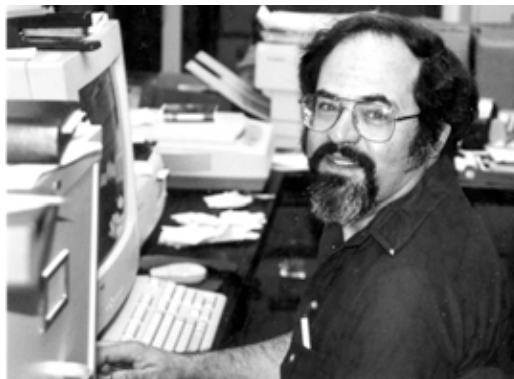


## The Power of the Sun. . .Down to Earth



By Eugene F. Mallove, Sc.D.

Pouring across every square meter of the surface of a large sphere centered on the Sun, with the radius equal to the average distance of Earth from the Sun, are about 1.4 kilowatts of electromagnetic power. Day in and day out, sunlight illuminates our little world and gives life to its surface inhabitants through a complex food chain. (Those microbial denizens of the very deep—kilometers beneath the rocky surface—may exist without benefit from the Sun, or so we are beginning to understand.)

Devotees of solar energy have built passionate careers around the power of sunlight, diluted as it is from its 1.4 kilowatt per square meter strength in airless low-earth orbit—realm of space shuttles and space stations. There are those too who have made ambitious plans to capture the intense power of sunlight in space on vast, delicate structures in high orbit, akin to spaceborne leaves. Converted to microwave power, this would be transmitted to huge antennae on the ground, and thence to the electric power grid. A recent book, *Solar Power Satellites: A Space Energy System for Earth* (by Peter Glaser *et al.*, John Wiley & Sons, 1998) describes these vaunting ambitions.

Alas, the heyday of such solar power satellites is likely never to come. They will literally not have their “place in the Sun.” Nor is it probable that photovoltaic or other conversion of sunlight to electricity will become a primary energy source on Earth’s surface—however well-intended these efforts might be.

Terrestrial and space-based solar power are destined to fade, primarily because the power of the Sun has already begun to come down to Earth. Certainly this has not happened in any practical sense at the failed and dying hot fusion reactors at Princeton, MIT, and elsewhere. Rather, the Sun’s power

now comes in more concentrated, practical form: low-energy nuclear reactions (LENRs). These mimic on Earth at near ambient temperature what supposedly occurs deep within a stellar interior at (allegedly) multi-millions of degrees. “The circumstances of solid-state cold fusion are not those of hot fusion,” to paraphrase the late Nobel laureate Julian Schwinger. LENRs don’t deliver lethal radiation, just wonderful, enduring heat.

At least one branch of the expanding field of LENRs appears to be quite literally the *cold fusion* of deuterium (heavy hydrogen) into helium-4 (garden-variety helium), with perhaps a dash of the rare isotope helium-3 being produced as well. That is how Professor Y. Arata and Dr. Y.C. Zhang described their work in the *Journal of the High Temperature Society of Japan*, “Solid State Plasma Fusion (“Cold Fusion”)” Vol. 23, the entire 56 page January 1997 issue. These experiments were done electrochemically in heavy water, as was the original Fleischmann-Pons experiment, but in this case a special cathode was used that contained powdered palladium black sealed within a Pd-metal chamber. Respected hot fusion scientist Arata, for one, believes that the power of the Sun has already come down to Earth.

It is coming down for others too. As Jed Rothwell reports in this issue (page 25), Dr. Michael McKubre of SRI International reported to a session of the Annual Meeting of the American Physical Society the results of a straight Pons-Fleischmann cell replication. Helium-4 production was 99% commensurate with the excess heat measured from the SRI experimental cell. That is, it could be explained by the diversion of the normally expected high energy (23.8 MeV gamma) radiation into metal lattice heat. By his nature, McKubre is much more reserved than Arata in touting his work as “cold fusion,” but let’s face it, he knows what he’s got and he has a great suspicion about what it is: the power of the Sun brought to Earth.

Low-Energy Nuclear Reactions were also the subject of several talks at the June 1999 meeting of the Society for Scientific Exploration (SSE) [18th Annual SSE Meeting, Northrup Hall, University of New Mexico, Albuquerque, June 3-5]. There Dr. McKubre reported more

details of his group’s replication of the high-temperature catalytic fusion process of Dr. Les Case (see *Infinite Energy* Issues, No. 19 and following). He reported that 50 cubic centimeter closed cells, containing commercial catalyst (Pd-doped carbon), produced apparent excess heat output of roughly 0.25 to 0.5 watts. He had run about a dozen cells, with a success rate in the range of 30% to 50% of the cells. McKubre reported that care must be taken in this work, especially in making sure that the catalysts are pure and clean.

In the pressurized heavy-hydrogen gas, helium-4 appeared to grow roughly linearly with time to about 11 ppm helium-4, exceeding the 5.22 ppm helium-4 in the ambient environment during the month of its operation. There was practically no chance then that the vessel’s helium could have come from external infiltration—or, for that matter, from internal contamination. The control run with ordinary hydrogen gas (H<sub>2</sub>) produced no unusual effects whatever—no apparent excess heat and no helium. Again, the power of the Sun apparently brought to Earth. McKubre said that the case for the excess heat was “essentially overwhelming.”

Dr. Melvin Miles of the U.S. Navy’s China Lake Center again reviewed his compendious results for helium association with excess heat production in Fleischmann-Pons-type cells—a clear demonstration of the power of the Sun brought to Earth. His full 1996 U.S. Navy report about this was reprinted in *Infinite Energy*, Issue No. 15/16.

Why then is there not a great ringing of bells, fireworks, and celebrations heralding the coming Cold Fusion Age? The world at large little knows nor apparently has long remembered the promise of cold fusion, which burst forth in March 1989. A sign of this: *Time* magazine dated June 14, 1999 listed Cold Fusion among “The 100 Worst Ideas of the Century.” It is right up there with Woody Allen, Prohibition, The Maginot Line, The Titanic, the (fraudulent) Hitler Diaries, and the Jerry Springer Show. With such impunity do the less-than-funny people at *Time* pass judgement on one of the most important discoveries in the history of science. Revolting! Fortunately, the ignorant hacks at *Time*, and their cousins at various science magazines who should know better, will not determine the course of scientific history. Mother Nature is speaking to us loudly and clearly: “Yes, I can do this trick of

bringing the power of the Sun down to Earth—power for you to live and prosper by.” It will be done. The question is, “When?”

Should we be so surprised that a very good thing has taken a little more than a decade to get even this far—encouraging reports at obscure meetings by frontier scientists who are mostly ignored or mocked? Look at the history of photovoltaic cells—the conversion of sunlight to useful electricity. According to the excellent history, *From Space to Earth: The Story of Solar Electricity* (John Perlin, 1999, Aatec Publications, Ann Arbor, Michigan), the first hints of the ability of light to generate electricity appeared in the 1860s. A selenium testing device being used to lay trans-Atlantic telegraph cables evidenced the phenomenon. Then in the 1870s in England, Prof. William Grylls Adams and his student Richard Evans Day proved that light, not heat, was the actual source of the electrical power being generated in selenium.

According to Perlin’s book, German scientist Werner von Siemens judged the photoelectric effect “scientifically of the most far reaching importance.” Ditto for James Clerk Maxwell. Perlin writes: “Few scientists heeded Siemens call because most of his contemporaries viewed photoelectric devices, such as Fritts’ ‘magic’ plates, as perpetual motion machines. They appear to generate power without consuming fuel and without dissipating heat.” It took until the 1950s for the more potent but still weak silicon photo-electric cell to be developed. It was not until the energy crunches of the 1970s that more attention was paid to photo-electricity as a utilitarian power source. We hope and trust that it will not require a century for cold fusion power to be commercially developed.

Already there are signs that cold fusion will not suffer the century-long trial of photoelectricity. First, there is more impetus today to find clean, renewable energy sources. There is also the real prospect that the catalytic fusion approach of Dr. Les Case will prove viable. It looks to be a robust process, but, to be sure, it is still having its growing pains. It is wonderful that we now have solid confirmation of the Case process in the SRI results. It is so very tragic that because of the arrogant opponents of cold fusion, these conclusions are not widely known and appreciated.

If some show-stopper for catalytic fusion should arise, e.g. short-time failure of the catalysts, there is another very promising technology now emerging from its present sleep in the hands of CETI (Clean Energy Technologies, Inc.): the thin-film multi-layered cathode electrolytic approach of Prof. George Miley of the University of Illinois at Urbana-Champaign (see *Infinite Energy*, Issue No. 9 and following).

Based on his work with his own (not CETI’s) nickel- and palladium-coated

beads in 1996, Dr. Miley’s group is now forging ahead with fairly consistent and reproducible heat generation, but with other geometries and techniques. Expect to hear much more from the Miley group soon. CETI may return to the fold if it can iron out the problems that it had been having with reproducibility *on demand* of its thin-metal-film excess heat process.

There is Very Big News on the “political” front from Miley. In early May 1999, Miley’s Low Energy Nuclear Reactions Group was awarded a contract by the U.S. Department of Energy to conduct a “Scientific Feasibility Study of Low-Energy Nuclear Reactions (LENRs) for Nuclear Waste Amelioration.” Miley’s proposal was selected by the DOE’s Nuclear Energy Research Initiative (NERI) program as one of forty-five awards, made on May 7, that “resulted from the independent peer-review” of 308 proposals received by the DOE.

This is the very first time since 1989 that the DOE has *officially* spent money on cold fusion research—beyond the initial period in which the DOE’s “HeavyWatergate” Huizenga Cold Fusion Panel did its dirty work (which still continues to obstruct the

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#### About the Author

Beverly Rubik, Ph.D., biophysicist, is a leading scientist exploring the frontiers of science, medicine, and spirit. In 1996, Dr. Rubik founded a non-profit institute, the Institute for Frontier Science in Oakland, California for research and education on subtle energies, consciousness, and energy

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es the credibility of the report in my eyes, as I would expect a simple artifact to occur every time, since the output helium rises in a simple, untroubled line. My meager wits are unable to imagine any applicable artifact. Therefore, I expect this breakthrough success to continue at SRI, and to be speedily replicated by other labs. In addition, since in physics, the basic rule is that what is not prohibited is mandatory, then we must give much greater credence to the vast body of reports of the many varieties of cold fusion in the last ten years. The seedling has not expired and deserves copious watering. Without being specific, McKubre said that theoretical progress was being made."

True to the "hint and run" behavior of skeptics, Murray later backed-away from his positive assessment and came up with an easily dismissed objection: that covertly bound helium might have been emitted by the catalyst itself! There is no credible evidence that this could be occurring, especially in view of the fact that no helium was found to build up in the ordinary hydrogen or deuterium control test with the same batch of catalyst. It is quite clear now that this catalytic fusion direction is among the most promising of the low energy nuclear reaction processes.

#### Calorimeter Development:

NERL's flow calorimeter went through a redesign when the previous design, which employed pulse width modulation, failed to meet stringent inlet water temperature requirements. A better method using amplitude modulation resulted in vastly improved regulation, which will enable better calorimeter sensitivity. Further testing and some tuning will soon enable us to perform this versatile form of calorimetry. □ □ □

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U.S. patent process and influence journalistic accounts). How this Miley award slipped through the normally vicious opposition within DOE is difficult to discern. It is a wonder, that's for sure! When we learn more about how this happened, we'll let our readers know.

Some people say that on these pages we should be kind to the DOE, because of this landmark award to Miley and other initiatives that may be afoot. Hell no! We say to the DOE—"What took you so long?" Whom do you claim to represent: special academic interests or the people of the United States? Deputy Secretary of Energy Dr. Ernest Moniz—former head of the MIT Physics Department—are you listening? We hope you are. Are you listening to some of your underlings who know that the DOE's war against cold fusion should come to an end—now?

Is U.S. Energy Secretary Bill Richardson listening? Not to our knowledge, even though we are told he had some time to reflect on the message of *Infinite Energy*, Issue No. 24, the 10th Anniversary of Cold Fusion issue. His latest project is to push for the U.S. to generate 5% of its electricity by windmills in the year 2020. More power to him for that, but what about a little wind from him about cold fusion?

The Miley contract and his study's nearly certain success, based on his past work, establishes a gaping crack in the foundation of DOE's opposition to cold fusion. Politicians who hold the purse strings for DOE may take note and wonder whether it is time to force DOE to make a long overdue re-evaluation of cold fusion—this time based on a decade of clear experimental evidence in support of the phenomenon.

In other news: the venue for the Eighth International Conference on Cold Fusion has been set: Frascati, Italy, May 21-26, 2000—the first international cold fusion conference of the new millennium. Sponsorship is by the Italian National Institute of Nuclear Physics and the Italian Physical Society. Italy, following in the more modest footsteps of France, is beginning to set up the infrastructure of a national cold fusion program.

With all the forgoing, are we witnessing a dimly glimpsed "light at the end of the tunnel" in the prolonged struggle against forces of darkness, or is this an illusion as some past optimistic tidings turned out to be? Could the light be from that metaphoric train bearing down on weary, bleary-eyed seekers? Is this an auspicious light of day at the end of the interminable "tunnel," or does the apparent glow come from a dangerous "train"? Let us hope it is the former as we forge ahead. ∞