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S.C.D.

## Why "Cold Fusion"?

When they added up all the excess energy their cell had produced, the amount was so large that it could not be explained by a mere chemical reaction—of any kind. The process became known as "cold fusion," for the lack of a better explanation, and because Fleischmann and Pons were using the very same deuterium form of hydrogen that scientists with billion-dollar machines were using to try to create practical *hot* nuclear fusion at temperatures of millions of degrees.

Dennis Cravens doesn't have a \$30 million dollar a year budget like the hot fusion laboratory at MIT in Cambridge, Massachusetts, the Plasma Fusion Center, or the Princeton Plasma Physics Laboratory in New Jersey, where new results often capture headlines—even though the hot fusioners have never produced a *single watt* of excess energy. (If and when the hot fusioners do achieve excess energy, it will be with a blast of lethal neutron radiation that will have to be tamed.) Professor Cravens' work is completely and deliberately ignored by the U.S. government, even though major Japanese corporations have embraced this upstart technology.

Cravens has already accomplished what the hot fusioners have never done and will never do with their \$500 million a year program. He gets more heat energy out of his tiny liquid cells with palladium or nickel electrodes than he puts in as electrical energy—and he gets it with no radiation. You can read about his experiments in this issue, and—if you are then bubbling over with enthusiasm about "cold fusion"—you may want to try them yourself. He'll point the way.

### Something new under the sun

Water as fuel? Pollution-free power? How can unlimited power from water be real, when scientific officialdom supposedly investigated the Fleischmann and Pons claims and found them without merit back in 1989? More to the point, why are some scientists ridiculing anyone who even *suggests* investigating "cold fusion?" Where does all this excess heat in the opposition to cold fusion

come from? Is it intellectual arrogance on the part of some scientists and the fear of pack journalists that they may have to eat crow?

Any student of history will tell you that following many major breakthroughs in science and technology, the pioneers were ridiculed by the establishment, often with the enthusiastic support of the news media. Nothing has changed. Did the media cover last December's Fourth International Conference on Cold Fusion on Maui, which was sponsored by the Electric Power Research Institute? If they had, you would have seen cover stories on *Newsweek* and *Time*.

The Maui conference showed, as had the previous international conference in Nagoya, Japan in October, 1992, that hundreds of researchers around the world are achieving the same astonishing results in an increasing variety of reproducible, solid experiments. Unlike the hot fusion people, "cold fusion" researchers aren't trying to mimic the nuclear reactions inside stars, which occur at millions of degrees. So what is this "cold fusion?" Is it a new form of nuclear energy or something else even more remarkable that *seems* like nuclear energy, because it gives out so much continuous power—far more, apparently, than can be explained by chemistry. Yes, there is something new under the Sun, only it doesn't work like the Sun!

If this technology develops as the pioneers in the field expect, within a few years we will be seeing the beginning of the end to our dependence on oil, coal, and natural gas—and the end of much environmental pollution. This new low-cost power source may change the world far more than the automobile, the airplane, the telephone, or the computer. The predictions are that this new process—in all its variants—will provide lower cost power than hydroelectric generators, photovoltaics, wind-driven generators, and nuclear power plants. The generators should be small, light, and inexpensive enough to power cars, homes, and aircraft. Formidable industries stand to lose if they are unable to

**D**ennis Cravens, working with equipment that cost him less than \$5,000, much of it from Radio Shack and the local hardware store, has been doing what lots of well-known scientists claim is totally impossible—he's producing "cold fusion" excess heat, and he's been doing it in a lab that he set up in his garage in Vernon, Texas.

Dennis is a professor of chemistry and physics at Vernon Regional Junior College, and he's by no means alone in his success with this new technology. Hundreds of researchers around the world—at universities, national laboratories, and some of the largest corporations in the world—have confirmed the claims of scientists Martin Fleischmann and Stanley Pons. On March 23, 1989 at the University of Utah, they said that their research had shown something very mysterious was happening when an electrical current was passed between a palladium and a platinum electrode in a solution of heavy water and lithium salt. They were getting more power out as heat than they were putting in as electricity.

adapt to the expected rapid development of cold fusion energy.

#### Water as fuel?

It sounds crazy until you stop to think about it. Sure, for thousands of years we knew we could get energy out of matter through chemical reactions—ordinary fire does that with wood and fossil fuels. Then in the 1930s and 40s we learned how to split the nuclei of uranium atoms to get fission power and the atomic bomb. Soon thereafter, scientists developed the even more powerful hydrogen bomb, which gets energy out of matter by uniting—fusing—forms of hydrogen nuclei. Now science and technology are confronted with what is indisputably another way of getting energy out of matter, a gentler way of tapping it: “cold fusion.” Though its detailed mechanism remains unexplained, there is simply no longer any doubt that cold fusion works. To deny the scientific evidence for cold fusion—as many have attempted—is to stand science on its head: to suggest that past “accepted theory” can legitimately falsify thousands of experiments that appear to contradict that theory.

#### Because of “cold fusion”, the world as we know it is about to end.

This is very good news. The fossil fuel age, the Oil Age, will in all probability begin to end during the waning years of the 20th Century, and we intend to be the herald of this process. After five years of controversy and neglect, an astonishing discovery—“water as fuel”—has begun to blossom around the world. “Cold fusion,” Utah’s “miracle or mistake” of the spring of 1989, turned out to be a real phenomenon after all. Hence this magazine: the world’s first devoted exclusively to “cold fusion” and possibly the world’s first to have mysterious quotation marks in its name! We do know what we are talking about—excess energy; we just don’t know exactly what causes it! Our cold fusion theorist friends have plenty of ideas, and they will be telling you about them in our pages.

Cold fusion has now reached a critical stage in which improved communications will play a key role. The field is in ferment and expanding explosively. In one of history’s classic ironies, the 1989 announcement of “excess energy from water” in a relatively simple table-top

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experiment—possibly by a heretofore unknown form of nuclear energy—occurred less than 12 hours before the Exxon Valdez caused a massive oil spill into the waters off the coast of Alaska. There was an initial media hoopla over the cold fusion story, but the press then lost interest as it became more difficult to discern the truth amid claims and counter-claims of angry chemists and physicists. With few exceptions, journalists bought the notion that cold fusion was nothing but hot air. “Pathological science” became the common insult, as few noticed that *pathological skepticism* about a new phenomenon was the real problem. Contrary to the media’s perception, cold fusion never died and was certainly never disproved; it simply went underground as groups of courageous scientists in over a dozen countries mounted a concerted effort to understand and reproduce the mysterious phenomenon. Thanks to their hard work, it has survived.

Scientists in laboratories around the world are closing in on an explanation. Some cold fusion researchers suggest that the nuclei of hydrogen isotopes participate in heretofore unknown nuclear reactions within the confines of metal atomic lattice structures—leading to vir-

tually radiationless nuclear energy. Others say that cold fusion manifests as very faint low-level nuclear reactions, but that its more important aspect for technology—the prodigious heat evolution, which is far beyond known chemistry—comes from a new type of “super-chemistry,” which affects not the nucleus but the outermost part of an atom, its electron “cloud.”

Whatever nature’s long-hidden secret that allows us to use water as fuel, cold fusion phenomena are real beyond any reasonable doubt. Excess power production and low-level nuclear effects have been convincingly demonstrated and made substantially reproducible with a remarkable variety of techniques. Moreover, laboratory cold fusion experiments have begun to exhibit astonishingly high levels of power intensity, surpassing in small volumes the powers found even in fission nuclear reactors—many kilowatts per cubic centimeter, but without associated radiation.

#### Is cold fusion about to be commercialized?

Yes, indeed! The Japanese Ministry of International Trade and Industry (MITI) has launched a massive “New Hydrogen Energy” program to do just that. It is conservatively estimated that Japanese corporations are already spending \$90 million/year on cold fusion, a figure sure to increase dramatically as practical prototype devices emerge in the next few years—or months. In the U.S., where anti-cold fusion sentiment has been particularly intense, the Electric Power Research Institute, the \$500-million/year research arm of the electric utility industry, continues its cold fusion R&D program. Last December it organized the Fourth International Conference on Cold Fusion, which was held on Maui. Other entrepreneurial cold fusion companies are springing up in the U.S. This corporate involvement is perhaps the most important reason we decided that the time was ripe for “Cold Fusion.”

**W**ayne Green, our New Hampshire publisher, whose magazines helped accelerate the personal computer and other

technology revolutions, says that a publication in a new technology area serves three purposes: "It speeds up technical development by providing faster and better communications between the researchers and developers in the new field; it not only helps attract new people to the field, it enables them to get up to speed much faster than they could waiting for books to be published; and, probably of even greater importance, a publication makes it possible for entrepreneurs to provide products to help the new field grow. It makes a new industry develop faster."

There you have it, our mission: to accelerate the "cold fusion" revolution by disseminating the truth about scientific and technological developments in what will surely be one of the most significant technology upheavals in history. We will publish the latest discoveries and findings in a manner that can be understood by a broad spectrum of people. Our intended audience is not restricted to scientists and engineers, though we will certainly aim to provide these experts with timely and challenging material that will help them in their work. "Cold Fusion" will also explore the spectacular changes in store for civilization in the coming energy revolution—technological, as well as economic, social, and political.

**W**e will also expose the strange politics of opposition to cold fusion, both past and present, which has so hamstrung research on the phenomenon. Part of that role will be to comment on how cold fusion is or is not being treated in the news media. We promise that our magazine will expose the numerous instances in which the media have ignored the facts, disparaged honest research, and stood science on its head.

Since the parallel is so striking, it is worth recalling what happened to two American inventors whose initial success occurred just over 90 years ago. On December 17, 1903, Wilbur and Orville Wright realized an age-old dream when they launched the world's first successful heavier-than-air flying machine. For five years, their millennial accomplishment went largely ignored by

the scientific establishment and the major media, even though the brothers Wright made no secret of their invention. For years leading up to a dramatic demonstration at Fort Myer, Virginia, they tested their aircraft in full view of commuters on an interurban

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railroad near Dayton, Ohio. Yet for five years the Wrights were considered cranks by U.S. government bureaucrats who refused to take them seriously! So, in search of support the Wrights took their invention to France.

**A** few years ago, two other scientist-inventors, one American and one British, took another millennial invention to France: "cold fusion." Drs. Pons and Fleischmann are now working on cold fusion energy technology in the well-equipped Japanese-financed IMRA Europe S.A. laboratory near Nice, France. They left behind the scientific bigotry against their discovery that was unleashed in the U.S. The Japanese consortium of industrial giants has given them research funding. Meanwhile, in hundreds of other laboratories the world over, researchers explore an astonishing array of physical phenomena that stem from the original discovery of the cold fusion pioneers. It has been five years since the announcement in Utah, and the "Fort Myers of cold fusion" approaches—the demonstration of prototype technology.

Like flight, which we take for granted today, "cold fusion" will some day be taken for granted. But only five years into the Cold Fusion Age, as we launch "Cold Fusion" Magazine, we can hardly imagine anything nearly as exciting and pregnant with virtually infinite possibilities.

Our pages will offer much more than theories on the frontiers of science. In the exciting months to come, "Cold Fusion" will feature some of the most knowledgeable people in the world writing about what the cold fusion revolution is likely to mean for the world. How will cold fusion energy begin to replace the existing energy infrastructure? What will cold fusion automobiles be like, and the "cold fusion home"? What about the impact of water-fuel energy on agriculture, financial markets, geopolitics, and the environment? These will be a continuing focus of this magazine, in addition to detailed reports about the ongoing science, technology, and business of cold fusion. We expect that you will be thrilled with what future issues bring to you.

### About the editor ...

"Cold Fusion" Editor Dr. Eugene F. Mallove brings to the magazine broad experience in high technology engineering with Hughes Research Laboratories, TASC (The Analytical Science Corporation), Jaycor Systems Division, Northrop Precision Products Division, and MIT Lincoln Laboratory. Since 1991, Dr. Mallove has worked as a consultant to U.S. corporations conducting and planning R&D in cold fusion. He is the author of three science books for the general public, including the Pulitzer-nominated book on cold fusion, "Fire from Ice: Searching for the Truth Behind the Cold Fusion Furor" (John Wiley & Sons, 1991). He has taught science journalism at MIT and at Boston University; he was Chief Science Writer at the MIT News Office when cold fusion erupted. Prior to that, he was a top science writer and broadcaster with the Voice of America in Washington, DC, and also wrote science and technology articles for magazines and newspapers, including MIT *Technology Review* and *The Washington Post*. Dr. Mallove holds a Doctoral Degree (Sc.D.) in Environmental Health Sciences (Air Pollution Control Engineering) from Harvard University, and a Master of Science Degree (SM, 1970) and Bachelor of Science Degree (SB, 1969) in Aeronautical and Astronautical Engineering from the Massachusetts Institute of Technology.