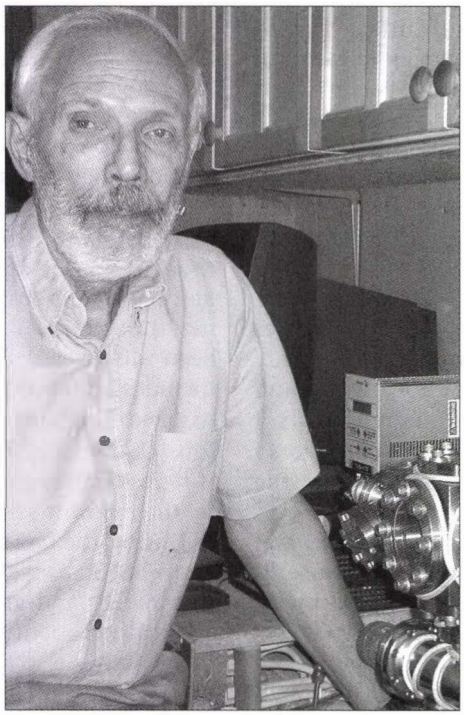
An Interview with Dr. Edmund Storms

Author of *The Science of Low Energy Nuclear Reaction*

John Allen Rudesill*

We have the honor and distinction of visiting with Dr. Edmund Storms, who has recently published his first book on cold fusion titled *The Science of Low Energy Nuclear Reaction: A Comprehensive Compilation of Evidence and Explanations About Cold Fusion*. Dr. Storms has culminated his 34 year career as a radiochemist at Los Alamos National Laboratory and 18 years in cold fusion science with this solidly convincing review of the field. The work is written in a narrative style and is generously replete with tables and figures to support the text. There are extensive references and bibliography to enable the reader to identify the primary sources, many of which are available on the e-library website, www.LENR-CANR.org. The book has Forwards by two distinguished scientists who themselves have long been active in the cold fusion effort. Both Dr. David Nagel, a Professor at George Washington University (D.C.) and Dr. Michael McKubre at SRI in Menlo Park, California regard this book as a benchmark guide book that will serve scientists and students interested in cold fusion as a must-have reference for many years to come. I agree with them and highly recommend the book for anyone interested in the subject area. They will find the book is well-written and accessible to non-scientists and yet it is challenging to serious academics. Dr. Storms is to be commended for the serious effort made to produce this important book. The book is published by World Scientific Publishing Company; *Infinite Energy* hopes to soon offer the book in its catalog.



Dr. Edmund Storms

Readers of *Infinite Energy* will recognize Ed Storms as a contributor to *IE* over the years and as having served on the magazine's editorial board. This interview was conducted mainly by email given the geographic separation and time zone difference. The Q&A will first give us some background on and insight into Ed Storms the man from his early years (not covered in the book). It will then highlight key technical aspects that Dr. Storms has concluded are critical to the successful replication of cold fusion phenomena.

John Allen Rudesill (JAR): Your landmark book *The Science of Low energy Nuclear Reaction* provides some career biographical information that gives insight into your adult years. It is always fascinating to know what, if any, experiences from a person's formative years helped steer them toward the path that they later followed. Can you recall any particular experiences or events from your youth during the end of the depression and war years that shaped your ideals and ignited your passion?

Edmund Storms (ES): Like many people who made science their career, I was interested in how nature worked from as early as I can remember. All through high school, I had a laboratory in the basement in which I did those things modern children are no longer permitted to do, like making explosives and rockets. I taught myself glass blowing so that I could make a Geiger counter to search for uranium. In fact, in those days I had to even make the vacuum pumps because what little equipment that was available was much too expensive for a kid to buy. Nevertheless, I could buy all the chemicals to make all of the common explosives. Because our house was near the edge of town, the explosions raised no alarm. If I had grown up now, I would be looking forward to a long prison term instead of a productive life in science. Back then, chemistry was the science that held a kid's attraction because all kinds of neat stuff could be made, sometimes with the added advantage of getting the parents attention when smoke filled the house.

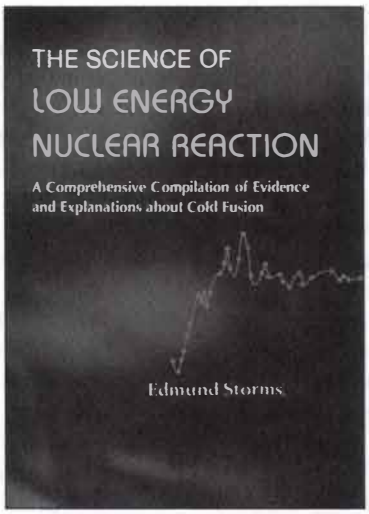
JAR: Yes, I too made loud noises, smoke, and strange colored flames as I became interested in chemistry and later chemical engineering. I even got paid in my first job to make and test pyrotechnic materials. Something beyond smoke and bangs happened in your youth. How did the development and use of the atomic bombs affect your outlook in your early years?

ES: I found the atom bomb to be a horror and I wanted nothing to do with its refinement, even though I eventually worked at the Los Alamos National Laboratory on non-weapon programs. Some efforts are too dangerous for all mankind to be developed, no matter what temporary justification is used. This and other examples have convinced me that human society is eventually doomed because increas-

ingly lethal weapons will be developed under one pretense or another. Mentally corrupt people will find reasons to use them for what seem to be good reasons at the time. I have no doubt that cold fusion will be used to enhance the power of weapons, but meanwhile it can do some good for mankind. Therefore, we in science can only expect to make life temporarily better for ourselves and each other because we need more energy, yet every energy source has the potential to destroy.

JAR: You have made a very clear and powerful statement against WMD's and in particular nuclear devices. I tend to agree with the inevitability of such weapons being misused despite any of our most passionate efforts to prevent this from happening. What was the main reason you chose a Ph.D. in radiochemistry, given your aversion to nuclear weapons given in the previous answer?

ES: I got interested in radiochemistry only because I was interested in studying under Prof. Kennedy at Washington University (St. Louis). He started the field of radiochemistry and was a great teacher with ideas well beyond the field. The field became even more interesting to me when weapon testing dumped a lot of radioactivity on St. Louis. Ordinary people had no idea what was happening to their environment and bodies. My studies gave me a much better idea of what to fear and what to ignore.



JAR: During your early years at LANL in the late 1950s, did you ever imagine that there might be some remarkable, even astounding possibilities for peaceful fusion energy and further that you would become an important participant?

ES: Neither I nor anyone I know had any idea such nuclear reactions were possible. Yet, many people at LANL tried to make the claims work once they heard about the claims of Fleischmann and Pons. I, and a few others, succeeded, which gave us a reason to continue our studies. Once I was sure the claim was real, I knew it would have a great effect on my life as well as on society. However, I'm sad it took so long and that the energy problems had to get so serious before people woke up. In addition, the field has been good to me in the interval by giving me something worthwhile to do after I retired from LANL. Other people who tried to stay in the field have not been as fortunate.

JAR: From my own experience, I remember moving from development to research at W.R. Grace in 1987 and very quickly becoming involved in the race to make samples of the exciting new ceramic high temperature superconductor YBaCuOx 123. My colleagues and I invented a rather elegant process to make the ceramic powder and we sent samples all over the world. This was exciting compared to our more pedestrian catalyst research. Then in 1989, Pons and Fleischmann made their historic announcement at a press conference claiming cold fusion. At that time, Grace had a competent electrochemistry group and one scientist put together a FP cell and turned on the DC. It didn't take long before a radiation alarm was triggered, causing a building evacuation. No more work was allowed after that even though the radiation alarm was probably false. You have described in your book some of the events at LANL in the wake of P&F. What was it like for you at LANL when the F-P announcement came out and how did that change your career path at the lab?

ES: After the F-P announcement, LANL changed and became a very exciting place to work for a short time. Once the claims could not be easily replicated, unimaginative managers and politicians took over. At the same time, the DOE was applying mindless rules to all work. As a result, a large fraction of the lab retired when they were given a bonus for leaving. Typically, the people in charge were surprised and had to hire many back as consultants, myself included. Eventually, Carol and I completed a house in Santa Fe containing a cold fusion laboratory, which made even working part-time at LANL unattractive. Seeing how poorly the present laboratory has been treated by the government, I'm glad cold fusion came along when it did.

JAR: It is now more than 18 years since that F-P eventful announcement and the world has gone through many changes with the obvious overuse of resources by the growing human population and our appetite for better living conditions. How has your ongoing involvement in cold fusion and low energy nuclear reactions shaped your priorities and values over the last two decades?

ES: Studying and researching cold fusion has become my full-time job. Thanks to skeptics, competition for this job has not been high, making my small efforts significant. So, thanks to the skeptics, I have something to keep me busy. For this, I'm thankful.

JAR: It is now ten years since we met at the first energy conference I ever attended in May of 1997 hosted by ANE (Association for New Energy) as I recall in Denver, Colorado. It was kind of comical that myself at 6'7" and you nearly the same height were standing together with Chip Ransford who is about 6'2" and we were clearly the tallest fellows there. We have become friends over the years and I have enjoyed our wide ranging conversations. It is sobering that ten years later the hope that was evident in many of the technology areas is still not realized in actual commercial hardware despite the tireless efforts and sacrifice of many devoted individuals. Do you feel at this point like a man on a mission regarding getting the low energy nuclear reaction technology out of the neonate care and into the mainstream commercial pipeline?

ES: I have no mission except to get out of bed without too much effort and challenge my mind in the lab. Society will find cold fusion when the need is greater than the ignorance. Even then, the idea will be fought by established energy industries. I can only provide the facts, rather like scat-

tering seeds with a hope that some will take root. Unfortunately, land in the U.S. is covered by rocks allowing only a few seeds to grow. I'm too old to remove the rocks, so I just keep throwing seeds.

JAR: I see from your answer to the last question about a mission in regard to cold fusion that you don't see yourself advocating for the acceptance and development of the technology at least in the vocal and ardent fashion of a Gene Mallove, whose influence continues on through his writings and *Infinite Energy* magazine. So let's explore what message(s) you intend for the reader to get through reading your book. Is it reasonable to say that you expect the reader to be convinced that cold fusion is real and that considerable data exists to support that conclusion?

ES: The book was written mainly to show the reality and to help people investigate the subject. I have no idea whether the effect can be made practical or not. It is premature to expect a practical application and unwise to promise such a result. Nevertheless, I think the probability that cold fusion can be made practical is so high that serious effort is warranted. Meanwhile, the need for clean energy has become so great, all possibilities need to be explored.

JAR: In a recent conversation you made an analogy that describes the main challenge in doing cold fusion and low energy nuclear reaction experiments. Using geography as an analogy, you commented that if the nuclear active environment was the Empire State Building most experimenters would miss it because they do not know what city it is in! This means that well-designed and conducted experiments often saw no evidence of LENR or CF because the parameter space explored was in the wrong city by analogy. Would you give the reader some highlights from your book that summarize how 18 years of collective work has narrowed the parameter space toward more consistent hits on the "Empire State Building"?

ES: This is a materials science problem, not a physics problem. Instead of asking what mechanism makes the effect happen, we need to ask what environment is required. A number of methods have been found to work. A search needs to be made to discover what environment is common to these methods. I believe the environment must contain certain critical elements, but unexpectedly palladium is not one of them. Obviously, the environment with its critical elements is rare, although it is occasionally created by chance. The challenge is to increase the probability to 100%. Once the environment has been created, the mechanism works automatically without any additional encouragement. Just like fire, it is not necessary to understand the chemical mechanism to make material burn. An ignorant person only needs to make a spark and nature does the rest.

JAR: Much of your book reviews the challenges of both properly measuring heat via calorimetry and detecting nuclear reaction products. Do you think the methods you describe and reference can finally convince the more objective skeptics that measurement issues are beyond reproach?

ES: The evidence is now so overwhelming and internally consistent that disagreement about the reality would have vanished long ago in any other field. Only the psychological issues prevent acceptance in this field. Too many people will have to admit they were wrong about an important subject. In addition, some small-minded people find the field to be such a good way to describe poor science that they can not give up the metaphor cold fusion has become.

JAR: You chide the pathological skeptics as being the alter ego of those who conduct pathological science. Another very important part of your book examines some of the more promising mechanisms proposed to explain how cold fusion takes place. You compare the mechanisms on their ability to explain the most observations. Can you summarize why the Mills hydrino or in this case deutrino particle is an essential part of the cold fusion mechanism according to your view?

ES: Several essential conditions must exist before LENR can occur and be consistent with the "normal" behavior of nature. A source of energy is required along with a mechanism to cause it to concentrate on a few atoms. Common experience and the Second Law of Thermodynamics stand in the way of such a mechanism. In addition, this mechanism must overcome or neutralize the Coulomb barrier. Adding to the problem, this mechanism must be so efficient that it can permit rates in excess of over 10^{12} reactions/sec, while producing a variety of nuclear reactions involving deuterium or hydrogen with atoms having a high atomic charge. Only the Mills hydrino mechanism has all of the necessary features combined into one theory. In other words, LENR requires the existence of something having the basic features of the hydrino. The hydrino forms by an exothermic reaction, which avoids the problem of spontaneous concentration of energy. Its formation can place an electron near the nucleus where it can shield the positive charge of the hydrogen or deuterium nucleus. And it requires the presence of a rare catalyst, which accounts for the unique feature of the environment that makes the process so hard to replicate. A person only needs to believe the hydrino is real and cold fusion starts to make sense.

JAR: It is curious that Mills in his early hydrino work acknowledges the potential for facilitating fusion and yet he made a clear effort to separate himself and his technology from the cold fusion camp perhaps to avoid the attacks from the hot fusion critics and skeptics. As a result, he has had ample sustained funding to develop his discoveries and ideas and he also has his own cadre of skeptics and critics. Do you think it is time to initiate a dialog with Mills to appeal for his help in understanding the behavior of hydrinos and deutrinos in the nuclear environment?

ES: I think having a dialog with Mills would be very worthwhile. He realized his theory could be applied to LENR many years ago, but decided not to get involved with the field. I think he was wise because a two front war is seldom won by the defender. It would be ironic if his generally rejected theory would be the long-sought explanation for the generally rejected idea of LENR.

JAR: I have known Mills since 1999 and we have had a num-

ber of interesting conversations over the years. I visited his lab in 1999 and also we later analyzed four of his samples informally at Grace during this time. They were halide salts of potassium and rubidium that Mills said contained hydrinos. We agreed to subject the samples to several routine analytical methods that could detect this altered form of hydrogen in ways not described in analytical handbooks. We did see that the proton NMR had an unusual chemical shift that was similar to measurements Mills had made and was not to be found in any reference at that time for an alkali halide or hydride. We also looked at XPS to scan for unusual bond energies which again we did see a weak signal that was similar to what Mills had seen on these materials. I recall we also did infrared spectroscopy on the samples and again some unusual features were seen as Mills told us he had seen. I have been strongly convinced ever since that Mills has discovered something unique and important. Given your conviction that hydrinos and deutrinos are important or even necessary in cold fusion, wouldn't it make sense to test the materials used in these experiments for the anomalous signatures Mills has cataloged?

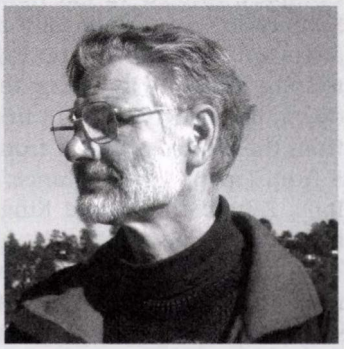
ES: LENR, I believe, involves a Mills catalyst, but ones that only operate in a solid. These are not the catalysts Mills predicts will work in a gas. The hydrino materials Mills makes, I believe, will be inert in a solid-based LENR environment. Although the general mechanism Mills proposed has universal application, it must be modified when applied to LENR.

JAR: Confirming the presence and participation of hydrinos and/or deutrinos in cold fusion would be a big advance in narrowing the parameter space of study and accelerate advances in the science of low energy nuclear reactions. Can you offer our readers some thoughts and speculations as to how and when this may take place?

ES: Because few people believe Mills, general application of his theory to LENR will take a long time. In addition, experimenters generally find what they are looking for. In other words, if the role of the hydrino is not sought, it will not be found. Therefore, I expect proof that hydrinos play a role will be slow to be found and accepted. For example, J. Dufour has already provided some observations consistent with this idea, but his efforts have had little effect on the popular explanations.

JAR: In conclusion, I and *Infinite Energy* would like to thank you for your thoughtful and insightful participation in this interview. You have done science and humanity a great service by collecting the many works in this important new energy field of low energy nuclear reactions and organizing them in a well-narrated and annotated style that is both very accessible and technically deep enough to whet the appetites of graduate students and beyond. I have no doubt that your effort will stand as a must-have resource for anyone studying the frontiers of nuclear science.

About the Author



John Allen Rudesill is recently retired after 31+ years as a Principal Engineer at Grace Davison Refining Catalyst Technologies, where he was involved in research and development of new fluid cracking catalysts and environmental additives to lower NOx emissions. He has a BS in chemical engineering from Cal-Poly, Pomona, California (1971), is co-inventor on thirteen U.S. patents for catalyst innovations and high temperature superconductors, and he has co-authored several American Chemical Society catalyst papers and book chapters. He has a life-long interest in improved energy technologies and intends to pursue these interests as a second career. He intends to help find answers to the energy challenges faced by the Earth's growing population. John also enjoys playing music on guitar with his lovely wife and friends.

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