facing a waiting scientific firing squad.

- Behind the layers of dirt and scandal thrown at the University of Utah and its National Cold Fusion Institute, lies a simple fact: To quote Hal Fox, who heads the Fusion Information Center in Salt Lake City (which is not connected to the university): "The discovery and announcement of cold fusion by Pons and Fleischmann . . . and the domestic and international patents will probably result in the University of Utah becoming the richest university in the nation."
- Hal Fox also reports that new work by Dr. Robert T. Bush and Robert D. Eagleton at the California State Polytechnic University in Pomona demonstrates that "thin films of palladium can produce more power per cubic centimeter than is being produced in a standard nuclear (fission) power plant reactor core."

Need for political will—and funding

Coming up at the end of June is the second annual conference on cold fusion, to be held in Como, Italy. Conference organizers include many of the cold fusion pioneers from around the world, and it is no accident that next year, the third annual conference will most likely be held in Japan, India, or China. Like many scientific advances in this century, cold fusion could easily be one where the initial work is conceived and carried out in the United States, but the actual development may take place elsewhere. This is not because this country doesn't have the brains to develop its own ideas, but because of the lack of political will to do it—and therefore the lack of funding. The bipartisan malthusian establishment wants zero growth, not the technological advances that promote population growth. This deliberate non-development has happened with advanced nuclear technology, with many electronics breakthroughs, and even with the budget-starved "hot" fusion program.

The fate of a U.S. cold fusion development is not yet sealed, however. A group of U.S. scientists and engineers, reports Hal Fox, has put together "over $25 million of natural resource assets as an 'asset of last resort' to help guarantee investments in Utah's cold fusion developments." The group is concerned that the National Cold Fusion Institute, established with state and private funding at the University of Utah, is nearing the end of its initial funding in June and that no new funds may be forthcoming.

That funds are not being renewed is not because of "bad research" but because of "bad press." Specifically, the science mafia and their friends in the press created both an aura of internecine battles at the university and such an unpleasant atmosphere that Stanley Pons was forced to continue his work in France, reportedly with Japanese funding. The accompanying interviews with Martin Fleischmann and Fritz Will, the director of the National Cold Fusion Institute, both discuss this unpleasantness. To say the least, it is hardly a situation conducive to scientific research and discovery.

Part of the difficulty lies in the patent process. European patents are published 18 months after the filing date. If you want world rights, you must be absolutely novel in your invention. To maintain this novelty, "you won't publish things in those months that would give anyone else an advantage in competing with you," said one U.S. patent attorney familiar with the cold fusion controversy. As a result, many cold fusion researchers, including Fleischmann and Pons, have not been forthcoming with details. This reticence on patent priority is exacerbated by the accurate perception that

scientists who talk about their successful experiments with cold fusion are subjected to such media attack that further research becomes difficult.

The animus from the science establishment, alluded to in all three of the interviews that follow, is astounding. The leading science journals—*Science* and *Nature,* to name two—have turned down manuscripts that describe positive results and have instead printed outrageous (and unscientific) allegations of "fraud"; for example, the charge that Texas A&M researchers spiked their cold fusion cells to produce tritium. One Nobel laureate resigned from the American Physical Society because of the manner in which his manuscript was rejected by a technical journal published by the society.

Much of the old "dirt" heaped on the cold fusion researchers has been swept into a new book by Dr. Frank Close, a physicist who works at the Rutherford Laboratory in Britain and the Oak Ridge National Laboratory in Oak Ridge, Tennessee. Scheduled to appear in May, Close's book *Too Hot to Handle* made the top of the front page of the *New York Times* March 17, in a nasty article titled "Cold-Fusion Claim Is Faulted on Ethics as Well as Science." The *New York Times*'s leading science reporter, William J. Broad, spends several hundred words discussing Fleischmann and Pons's alleged "false data." He makes no mention, however, of any actual news, such as the just-announced results of the Miles group or, for that matter, any results from the 90 or more laboratories in 12 countries that have successful cold fusion experiments.

'Fire from Ice'

The good news is that an honest account of the cold fusion battle is also scheduled to appear around the same time. The opposite of Close's warmed-over lies, *Fire from Ice: Searching for the Truth Behind the Cold Fusion Furor* is a *factual* account of cold fusion's first 18 months. Author Eugene F. Mallove, chief science writer at the Massachussetts Institute of Technology, reports on what happened after the March 23, 1989 announcement by Fleischmann and Pons, who did what research and what results they got. He doesn't omit the crucial positive information, and his book reflects the great potential of an emerging technology.

From the outset, Mallove starts with a point that most U.S. science writers (and readers) have yet to learn; namely, that science does not proceed by majority rule. As he says in his introduction, "It is a gross mistake to draw conclusions about the validity of reported findings by polling the membership of this or the other scientific organization or panel." Mallove offers more sound advice to all concerned, noting that one should "use extreme caution in dismissing experimental results just because theory suggests they are 'impossible.' Theory must guide science, but it should not be allowed to be in the driver's seat—especially when exploring the frontier."

Interview: Dr. Martin Fleischmann

Fusion can meet our future energy needs

Cold fusion pioneer Martin Fleischmann met with scientists in Milan, Italy, Feb. 12, 1991, to discuss the status of cold fusion and plan the second annual cold fusion conference, which will take place in Como, Italy, June 29-July 4. He was interviewed there by Evanthia Frangou. The interview, which we excerpt here, will appear in full in the summer issue of 21st Century Science & Technology *magazine.*

Q: What can you tell us generally about the perspective of cold fusion research today?

Fleischmann: It is now almost two years since the premature announcement of our experimental results. I would say that since then many people have got very interesting results, much more interesting than the results we had. There has been a lot of interest, of course, because underlying this research is the economic question. That is the question of how we are going to meet our energy needs of the future.

Now we have been very much criticized for making the social factors important in our work. Being in the field of electrochemistry, which has many industrial applications, it was very natural for us to take such a practical view. I know that here in Italy you are not too fond of nuclear energy. But my view and that of Stanley Pons is that in order to meet the future energy needs we will need the breeder reactor and then fusion reactors. So we have to push whatever program we have toward those objectives. And, of course, cold fusion enters into that perspective.

Q: Were you surprised by your results?

Fleischmann: Not surprised, astonished is the correct word. We did not expect to find what we found. This is one reason why we took so long in reporting it. We did not want to talk about it in 1989. Our optimistic target was 1990. This was due, as is well known, to the fact that our colleagues at Brigham Young University wanted to go ahead and publish their observations. Our difficulty was that we had results that looked technologically interesting. Although we were doing our work in secret, we then had to tell the university authorities what we were doing. And you can imagine, of course, they really were obliged to take patents.

So the driving force of the scientific publications became the patent consideration. There is nothing that you can do about it in retrospect. Should it happen again, I believe it would take more or less the same course. So now I am re-