In Memory of Dr. Stan Szpak

Frank Gordon

Dr. Stanislaw (Stan) Szpak, electrochemist and cold fusion scientist, passed away on October 12, 2016 in San Diego, California, one month short of his 96th birthday.

Stan was born on November 17, 1920 in Schenectady, New York. His family returned to Poland when he was two years old. He attended a Polish university, receiving degrees in Chemical Engineering. It was during his time in college that he woke up one morning to the sound of airplanes passing over his house on their way to bomb a small airport a few miles away, which was the start of the German invasion of Poland during World War II. Stan did not register as required by the occupiers and instead became part of the resistance, using his technical skills to make soap and tan leather, which his family used to barter for other goods. During this time he accidentally triggered a land mine that caused him to lose sight in his left eye and suffer some hearing loss.

When the war ended and Poland was under Russian influence, Stan—who was a U.S. citizen by virtue of his birth in the U.S.—applied to return to the U.S. and was successful in 1948. He got a job at the General Electric electroplating facility in Schenectady. After a few years, he resigned to attend the University of Pennsylvania, where in 1961 he earned a Ph.D. in Chemical Engineering. The title of his dissertation was "The Role of the Interface in Liquid-Liquid Mass Transfer (Transfer of Acetic Acid Across Water-Benzene Interface)." His advisor was Dr. Norman A. Hixson and others mentioned in the preface include Lawrence Delaney, Hans Lindermann and Robert Thygeson.

Stan relocated to the San Francisco, California area, where he worked for Lockheed. After a few years Stan began a Government career by accepting a civil service position at the Vallejo Naval Shipyard. It was while he was working there that he met and married his wife, Bozica, who had grown up in Serbia during the war before she immigrated to the U.S. In 1972 they relocated to San Diego, California to work for a predecessor to the SPAWAR Systems Center Navy Laboratory.

Stan Szpak in 2015. *(Courtesy of Cold Fusion Now.)*

In 1989 following the announcement by Martin Fleischmann and Stanley Pons that they had produced nuclear reactions in electrochemical cells, Stan switched his focus to understanding that process which at the time was known as cold fusion but is more commonly known today as low energy nuclear reactions (LENR). Among his many accomplishments, Stan is credited with being the first to use co-deposition to prepare the palladium cathode, which has since been successfully used by scientists worldwide.

During his career Stan co-authored numerous technical papers and was also an inventor on several patents. A partial list includes the *Journal of Chemical Physics*, *Electrochimica Acta*, *Trends in Electrochemistry*, *Techniques for Characterization of Electrodes and Electrochemical Processes* and the *Journal of the Electrochemical Society*. Many of those papers dealt with processes involved in electro-deposition so it is not surprising that he was the first to apply co-deposition techniques to prepare the LENR cathode.

Following retirement as a government employee, Stan accepted an Emeritus position at the SPAWAR lab, which allowed him to continue to work on LENR.

In 2015, Cold Fusion Now videotaped an interview with myself, Stan and Mel Miles. The transcript and link to the interview are available at:

http://www.infinite-energy.com/images/pdfs/FollowingNaturesDocuments.pdf

Upon hearing the news of his death, numerous messages of condolences and appreciation for his accomplishments have been received from the worldwide LENR community of scientists, including those published herein.

Pamela Mosier-Boss

I had the opportunity to work with Stan Szpak for over twenty years. When we first met in 1985, Stan was overseeing the building, testing and evaluation of large thionyl chloride based batteries for torpedo propulsion. During the course of that effort, it became apparent to Stan that the electrochemical reactions occurring within the thionyl chloride system were not well understood and that additional research was required to elucidate the reaction mechanism. During the 1980s Fleischmann and Pons were the first to demonstrate the use of spectro-electrochemistry to monitor electrochemical reactions. Stan wanted to employ this new technique to study the thionyl chloride electro-reduction. As I was an analytical chemist who specialized in spectroscopy and Stan was an electrochemist, it was only natural that we would

work on this together. We had to solve some material compatibility issues but, in the end, we obtained a greater understanding of this energetic system.

Then in 1989, our paths with Pons and Fleischmann crossed again. This time it was the Pd/D system and nuclear reactions. Stan was aware of the long times required to load the Pd with D in order to initiate the effect. Not being a patient man, Stan came up with the concept of co-deposition to speed up the reaction and the rest is, as they say, history. From Stan I learned a great deal about electrochemistry and, more importantly, how to get papers published. I found his ability to get papers through the review process absolutely astounding. It gave me great insight on how to do the same when it came time for me to take over the writing.

Needless to say, Stan was not the easiest person to work with. He had a very strong personality and held equally strong opinions. But, last I saw, many members of the LENR community have strong personalities. It's a requirement which enables us to deal with the likes of Douglas Morrison, Richard Garwin, Steven Koonin and Kirk Shanahan, to name a few. As Peter Gluck has elsewhere indicated, Stan has joined our other fallen distinguished warriors and colleagues in LENR Valhalla. In the halls of LENR Valhalla, they will discuss, argue and ultimately solve the mysteries of LENR. Stan, you will be missed and your contributions in the fields of LENR and electrochemistry will not be forgotten.

Melvin Miles

I first met Stan Szpak in 1968 when he began work with a battery/fuel cell electrochemical group at the Naval Ordinance Laboratory Corona (NOLC) in California. I had begun my research career there a year earlier after a NATO postdoctoral appointment in Munich, Germany, where I had my first introduction to electrochemistry on a project with Professor Heinz Gerischer. While I was working at this Navy laboratory, Stan was very helpful in teaching me several electrochemical techniques, especially cyclic voltammetry, which became my favorite for electrochemical research. At this Navy laboratory group, it was well known that Stan had many creative ideas in designing experiments, but he was not very good at actually working with his hands and setting up experiments. Therefore, another person there was assigned to helping Stan set up his experiments. As I recall, a co-worker stated that Stan was like "a bull in a China shop" in performing actual laboratory work. However, he had considerable knowledge of electrochemistry and other areas of science as well as good ideas for research. I have heard of many other cases where a scientist may be very good with scientific theory, but not very talented in actual laboratory skills.

I remember once that Stan invited me to go with him to a top national track meet at the coliseum in Los Angeles. We both enjoyed attending this track meet. I was always interested in sports, but I was surprised that Stan had this interest in track and field events.

In the Spring of 1969 came an upsetting announcement that NOLC was going to be shut down and only some of the NOLC projects would be moved to the Navy laboratory in China Lake, California. To our dismay, our electrochemical group was among those not invited to move to China Lake. I wound up going to teach at Middle Tennessee State University (MTSU) and Stan and others moved to a Navy installation at Mare Island near San Francisco. I later returned in 1978 to work as a research scientist at the Navy laboratory in China Lake, and Stan moved to the Navy laboratory in San Diego. The cold fusion announcement in 1989 brought us back into collaboration. That same year at an Electrochemical Society meeting in Florida, Stan informed me of his cold fusion method using co-deposition. Several years later in 1991 we both presented important papers at the ICCF2 in Como, Italy. Stan's paper was on his co-deposition method, and mine was on the correlation between the excess heat effect and helium-4 production. This led to a Navy program funded by the Office of Naval Research (ONR). As a result, I would make trips to San Diego to visit with Stan Szpak and Pam Boss. We always had a good lunch at Stan's favorite seafood restaurant. Bob Novak, the funding officer at ONR for the cold fusion program, also was often present at our San Diego meetings.

My last meeting with Stan was at his home in January 2015, where Ruby Carat interviewed him for her movie involving the co-deposition work of Stan and Pam Boss. He was still working on papers involving cold fusion.

Stan was blunt and always said exactly what he thought. Some may have been bothered by this, but I found it refreshing. You always knew exactly where Stan stood on any issue from science to politics. He will be greatly missed by me and many others.

Michael McKubre

I met Stan Szpak initially in 1979 or 1980 when I was just beginning to establish my electrochemistry program at SRI. Stan was one of my very first program managers (Tom Passell was another) at a time when every project was vital and every program special. Both for the research opportunity with its attendant funding, and the technical advice and insight offered by Stan, this project and this man were crucial to my early career. By experience and status Stan was definitely the boss in our early relationship, but he was never anything except gracious and helpful—albeit extremely direct. The project—examining (and potentially reducing) the rate limitation to discharge of lithium-thionyl chloride batteries—was challenging and potentially quite hazardous. This system was and is one of the most energetic batteries, so much so that it is still one of the military favorites. The young SRI team needed all the help we could get and Stan was a solid and reliable source of deep technical knowledge.

Our circles did not coincide again until 1991 at ICCF2 in Como, Italy. This conference was perhaps the most formative of my life and gave me the opportunity to meet and, in Stan's case, re-meet, many or most of the giants who established the science of cold fusion. Stan's reported concept of co-deposition was a genius-level innovation that typified his approach to science and experimentation. Stan was not a tinkerer—he was a thinker. He did not "fiddle" with experiments as so many of us do to make them better. He thought deeply about the fundamental aspect of an experiment: What is it intended to do? What is its critical weakness?

Stan was one of the very few who identified early the need for D:Pd loading to cause what later became known as the Fleischmann-Pons Heat Effect (FPHE). He also recognized (and was offended by) the need for an initiation time of weeks for this effect to appear in bulk palladium. He recognized this as being a critical weakness and impediment to

progress. So Stan thought himself around these problems. While the rest of us pedantically attempted to improve our skills with bulk material electrochemistry, Stan and his group sought to "co-deposit." By ensuring that D atoms were present at the sites where Pd atoms were deposited he had the capacity to produce PdD, fully formed, straight out of solution.

Critically, I believe, co-deposition had the capacity to accomplish another necessary result that Stan may not have appreciated then—and may not agree with now (wherever he may be) as we still do not fully understand it. But co-deposited structures also immediately contained a wide spectrum of defects of different types, shapes and sizes, some of which may be important in the long initiation time to produce the FPHE. So Stan's conceptual genius, implemented by his very able colleagues at SPAWAR, solved immediately three technical problems (by 1991) that many researchers today are still unable to disentangle: high D:Pd loading; fast loading; creation of a multiplicity of defects in an environment of high deuterium chemical potential.

I associate Stan Szpak in my mind with Martin Fleischmann and they were good friends with deep mutual respect. Both were highly innovative thinkers (and sometimes criticized for this); both trained classically as "old school" physical electrochemists of a type that has almost ceased to exist; both were charming and witty with deep good humor, world knowledge and chuckles that I can hear today. We will miss you, Stan.

Lawrence Forsley

I first met Stan around 1990 at the same time I met Frank Gordon and Pam Boss at NOSC, now SPAWAR, in San Diego. I was running my first cold fusion experiments at the University of Rochester (under the baleful glare of John "…Fiasco of the 20th Century" Huizenga) and knew of NOSC from a Navy BAA (Basic Area Announcement) for a long lived battery using cold fusion. On the surface, this made sense since torpedoes and batteries were their business, and Stan worked on battery electrochemistry. However, later I found Frank was unaware of this BAA. Over the next 15 years I stopped in San Diego whenever I was in the area and eventually I moved to San Diego to work closer with the SPAWAR team.

Stan always graciously pointed out where I was wrong. Once I reviewed one of his papers, where, again, I was wrong: save that the journal reviewers agreed with my points. But, his emphasis on the complicated interphase in an electrolytic cell haunts us with its importance. His development of the Pd/D co-deposition technique, with Pam Boss' assistance, has been profound. Stan was an impatient person and awaiting bulk loading wasn't an option.

Co-deposition loads Pd relatively quickly to high stoichiometry without cracking. He and Pam Boss observed oscillating tritium production during co-deposition, first seen by Bockris, and again 20 years later by Korean researchers. Others—including Mel Miles, Dennis Letts and Dennis Cravens, and Mitchell Swartz—modified or developed their own co-deposition protocols. Miles found the co-deposition surface produced as much heat as bulk palladium. We published the presence of various nuclear particles and transmutation products using Stan's protocol.

U.S. patent 8,419,919 was issued for the generation of energetic particles using palladium-deuterium co-deposition. Indeed, the co-deposition protocol may be Stan's most lasting legacy, as over 50 papers have been published by researchers from four countries to date. It has provided some of the most provocative "cold fusion" evidence, having been replicated in three or more U.S. government laboratories while generating excess heat, transmutation and nuclear particles. I imagine Stan is pleased!