# LENR INVESTIGATIONS BY FRAN TANZELLA

*A PROJECT OF THE LENR RESEARCH DOCUMENTATION INITIATIVE*

## THIRD DRAFT REPORT, UPDATE 2

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## Contents

# 1 Introduction

Cold fusion (CF) was announced on March 23, 1989, by Dr. Martin Fleischman and Dr. Stanley Pons. The immense potential energy benefits of CF (also referred to as Low Energy Nuclear Reactions, LENR) were immediately recognized. Humankind's need for a source of cheap, clean, inexhaustible, and safe energy seemed to be realized. However, LENR was rejected by mainstream science within a year or so, and it remains highly marginalized to this day. On the other hand, the phenomenon has continued to be rigorously pursued by many investigators in several countries. The mounting evidence for the reality of LENR shows that its potential benefits may yet be realized.

Because it is a "pariah" science, LENR has attracted relatively few new investigators to the field. Many of the researchers became active in the early months and years after the 1989 announcement. Now 36 years later many of these investigators are leaving the field. The results of their many years of LENR investigation are at risk of being lost, which would be extremely unfortunate not only for the field, but also potentially for humanity.

An initiative is underway to mitigate the risk of loss of research records of LENR investigators. Its objectives are to collect, organize, document, and archive these records. It is being performed by LENRGY, LLC[1], whose President is Dr. Thomas Grimshaw. The LENR Research Documentation Initiative (LRDI) assists researchers in making sure that their efforts are preserved and to keep the records available for additional analysis and interpretation. The LRDI began with a pilot project with Dr. Edmund Storms and now includes 10 projects with 15 participants. It is described in a recent article in Infinite Energy[2] as well as on a dedicated website[3].

A project has been initiated under the umbrella of the LRDI to document the LENR research of Dr. Tanzella at SRI and after he retired from that organization. The objective of the Tanzella

[1] LENRGY: LENR Energy – Pursuing the Benefits of Cold Fusion Realization. www.lenrgyllc.com.

[2] Grimshaw, T., 2020. Documenting Cold Fusion Research: Preserving a Vital Asset for Humankind. Infinite Energy, Issue 150, March/April 2020, p. 9-13.

[3] LENR Research Documentation Initiative: Collection, Organization, Description, Archiving of LENR Research Records. www.lenr-documentation.org.

LENR Research Documentation Project (TLRDP) is to collect and record as much of his research record as possible.

Dr. Tanzella (Figure 1-1) received his B.S. degree in chemistry at Southeastern Massachusetts University and his Ph.D. in inorganic chemistry from the University of California, Berkeley[4]. He went on for post-doctoral studies at the University of Pennsylvania. He investigated the synthesis of novel electronic conductors using high-end energy oxidizing materials for his Ph.D. degree. In his post-doctoral studies, he researched the electrochemistry of lithium polymer electrolytes.

Dr. Tanzella worked as a chemist at E.I. Dupont for over four years before joining SRI International in 1986. At SRI he used electrochemical methods to monitor chemical reaction rates in many processes, including hydrogen in palladium. He helped develop the LENR electrochemical and calorimetry program at SRI. More information on Dr. Tanzella's LENR career is provided in Section 8.

*Figure 1-1*
*Dr. Fran Tanzella in His LENR Laboratory, Energy Research Center, Belmont, CA.*
*Photo Taken October 2019.*

[4] Professional Biographies for the Tanzella LENR Research Documentation Project. Memo to Fran Tanzella from Tom Grimshaw, February 3, 2020.


This TLRDP report presents the results of the information collection and interviews of Dr. Tanzella. The components of research record include publications and unpublished reports, electronic files, hardcopy records, and LENR library materials. An interview of Dr. Tanzella regarding his LENR and other research has been conducted and included in the Project. The phases of Dr. Tanzella's LENR research are in preparation, and future potential work is suggested. Memos were used to record the findings as progress was made. A folder on Dropbox has been set up to store the Project documents. More information on how the TLRDP is being conducted is in Section 10.

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## 2 Publications and Unpublished Reports

Dr. Tanzella has authored or co-authored many publications and reports in his long LENR research career. For his professional resume, he selected the following list of publications[5].


S. Crouch-Baker, M.C.H. McKubre, and F.L. Tanzella, "Variation of resistance with composition in the Œ≤-phase of the H-Pd system at 298 K". Zeitschrift fuer Physikalische Chemie (Munich), Vol. 204, pages. 247-254, (1998)

P. Tripodi, et al., "Temperature coefficient of resistivity at compositions approaching PdH". Physics Letters A, Vol. 276, pages. 122-126, (2000)

W.B. Clarke, et al., "Search for 3He and 4He in Arata-style palladium cathodes II: evidence for tritium production". Fusion Science and Technology, Vol. 40, pages. 152-167, (2001)

M. McKubre, et al., "Finite element modeling of the transient calorimetric behavior of the MATRIX experimental apparatus: 4He and excess of power production correlation through numerical results". Conference Proceedings - Italian Physical Society, Vol. 70, pages. 23-27, (2000)

V. Violante, et al., "Hydrogen isotopes interaction dynamics in palladium lattice". Conference Proceedings - Italian Physical Society, Vol. 70, pages. 409-417, (2000)

M.C.H. McKubre, et al., "Replication of condensed matter heat production". ACS Symposium Series, Vol. 998, pages. 219-247, (2008)

L.P. Forsley, et al., Comparison of three methods of analyzing nuclear tracks observed in CR-39 detectors used in Pd/D co-deposition experiments, in Abstracts of Papers, 241st ACS National Meeting & Exposition, Anaheim, CA, United States, March 27-31, 2011. 2011. p. ENVR-33.

F. L. Tanzella, et al., Detection of high energy particles using CR-39 detectors Part 2: Results of in-depth destructive etching analysis, International Journal of Hydrogen Energy, Vol. 42, pages 429-436, (2017)


Dr. Tanzella's publications and reports have been added to the TLRDP as individual reports and other items collected for the Project and as lists of items he has prepared previously.

### 2.1 Collected Reports

Several individual papers and reports have been added to the TLRDP from Dr. Tanzella's electronic and hardcopy files. They are listed below.


McKubre, M., et al., 1990. Calorimetry and Electrochemistry in the D/Pd System. in First Annual Conference on Cold Fusion. University of Utah Research Park, Salt Lake City, Utah: National Cold Fusion Institute[6].

Crouch-Baker, S., M. McKubre, M., and Tanzella, F., 1997. New Hydrogen Energy Research at SRI International[7]. SRI Annual Report. March.


[5] Professional Biographies for the Tanzella LENR Research Documentation Project. Memo to Fran Tanzella from Tom Grimshaw, February 3, 2020.

[6] ICCF-1 Paper: Calorimetry and Electrochemistry in the D/Pd System. Memo to Fran Tanzella from Tom Grimshaw, March 31, 2020.

[7] SRI Reports for New Hydrogen Energy (NHE). Memo to Fran Tanzella from Tom Grimshaw, March 1, 2020.

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McKubre, M., 1997. The Status of NHE Research[8]. SRI Report. September.

Crouch-Baker, S., M. McKubre, and F. Tanzella, 1997. Investigation on Evaluation of New Systems for New Hydrogen Energy Production[9]. SRI Final Report. November.

McKubre, M., et al., 1998. Energy Production Processes in Deuterated Metals, Volume 1[10]. EPRI TR-107843-V1. June.

McKubre, M., F. Tanzella and P. Hagelstein, 2009. From "Cold Fusion" to "LENR" to "CMNS" to Fleischmann Pons Effect: 20 Years of Research at SRI. Presentation at ACS 237th National Meeting, Symposium on New Energy Technology. March.[11]

Tanzella, F., R. Godes, and R. George, 2019. Advanced Isoperibolic Calorimetry in Brillouin's Reactor. Presentation at 2019 LANR/CF Colloquium at MIT. March[12].

## *2.2 Lists of Publications and Reports*

Lists of LENR publications have been found in Dr. Tanzella's files and from LENR-CANR.org. They have been added to the TLRDP as follows:

- Selected SRI and Related Reports in "Reports" Section of Electronic Files[13] (Table 2-1)
- SRI LENR List in Endnote[14] (Table 2-2)
- List of Publications in SciFinder[15] (Table 2-3)
- List of Items Found on LENR-CANR.org with a Search for "Tanzella"[16] (Table 2-4)

Copies of 17 of the 66 items found on LENR-CANR.org have been downloaded and added to the Project as indicated by the last column in Table 2-4.

[8] SRI Reports for New Hydrogen Energy (NHE). Memo to Fran Tanzella from Tom Grimshaw, March 1, 2020.

[9] SRI International Report for for the Tanzella LENR Research Documentation Project. Memo to Fran Tanzella from Tom Grimshaw, February 4, 2020.

[10] SRI International Report for EPRI. Memo to Fran Tanzella from Tom Grimshaw, February 6, 2020.

[11] PowerPoint Presentations Dated 2009 and 2019. Memo to Fran Tanzella from Tom Grimshaw, February 20, 2020.

[12] PowerPoint Presentations Dated 2009 and 2019. Memo to Fran Tanzella from Tom Grimshaw, February 20, 2020.

[13] Selected SRI and Related Reports. Memo to Fran Tanzella from Tom Grimshaw, February 21, 2020.

[14] References in Endnote and SciFinder. Memo to Fran Tanzella from Tom Grimshaw, February 22, 2020.

[15] Publications List on Sci Finder for the Tanzella LENR Research Documentation Project. Memo to Fran Tanzella from Tom Grimshaw, February 5, 2020

[16] Tanzella in "All Authors" on LENR-CANR.org: Update. Memo to Fran Tanzella from Tom Grimshaw, May 4, 2019.

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*Table 2-1*
*Items Found in "Reports" Section of Electronic Files*

| No | Title | Date | Description |
|---|---|---|---|
| 1 | Investigation on Evaluation of New Systems for New Hydrogen Energy Production | 11/1997 | SRI Final Report |
| 2 | Cavitation–Induced Excess Heat in Deuterated Metals | 3/1998 | EPRI TR l-108474 |
| 3 | Development of Energy Production Systems from Heat Produced in Deuterated Metals - Volume 1. | 6/1998 | EPRI TR–107843–V1 |
| 4 | Development of Energy Production Systems from Heat Produced in Deuterated Metals - Volume 2. | 6/1998 | EPRI TR–107843–V2 |
| 5 | Hydrogen Isotope Fuel Cell | 10/2004 | United States Patent Application 20060093874 |
| 6 | Title of the Invention: Electrolytic Cell | 12/2004 | World Intellectual Property Organization, Publication Number WO 2004/108994 A2 |
| 7 | Spindletop Tests at SRI: January-June 2005 | 6/2005 | PowerPoint Presentation |
| 8 | Patterson Fuel Cell | 2006 | PowerPoint Presentation |
| 9 | New Physical Effects in Metal Deuterides | 1/2006 | Proceedings of the 11th International Conference on Cold Fusion, Condensed Matter Nuclear Science, Pages 23-59 |
| 10 | Catalytic Electrode, Cell, System in Process for Storing Hydrogen Deuterium | 2/2006 | United States Patent and Trade Office, Petition to Make Special |
| 11 | Hydrogen Isotope Fuel Cell | 5/2006 | United States Patent Application Publication, US 2006/0093874 A1 |
| 12 | EM-Stimulated Low Energy Nuclear Reactions | 12/2006 | SRI P16072 |
| 13 | New Physical Effects in Metal Deuterides | 3/2007 | SRI P16816 |
| 14 | New Physical Effects in Metal Deuterides: Phase II | 2/2010 | SRI P18266 |
| 15 | Coherent X-Ray Generation | 10/2013 | SRI P21785 |
| 16 | Final Report on Theoretical Studies in Support of the DARPA Ultrabeam Project | 1/2014 | Unknown |
| 17 | Heat Measurements in Electrolytic Meral-Deuteride Experiments | 10/2015 | SRI P19120 |

*Table 2-2*
*Reports Found in SRI LENR EndNote File*


1. McKubre, M. C. H., et al. (1992). "Aspects of the electrochemical loading of hydrogen and its isotopes into palladium." Proc. - Electrochem. Soc. 92-5(Proc. Symp. Hydrogen Storage Mater., Batteries, Electrochem., 1991): 269-286.
2. McKubre, M. C. H., et al. (1992). Method for producing heat from deuterated palladium. Application: WO, (Electric Power Research Institute, Inc., USA). 28 pp.
3. McKubre, M. C. H., et al. (1992). Methods for forming films on cathodes. Application: WO, (Electric Power Research Institute, Inc., USA). 25 pp.
4. McKubre, M. C. H., et al. (1992). Methods for cleaning cathodes. Application: WO, (Electric Power Research Institute, Inc., USA). 27 pp.
5. McKubre, M. C. H., et al. (1992). Apparatus for producing heat from deuterated palladium. Application: WO, (Electric Power Research Institute, Inc., USA). 31 pp.
6. Crouch-Baker, S., et al. (1993). Apparatus for producing heat from deuterated palladium alloys. Application: WO, (Electric Power Research Institute, Inc., USA). 22 pp.
7. McKubre, M. C. H., et al. (1993). "Excess power observations in electrochemical studies of the deuterium-palladium system; the influence of loading." Front. Sci. Ser. 4(Frontiers of Cold Fusion): 5-19.

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8. McKubre, M. C. H., et al. (1993). Apparatus for producing heat from deuterated film-coated palladium. Application: WO, (Electric Power Research Institute, Inc., USA). 19 pp.
9. Smedley, S. I., et al. (1993). "The January 2, 1992, explosion in a deuteriuum/palladium electrolytic system at SRI International." Front. Sci. Ser. 4(Frontiers of Cold Fusion): 139-151.
10. Crouch-Baker, S., et al. (1994). Apparatus for storing isotopes of hydrogen. Application: WO, (Electric Power Research Institute, Inc., USA). 24 pp.
11. McKubre, M., et al. (1994). "An overview of excess heat production in the deuterated palladium system." Proc. Intersoc. Energy Convers. Eng. Conf. 29th(Pt. 3): 1478-1483.
12. McKubre, M. C. H., et al. (1994). "Isothermal flow calorimetric investigations of the D/Pd and H/Pd systems." J. Electroanal. Chem. 368(1-2): 55-66.
13. McKubre, M. C. H., et al. (1994). Methods for forming films on cathodes. Application: WO, (Electric Power Research Institute, Inc., USA). 30 pp.
14. Wark, A., et al. (1996). "The effect of ultrasound on the electrochemical loading of hydrogen in palladium." J. Electroanal. Chem. 418(1-2): 199-204.
15. Crouch-Baker, S., et al. (1998). "Variation of resistance with composition in the Œ≤-phase of the H-Pd system at 298 K." Z. Phys. Chem. (Munich) 204(1/2): 247-254.
16. Tripodi, P., et al. (2000). "Temperature coefficient of resistivity at compositions approaching PdH." Phys. Lett. A 276(1-4): 122-126.
17. Clarke, W. B., et al. (2001). "Search for 3He and 4He in Arata-style palladium cathodes II: evidence for tritium production." Fusion Sci. Technol. 40(2): 152-167.
18. Lipilin, A. S., et al. (2005). Liquid anode electrochemical cell. Application: WO, (Sri International, USA). 25 pp.
19. McKubre, M., et al. (2006). "The need for triggering in cold fusion reactions." Condens. Matter Nucl. Sci., Proc. Int. Conf. Cold Fusion, 10th: 199-212.
20. Violante, V., et al. (2006). "Search for nuclear ashes in electrochemical experiments." Condens. Matter Nucl. Sci., Proc. Int. Conf. Cold Fusion, 10th: 405-420.
21. Violante, V., et al. (2006). "Study of lattice potentials on low-energy nuclear processes in condensed matter." Condens. Matter Nucl. Sci., Proc. Int. Conf. Cold Fusion, 10th: 667-680.
22. Dardik, I. I., et al. (2007). Modified electrodes for low energy nuclear reaction power generators. Application: WO, (USA). 37pp.
23. McKubre, M. C. H., et al. (2008). "Replication of condensed matter heat production." ACS Symp. Ser. 998(Low-Energy Nuclear Reactions Sourcebook): 219-247.
24. McKubre, M. C. H. (2009). "From cold fusion to condensed matter nuclear science: 20 years of research." Abstracts of Papers, 237th ACS National Meeting, Salt Lake City, UT, United States, March 22-26, 2009: ENVR-004.
25. McKubre, M. C. (2010). "Cold fusion, LENR, CMNS, FPE: One perspective on the state of the science." Abstracts of Papers, 239th ACS National Meeting, San Francisco, CA, United States, March 21-25, 2010: ENVR-126.
26. Violante, V., et al. (2010). "Material science behind the Fleishmann and Pons effect." Abstracts of Papers, 239th ACS National Meeting, San Francisco, CA, United States, March 21-25, 2010: ENVR-122.

*Table 2-3*
*Reports Listed on "SciFinder" for Tanzella*

1. J.O. Albright, F.L. Tanzella, and J.G. Verkade, "*Nitrosyl stretching frequency as a function of ligand basicity in nitrosyltrisphosphitonickel tetrafluoroborate complexes*". Journal of Coordination Chemistry, Vol. 5, pages. 225-229, (1976)
2. H.R. Wenk, et al., "*Deerite, (Fe, Mn)12Si8(O, OH)32, yet another type of chain silicate*". Naturwissenschaften, Vol. 63, pages. 433-434, (1976)
3. N. Bartlett, et al., "*Salts of aromatic cations and related graphite salts*". NATO Conference Series VI Materials Science, Vol. 1, pages. 293-299, (1979)
4. F.L. Tanzella, *Electron oxidation of aromatic molecules and related delocalized-electron solids*. 1980. p. 104 pp.

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5. F.L. Tanzella, *Electron oxidation of aromatic molecules and related delocalized electron solids*. 1980, Lawrence Berkeley Lab., Univ. California, Berkeley, CA, USA. p. 108 pp.
6. F.L. Tanzella, et al., "*Ion transport in PEO-alkali salt complex polymeric electrolytes".* Solid State Ionics, Vol. 5, pages. 681-684, (1981)
7. F.L. Tanzella and N. Bartlett, "*Quantitative synthesis of diphenylfluoroarsonium hexafluoroarsenate ((C6H5)2AsF2+AsF6-) and diphenylarsenic fluoride ((C6H5)2AsF3) via interaction of benzene with arsenic pentafluoride".* Zeitschrift fuer Naturforschung, Teil B Anorganische Chemie, Organische Chemie, Vol. 36B, pages. 1461-1464, (1981)
8. T.J. Richardson, F.L. Tanzella, and N. Bartlett, "*The preparation and characterization of radical cation salts derived from perfluorobenzene, perfluorotoluene, and perfluoronaphthalene".* Journal of the American Chemical Society, Vol. 108, pages. 4937-4943, (1986)
9. M.C.H. McKubre, S.I. Smedley, and F.L. Tanzella, "*The electromotive force of the sodium/sulfur cell".* Proceedings - Electrochemical Society, Vol. 87-12, pages. 559-568, (1987)
10. M.C.M. McKubre, S.I. Smedley, and F.L. Tanzella, "*The electrochemical impedance of the sodium/sulfur cell".* Proceedings - Electrochemical Society, Vol. 87-5, pages. 214-227, (1987)
11. T.J. Richardson, F.L. Tanzella, and N. Bartlett, "*Comparison of polynuclear aromatic hydrocarbon cation salts with salts of simple fluoroaromatic cations".* Advances in Chemistry Series, Vol. 217, pages. 169-176, (1988)
12. M.C.H. McKubre, S.I. Smedley, and F.L. Tanzella, "*The electrochemical impedance of the sodium/sulfur cell. II. Interpretation of results".* Journal of the Electrochemical Society, Vol. 136, pages. 1969-1972, (1989)
13. M.C.H. McKubre, S.I. Smedley, and F.L. Tanzella, "*The electrochemical impedance of the sodium/sulfur cell. I. Experiments and results".* Journal of the Electrochemical Society, Vol. 136, pages. 1962-1968, (1989)
14. M.C.H. McKubre, F.L. Tanzella, and S.I. Smedley, "*The electromotive force of the sodium/sulfur cell".* Journal of the Electrochemical Society, Vol. 136, pages. 303-305, (1989)
15. R.D. Weaver, et al. *Some reliability considerations of various networks of sodium/sulfur batteries*. in *Intersociety Energy Conversion Engineering Conference*. 1989.
16. M.C.H. McKubre, et al. *Calorimetry and electrochemistry in the deuterium/palladium system*. in *Annu. Conf. Cold Fusion, 1st*. 1990.
17. M.C.H. McKubre, F.L. Tanzella, and B.C. Syrett, "*The determination of rates and mechanisms of localized corrosion using harmonic impedance spectroscopy".* International Corrosion Conference Series, Vol. NACE-9, pages. 191-197, (1990)
18. R.D. Weaver, P.C. Symons, and F.L. Tanzella, "*Some considerations of network reliability of sodium/sulfur load-leveling batteries".* Proceedings of the Intersociety Energy Conversion Engineering Conference, Vol. 25th, pages. 354-361, (1990)
19. R.D. Weaver and F.L. Tanzella, "*A novel switch for use in sodium/sulfur load-leveling batteries and a maintenance strategy for its use".* Proceedings of the Intersociety Energy Conversion Engineering Conference, Vol. 25th, pages. 348-353, (1990)
20. M.C.H. McKubre, et al., "*Isothermal flow calorimetric investigations of the deuterium/palladium system".* Conference Proceedings - Italian Physical Society, Vol. 33, pages. 419-443, (1991)
21. M.C.H. McKubre, S.I. Smedley, and F.L. Tanzella, "*The impedance response of sodium sulfur cells".* Proceedings - Electrochemical Society, Vol. 91-6, pages. 207-223, (1991)
22. M.C.H. McKubre, et al., "*Aspects of the electrochemical loading of hydrogen and its isotopes into palladium".* Proceedings - Electrochemical Society, Vol. 92-5, pages. 269-286, (1992)
23. M.C.H. McKubre, et al., *Method for producing heat from deuterated palladium*. 1992, (Electric Power Research Institute, Inc., USA). Application: WO
24. M.C.H. McKubre, et al., *Methods for forming films on cathodes*. 1992, (Electric Power Research Institute, Inc., USA). Application: WO
25. M.C.H. McKubre, S.I. Smedley, and F.L. Tanzella, *Methods for cleaning cathodes*. 1992, (Electric Power Research Institute, Inc., USA). Application: WO
26. M.C.H. McKubre, et al., *Apparatus for producing heat from deuterated palladium*. 1992, (Electric Power Research Institute, Inc., USA). Application:

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27. S. Crouch-Baker, et al., *Apparatus for producing heat from deuterated palladium alloys*. 1993, (Electric Power Research Institute, Inc., USA). Application: WO
28. M.C.H. McKubre, et al., "*Excess power observations in electrochemical studies of the deuterium-palladium system; the influence of loading".* Frontiers Science Series, Vol**.** 4, pages. 5-19, (1993)
29. M.C.H. McKubre, et al., *Apparatus for producing heat from deuterated film-coated palladium*. 1993, (Electric Power Research Institute, Inc., USA). Application: WO
30. S.I. Smedley, et al., "*The January 2, 1992, explosion in a deuteriuum/palladium electrolytic system at SRI International".* Frontiers Science Series, Vol**.** 4, pages. 139-151, (1993)
31. R.D. Weaver and F.L. Tanzella, *Apparatus and method for locating and isolating failed cells in a battery*. 1993, (Electric Power Research Institute, Inc., USA). Application: US
32. S. Crouch-Baker, et al., *Apparatus for storing isotopes of hydrogen*. 1994, (Electric Power Research Institute, Inc., USA). Application: WO
33. M. McKubre, et al. *An overview of excess heat production in the deuterated palladium system*. in *Intersociety Energy Conversion Engineering Conference*. 1994.
34. M.C.H. McKubre, et al., "*Isothermal flow calorimetric investigations of the D/Pd and H/Pd systems".* Journal of Electroanalytical Chemistry, Vol**.** 368, pages. 55-66, (1994)
35. M.C.H. McKubre, et al., *Methods for forming films on cathodes*. 1994, (Electric Power Research Institute, Inc., USA). Application: WO
36. B.J. Dougherty, F.L. Tanzella, and R.D. Weaver. *Some nickel-iron and nickel-metal hydride battery cycling results*. in *Annu. Battery Conf. Appl. Adv., 10th*. 1995.
37. A. Wark, et al., "*The effect of ultrasound on the electrochemical loading of hydrogen in palladium".* Journal of Electroanalytical Chemistry, Vol**.** 418, pages. 199-204, (1996)
38. S. Crouch-Baker, M.C.H. McKubre, and F.L. Tanzella, "*Variation of resistance with composition in the Œ≤-phase of the H-Pd system at 298 K".* Zeitschrift fuer Physikalische Chemie (Munich), Vol**.** 204, pages. 247-254, (1998)
39. M. McKubre, et al., "*Finite element modeling of the transient calorimetric behavior of the MATRIX experimental apparatus: 4He and excess of power production correlation through numerical results".* Conference Proceedings - Italian Physical Society, Vol**.** 70, pages. 23-27, (2000)
40. M. McKubre, et al., "*The emergence of a coherent explanation for anomalies observed in D/Pd and H/Pd systems: evidence for 4He and 3H production".* Conference Proceedings - Italian Physical Society, Vol**.** 70, pages. 3-10, (2000)
41. P. Tripodi, et al., "*Temperature coefficient of resistivity at compositions approaching PdH".* Physics Letters A, Vol**.** 276, pages. 122-126, (2000)
42. V. Violante, et al., "*Hydrogen isotopes interaction dynamics in palladium lattice".* Conference Proceedings - Italian Physical Society, Vol**.** 70, pages. 409-417, (2000)
43. W.B. Clarke, et al., "*Search for 3He and 4He in Arata-style palladium cathodes II: evidence for tritium production".* Fusion Science and Technology, Vol**.** 40, pages. 152-167, (2001)
44. P. Hagelstein, et al., *A device, system, and method for increasing multiple occupancy of hydrogen isotopes in a host lattice*. 2004, (USA). Application: WO
45. A.S. Lipilin, et al., *Liquid anode electrochemical cell*. 2005, (Sri International, USA). Application: WO
46. P.L. Hagelstein, et al., *Methods and apparatus for energy conversion using materials comprising molecular deuterium and molecular hydrogen-deuterium*. 2006, (Spindletop Corporation, USA). Application: WO
47. M. McKubre, et al., *The need for triggering in cold fusion reactions*, in *Condensed Matter Nuclear Science, Proceedings of the International Conference on Cold Fusion, 10th, Cambridge, MA, United States, Aug. 24-29, 2003*. 2006. p. 199-212.
48. V. Violante, et al., "*Search for nuclear ashes in electrochemical experiments".* Condensed Matter Nuclear Science, Proceedings of the International Conference on Cold Fusion, 10th, Cambridge, MA, United States, Aug. 24-29, 2003, Vol**.**, pages. 405-420, (2006)
49. V. Violante, et al., "*Study of lattice potentials on low-energy nuclear processes in condensed matter".* Condensed Matter Nuclear Science, Proceedings of the International Conference on Cold Fusion, 10th, Cambridge, MA, United States, Aug. 24-29, 2003, Vol**.**, pages. 667-680, (2006)

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50. M.C.H. McKubre, et al., "*Replication of condensed matter heat production".* ACS Symposium Series, Vol. 998, pages. 219-247, (2008)
51. P.L. Hagelstein, et al., "*Progress toward a Theory for Excess Heat in Metal Deuterides".* AIP Conf. Proc., Vol. 1154, pages. 257-271, (2009)
52. J. Marwan, et al., "*A new look at low-energy nuclear reaction (LENR) research: a response to Shanahan".* J. Environ. Monit., Vol. 12, pages. 1765-1770, (2010)
53. F. Tanzella and M. Mc Kubre, "*Cryogenic calorimetry of exploding PdDx wires".* Abstracts of Papers, 239th ACS National Meeting, San Francisco, CA, United States, March 21-25, 2010, Vol., pages. ENVR-123, (2010)
54. V. Violante, et al., "*Material science behind the Fleishmann and Pons effect".* Abstracts of Papers, 239th ACS National Meeting, San Francisco, CA, United States, March 21-25, 2010, Vol., pages. ENVR-122, (2010)
55. L.P. Forsley, et al., *Comparison of three methods of analyzing nuclear tracks observed in CR-39 detectors used in Pd/D co-deposition experiments*, in *Abstracts of Papers, 241st ACS National Meeting & Exposition, Anaheim, CA, United States, March 27-31, 2011*. 2011. p. ENVR-33.
56. M.C. McKubre and F. Tanzella, "*Modes of excess heat production in the Fleischmann-Pons Effect".* Abstracts of Papers, 241st ACS National Meeting & Exposition, Anaheim, CA, United States, March 27-31, 2011, Vol., pages. ENVR-28, (2011)
57. F. Tanzella, M. McKubre, and J. Bao, "*Helium and energy measurements from exploding PdDx wires at 77¬∞K".* Abstracts of Papers, 241st ACS National Meeting & Exposition, Anaheim, CA, United States, March 27-31, 2011, Vol., pages. ENVR-50, (2011)
58. S. Reed, et al., *Manufacturing payment card system comprising metal, polymer, thermal stabilizer, and plasticizer*. 2012, (Visa International Service Association, USA). Application: US


*Table 2-4*
*List of Items Found for "Tanzella" on LENR-CANR.org*

| No | Author | Year | Title | L-C? |
|---|---|---|---|---|
| 1 | Apicella, M. | 2005 | Apicella, M., et al. Reproducibility of Excess of Power and Evidence of 4He in Palladium Foils Loaded with Deuterium (PowerPoint slides). in American Physical Society Meeting. 2005. Los Angeles. | |
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# 3 Electronic Files

Dr. Tanzella's electronic files for the TLRDP are located on a small external hard drive[17] (Figure 3-1). Files from two folders on the hard drive, "Reports" and "Literature" have been copied for the Project. Screenshots of the contents of these folders are shown in Figures 3-2 and 3-3. The electronic files have been stored in the Project supplemental hard drive instead of the Dropbox folder because of the large amount of storage required. Folders and files of experimental data that are also on Dr. Tanzella's hard drive have not yet been included to the Project.

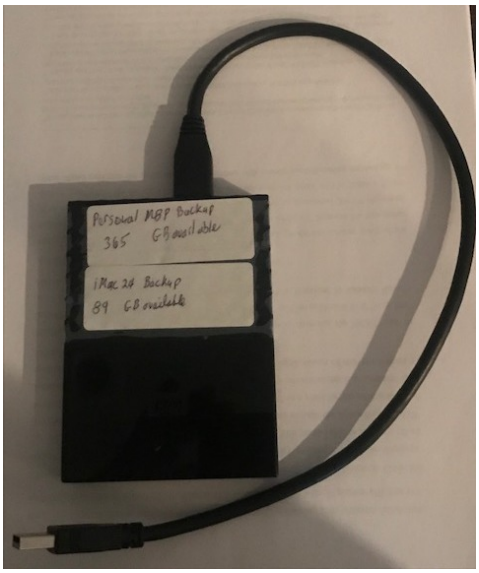


*Figure 3-1*
*Dr. Tanzella's External Hard Drive Containing LENR Files*

[17] Hard Drive Contents for Tanzella LENR Research Documentation Project. Memo to Fran Tanzella from Tom Grimshaw, December 6, 2019.

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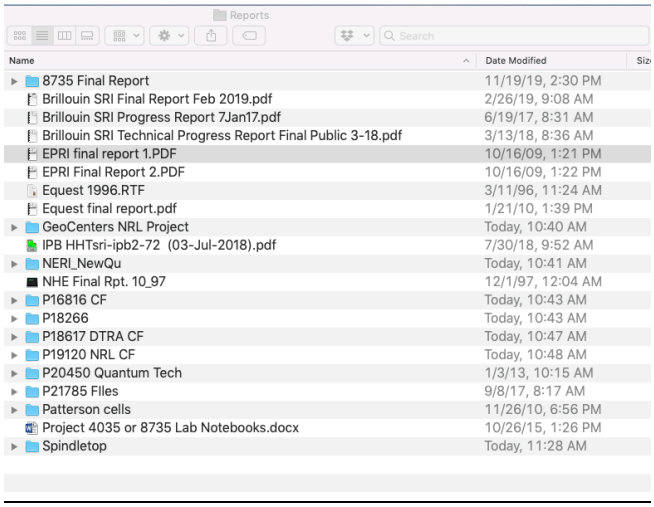
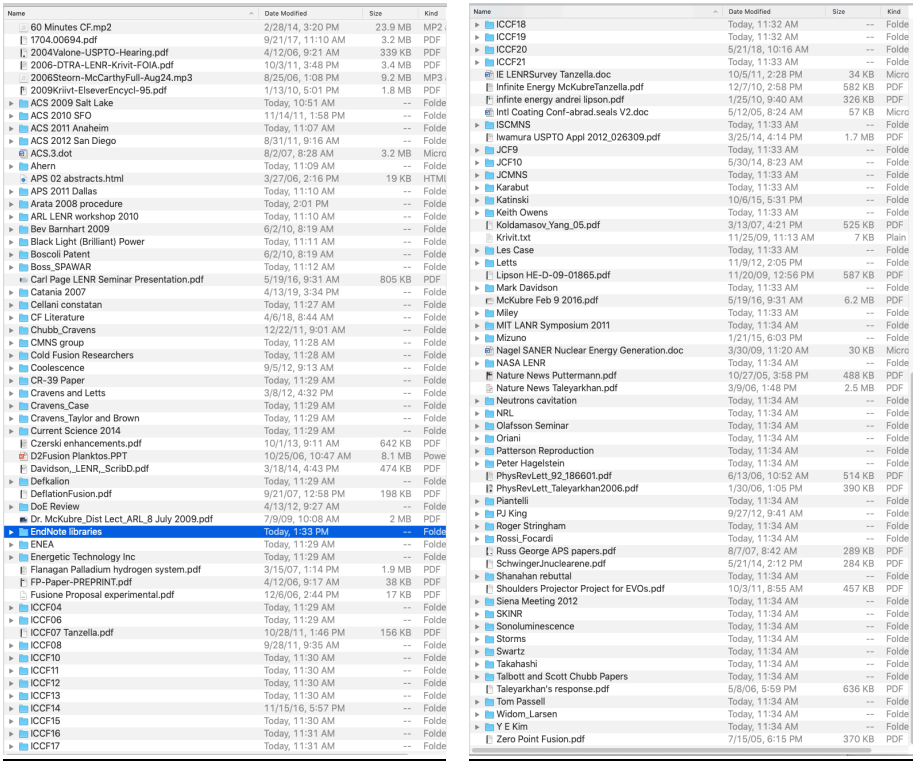



*Figure 3-2*
*Contents of "Reports" Folder on Hard Drive*



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| 2004Valone-USPTO-Hearing.pdf | 4/12/06, 9:21 AM | 339 KB | PDF |
| 2006-DTRA-LENR-Krivit-FOIA.pdf | 10/3/11, 3:48 PM | 3.4 MB | PDF |
| 2006Steorn-McCarthyFull-Aug24.mp3 | 8/25/06, 1:08 PM | 9.2 MB | MP3 |
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| ACS 2011 Anaheim | Today, 11:07 AM | -- | Folde |
| ACS 2012 San Diego | 8/31/11, 9:16 AM | -- | Folde |
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| ARL LENR workshop 2010 | Today, 11:10 AM | -- | Folde |
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| Cravens_Case | Today, 11:29 AM | -- | Folde |
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| DeflationFusion.pdf | 9/21/07, 12:58 PM | 198 KB | PDF |
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| ENEA | Today, 11:29 AM | -- | Folde |
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| Talbott and Scott Chubb Papers | Today, 11:34 AM | -- | Folde |
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| Widom_Larsen | Today, 11:34 AM | -- | Folde |
| Y E Kim | Today, 11:34 AM | -- | Folde |
| Zero Point Fusion.pdf | 7/15/05, 6:15 PM | 370 KB | PDF |

*Figure 3-3*
*Contents of "Literature" Folder on Hard Drive*

# 4 Hardcopy Records

Dr. Tanzella's hardcopy records consist of materials in two file cabinets and photographs located elsewhere in his office.

## 4.1 File Cabinet Contents

Dr. Tanzella has reviewed the contents of two file cabinets in his office (Figure 4-1) for the TLRDP. He identified three items that are most relevant to the Project[18]:

> Item 1. This is a book by Durham on solid-state nuclear track detection which we used for the Galileo project where we were using CR 39 which as a solid-state nuclear track detector.
>
> Item 2. This folder contains some raw plots of the mass spec from our reproduction of Les Case's hydrogen and deuterium in palladium on carbon catalyst – from which came the plot that shows a correlation between excess helium in excess energy.
>
> Item 3. This folder is a set of data and results from the reproduction of the Letts-Cravens experiment done by us for Spindletop, where we did the dual laser experiment using a thermal imaging camera and all of our normal calorimetry.

Dr. Tanzella also has hardcopy lab notebooks, which are described in Section 6.4.

*Figure 4-1*
*Two-Drawer and Three-Drawer File Cabinets in Fran Tanzella's Office*

[18] Hardcopy Folders from File Cabinet. Memo to Fran Tanzella from Tom Grimshaw, February 23, 2020.

### 4.2 Hardcopy Photographs

Dr. Tanzella has included in the Project eight packages of hardcopy photos from his LENR-related travels in Japan[19] (Figure 5-4). He has identified the packages as shown below.

| | |
|---|---|
| 1A | 1994? Sapporo. |
| 1B | 1994? Hokkaido. |
| 2A | Sapporo 1996. SF Bay Area 1997. NHE Lab. |
| 2B | Hokkaido 1994. |
| 3 | NHE Sapporo Lab |
| 4 | ICCF6 Toya 1996. |
| 5A | Japan 2005. |
| 5B | ICCF12 Yokohama. |

A photo of Packages 1A and 1B is shown in Figure 5-3 as an example. The photos in Packages 3[20] and 4[21] have been partially scanned and have been included in the TLRDP.

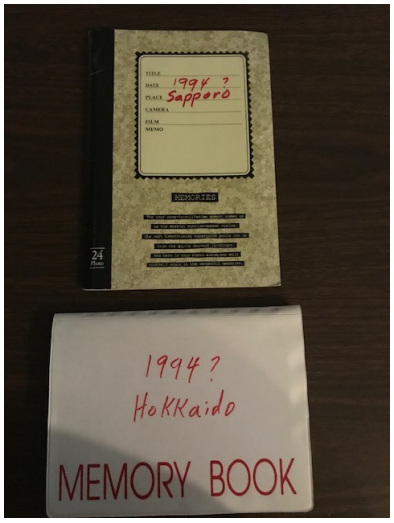


*Figure 4-2*
*Photo Packages 1A and 1B*

[19] Packages of Photographs. Memo to Fran Tanzella from Tom Grimshaw, January 20, 2020.
[20] NHE Photos. Memo to Fran Tanzella from Tom Grimshaw, March 2, 2020.
[21] ICCF-6 Reports and Photos. Memo to Fran Tanzella from Tom Grimshaw, March 3, 2020.

# 5 LENR Library

Dr. Tanzella has assembled a large collection of LENR books, reports and other materials during his years of LENR research. Most of his LENR Library is in two bookshelves in his LENR office (Figure 5–1). He also has a collection of hardcopy photos.

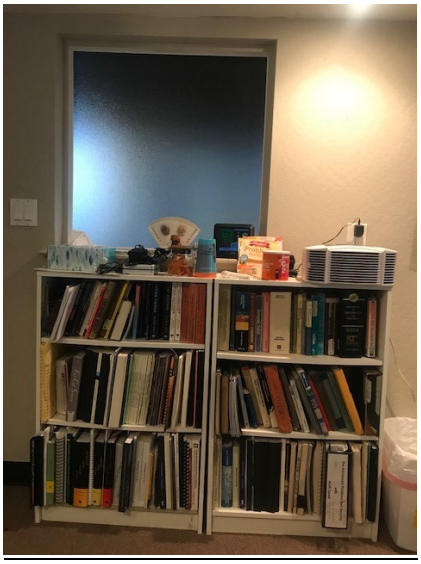

*Figure 5-1*
*Two Bookshelves in Dr. Tanzella's LENR Office*

## 5.1 ICCF Conference Materials

Dr. Tanzella has attended nearly all of the ICCF conferences going back to the first one in March 1990, just one year after the 1989 LENR announcement. He therefore has an almost complete collection of the ICCF proceedings and related materials[22] (Table 5-1). Photos have been taken of

[22] Conference Proceedings for the Tanzella LENR Research Documentation Project. Memo to Fran Tanzella from Tom Grimshaw, December 23, 2019.

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the proceedings collection for the TLRDP. Pictures of the ICCF-1 and ICCF-2 proceedings are shown as examples in Figure 5-2.

*Table 5-1*
*Dr. Tanzella's Collection of ICCF Conference Proceedings and Related Materials*

| Conference | Dates | Item(s) |
|---|---|---|
| ICCF-1 | 3/28-31/1990 | Proceedings |
| ICCF-2 | 6/29 – 7/4/1991 | Proceedings (The Science of Cold Fusion) |
| ICCF-3 | 10/21-25/1992 | Proceedings ("Frontiers of Cold Fusion") |
| ICCF-4 | 12/6-9/1993 | Proceedings (EPRI TR-1-4188, 4 Volumes) |
| ICCF-5 | 4/9-13/1995 | Abstracts |
| ICCF-6 | 10/13-18/1996 | Abstracts/Program |
| ICCF-7 | 4/19-24/1998 | Proceedings, Abstracts, & Program Manual |
| ICCF-8 | 5/21-26/2000 | Proceedings, Abstracts, List of Participants |
| ICCF-9 | 5/12-24/2002 | Proceedings, Abstracts/Program |
| ICCF-10 | 8/24-29/2003 | Proceedings, Program? |
| ICCF-11 | 10/31 – 11/5/2004 | Proceedings, Abstracts/Program |
| ICCF-12 | 11/27 – 12/2/2005 | Proceedings, Abstracts |
| N/A | 2006 | ENEA Nuclear Fusion and Fission and Related Technologies Department, Progress Report |
| ICCF-13 | 6/25 – 7/1/2007 | Proceedings |
| Workshop…[23] | 10/13-18/2007 | Proceedings, Abstracts |
| ICCF-14 | 8/10-15/2008 | Proceedings: Vol 1 & 2, Abstracts |
| ICCF-15 | 10/5-9/2009 | Proceedings, Abstracts, Program[24] |
| ICCF-16 | 2/6-11/2011 | Abstracts, Program, Transmutation Paper[25] |
| ICCF-17 | 8/12-17/2012 | Abstracts/Program |
| ICCF-19 | 4/13-17/2015 | Program |
| ICCF-20 | 10/2-7/16 | Abstracts, Program |
| ICCF-21 | 6/3-8/18 | Abstracts/Program |

[23] Workshop on Anomalies in Hydrogen/Deuterium Loaded Metals

[24] Beginning with ICCF-15, the ICCF Proceedings are published in the Journal of Condensed Matter Nuclear Science.

[25] Low Energy Nuclear Reactions: Transmutations by Srinivasan, Miley, and Storms

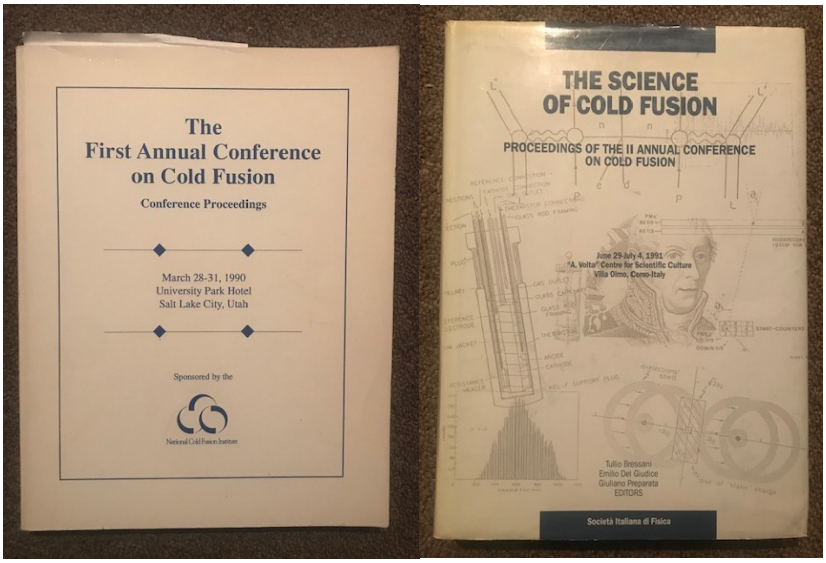


*Figure 5-2*
*ICCF-1 and ICCF-2 Conference Proceedings*

## *5.2 Other Library Items*

Besides the conference proceedings, Dr. Tanzella has many other items on the bookshelves shown in Figure 5–1[26]. They include hardcopy books and reports as well as a few CDs. The LENR-related items are in the bookcase on the left (Bookshelf A). The items in the upper and middle shelves (A1 and A2) are listed in Table 5-2a and 5-2b. The lower shelf (A3) contains the proceedings listed in Table 5-1. Other LENR Library items have been added to the Project in five categories as follows:

- "Reports from Bookshelf"
- "Reports from Bookshelf 2"
- "EPRI Reports"
- "Miscellaneous Bookshelf"
- "CDs Not on Bookshelf"

[26] Contents of Bookshelves in Laboratory Office. Memo to Fran Tanzella from Tom Grimshaw, February 1, 2020.

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Some of the items are in unspecified locations in the bookshelves, and others are elsewhere in Dr. Tanzella's office. The items in each category are listed in Tables Table 5-3a to 5-3e.

*Table 5-2a*

*Bookshelf A1 Items: LENR Books*

| | |
|---|---|
| The Rebirth of Cold Fusion | Krivit and Winocur |
| Excess Heat | Beaudette |
| Cold Fusion - The History of Research in Italy | ENEA |
| Lost History | Krivit |
| Fusion Fiasco | Krivit |
| Energy, Cold Fusion & Antigravity | Znidarsic |
| A Dialogue on Chemically Induced Nuclear Effects | Hoffman |
| Bad Science | Gary Taubes |
| Nuclear Transmutation | Mizuno |
| Cold Fusion Impact | Fox |

*Table 5-2b*

*Bookshelf A2 Items: LENR Reports and Presentations*

| | |
|---|---|
| BYU Conference Proceedings | In large envelope |
| Anomalous Nuclear Effects in Deuterium/Solid Systems – International Programs Review | Stapled report |
| Lattice Induced Nuclear Chemistry, LINC | Stapled report |
| Effect of Hydriding on the Physical Structure of Palladium. | Stapled presentation |
| Effective Hydriding on the Release of Contained Tritium from Palladium. | Stapled presentation |
| Observation of Charged Particle Bursts from Deuterium Loaded Thin Plate Titanium Foils | Stapled report |
| Nuclear Fusion Induced by the Controlled Out-Transport of Deuterons in Palladium | Stapled handwritten report |
| Tritium Production in Gas/Plasma Phase Loading – Experiments at BARC | Stapled handwritten report |
| Emission of Neutron Bursts from a Titanium-Deuterium Gas System in a High-Efficiency Low-Background Experimental Setup | Stapled report |
| Correlated Nuclear and Thermal Measurements in D/Pd and H/Pd Systems | Stapled report |
| Anomalous Heat Output from Pd Cathodes without Detectable Nuclear Products | Stapled presentation |
| Investigation of Anomalous Neutron Emissions in Solid/Deuterium Systems | Stapled report |
| The Precursor of "Cold Fusion" Phenomenon in Deuterium/Solid Systems | Stapled handwritten report |
| Electron Screening | Stapled report |


| | |
|---|---|
| Fluctuations and Non-Reproducibility in Cold Fusion from Free Quark Catalysis | Stapled report |
| Helium-3 and Tritium Hamilton Shear Zone | Stapled presentation |
| Measurements in the Gran Sasso Laboratory | Stapled handwritten report |
| Proceedings: Fourth International Conference on Cold Fusion, Volume 3: Nuclear Measurements Reports | EPRI report |
| Proceedings: Fourth International Conference on Cold Fusion, Volume 2: Calorimetry and Materials Papers | EPRI report |
| Development of Advanced Concepts in Nuclear Processes in Deuterated Metals | EPRI report |
| Proceedings: Fourth International Conference on Cold Fusion, Volume 1: Plenary Session Papers | Bound report |
| Proceedings: Fourth International Conference on Cold Fusion, Volume 4: Theory and Special Topics Papers | Bound report |
| Cavitation-Induced Excess Heat in Deuterated Metals | Stapled report |
| Cold Fusion Times | Newsletter |
| Comparison: Pons-Fleischmann Setup and Low-G Capacitor Setup | Paper-clipped report |
| Experimental Observations of Bubble Response and Light Intensity Near the Threshold For Single Mobile Sonoluminescence in Air-Water System | Physical Review C reprint |
| Resource Letter CF-1: Casimir Force | Stapled paper |
| Sonoimplantation of Hydrogen and Deuterium From Water Into Metallic Fine Powders | Applied Physics Let-ters stapled reprint |
| Journal of High Temperature Society (Japanese?) | Bound journal |
| The Basic of Nuclear Fusion Reactor Using Solid Pycnodeuterium | Bound report |
| Cavitation Theory & Experimentation, Etc. | Bound report |
| Fusion Technology | Bound journal |
| Fusion Technology | Bound journal |
| 21st Century Science & Technology, Fall 1991 | Bound journal |
| 21st Century Science & Technology, Winter 1993-94 | Pound journal |
| Infinite Energy, Uncertain Volume | Bound journal “ |
| “ Cold Fusion”, Premier Issue | Bound journal |
| “Cold Fusion”, Uncertain Date | Bound journal |
| Popular Mechanics , Uncertain Date | Bound journal |
| Popular Science, Uncertain Date | Bound journal |

*Table 5-3a*
*"Reports from Bookshelf" Items*

| | |
|---|---|
| Investigation on Evaluation of New Systems for New Hydrogen Energy Production | SRI International, Final Report, November 1997 |
| The Status of NHE Research | SRI International, September 1997 |
| Development of Advanced Concepts for Nuclear Processes in Deuterated Metals | EPRI Report |
| Cavitation-Induced Excess Heat in Deuterated Metals | Stapled Report |
| Development of Energy Production Systems from Heat Produced in Deuterated Metals | SRI International, January 1998 |
| Hydrogen in Metals | University of Strathclyde Report, March 2001 |
| Investigation of Hydrogen Absorption into Palladium and Nickel | University of Strathclyde, September 1994 |
| Light Hydrogen LENR in Copper Alloys | Stapled Report, ICCF-21 |
| Water-Free Replication of Pons-Fleischmann LENR | Stapled Report, Reprint, Journal Condensed Matter Nuclear Science, Volume 15 |

*Table 5-3b*
*"Reports from Bookshelf 2" Items*

| | |
|---|---|
| Radiation Detection Aspects of an Investigation of Anomalous Effects in Due to Rating Systems | Lockheed report, May 1993 |
| Technical Status of Cold Fusion Results | Stapled report |
| Toward the Establishment of Solid Fusion As a Perpetual Energy for Humankind | Bound report |
| Calorimetry – Fundamentals and Practice | Stapled photocopy |
| Hydrogen in Titanium | Stapled photocopy of book |
| Journal of the Less-Common Metals | Photocopy |
| Hydrogen in Metals II | Photocopy of book |
| Hydrogen in Disordered and Amorphous Solids | Photocopy a book |
| Perspectives in Hydrogen in Metals | Photocopy of book |
| Metal Hydrides | Photocopy of book |

*Table 5-3c*
*"EPRI Reports" Items*

| | |
|---|---|
| Development of Advanced Concepts for Nuclear Processes in Deuterated Medals | EPRI Report |
| Development of Energy Production Systems from Heat Produced in Deuterated Metals | SRI International, January 1998 |
| The status of NHE research | SRI international, September 1997 |
| Investigation on Evaluation of New Systems from New Hydrogen Energy Production | SRI International, Final Report, November 1997 |
| Hydrogen in Metals | University of Strathclyde, I'm Certain Date |
| Investigation of Hydrogen Absorption into Palladium and Nickel | University of Strathclyde, September 19 94 |
| Cavitation – Induced Excess Heat in Due to Rated Metals | SRI International, March 1998 |

*Table 5-3d*
*"Miscellaneous Bookshelf" Items*

| | |
|---|---|
| APS 2006 | CD in case |
| Least Action Nuclear Process LANP Model | CD in case |
| Cold Fusion – Fire from Water | CD in case |
| ICCF 20 Proceedings | CD in case |
| Proceedings of the 15th International Conference on Condensed Matter Nuclear Science | Bound report |
| Proceedings of the 16th International Conference on Condensed Matter Nuclear Science | Bound report |
| Current Science | Bound journal |
| Future Energy | Bound magazine |
| Thermal and Nuclear Aspects of the Pd/D2O System – Volume 1: A Decade of Research at Navy Laboratories | Bound report |
| Calorimetric Analysis of a Heavy Water Electrolysis Experiment Using a Pd-B Alloy Cathode | Naval Research Laboratory Report, March 26, 2001 |
| Naval Research Laboratory, 1994-95 Fact Book | Bound report |
| Fourth International Conference on Cold Fusion | Bound report |

*Table 5-3e*
*"CDs Not on Bookshelf" Items*

| | |
|---|---|
| 60 Minutes – Cold Fusion | CD in envelope |
| LENR Workshop, August 2009, SPAWAR | CD in envelope |
| Cold Fusion: Understanding the Fleischman-Pons Effect | CD in case |

# 6 Laboratories

Dr. Tanzella conducted most of his LENR research at SRI International[27] (Figure 6-1). After he retired in 66, he developed his private LENR lab in Belmont, California.

*Figure 6-1*
*SRI International Front Entrance*

## 6.1 SRI International Lab

The early (1989-91 timeframe) research team at SRI included six members[28] (Figure 6-2): Fran Tanzella, Michael McKubre, Mark Williams, Stuart Smedley, Romeu Rocha, Steve Crouch-Baker, and possibly Sharon Wing. Other workers in the next time frame were Alan Hauser, Ben Bush, Nada Jdvtic. After a tragic accident resulting in the death of Andy Riley on January 2, 1992, the LENR lab was moved to a new lab constructed with impact resistant clear plastic panels[29].

**Commented [FT1]:** Other workers in the next time frame were Alan Hauser, Ben Bush, Nada Jdvtic

During the latter period of his SRI affiliation before he retired, Dr. Tanzella was heavily involved in a LENR research collaboration with Brillouin Energy. A photo of members of the collaboration is shown in Figure 6-3. Photos of the SRI LENR lab are in Figure 6-4[30].

[27] Photos Added During February 17, 2020 Visit. Memo to Fran Tanzella from Tom Grimshaw, February 19, 2020.
[28] Cold Fusion Research Team at SRI. Memo to Fran Tanzella from Tom Grimshaw, January 19, 2020.
[29] Other workers in the next timeframe were Alan Hauser, Ben Bush and Nada Jdvtic.
[30] Photos of SRI LENR Lab. Memo to Fran Tanzella from Tom Grimshaw, March 25, 2020.

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*Figure 6-2*
*SRI LENR Research Team, 1989-91 Timeframe*
*Back Row, Left to Right: Fran Tanzella, Michael McKubre, Mark Williams*
*Front Row, Left to Right: Stuart Smedley, Romeu Rocha, Steve Crouch-Baker*


*Figure 6-3*
*SRI and Brillouin LENR Researchers*
*Left to Right: Tom Driscoll, Fran Tanzella, Dave Correia, Michael McKubre, Robert Godes, Robert George*

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*Figure 6-4*
*Interior of the SRI LENR Research Lab: "2 Empty Cubicles"*

### 6.2 NHE Laboratory, Sapporo, Japan

While at SRI, Dr. Tanzella conducted LENR research for several months at the NHE laboratory in Sapporo, Hokkaido, Japan. Figure 6-5 shows the NHE research group[31], which was led by Dr. N. Asami (shown fourth from the left in the photo). Dr. Tanzella can be seen near the rear of the picture. Figure 6-6 shows the gas manifold that was used to evacuate and fill electrolytic cells from SRI with hydrogen. The manifold was also used to monitor the pressure in the cells and to remove the hydrogen at the end of each experiment. The cells were backfilled with nitrogen for safety reasons when the hydrogen was removed.

[31] NHE Photos. Memo to Fran Tanzella from Tom Grimshaw, March 2, 2020.

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*Figure 6-5*
*NHE LENR Research Group*

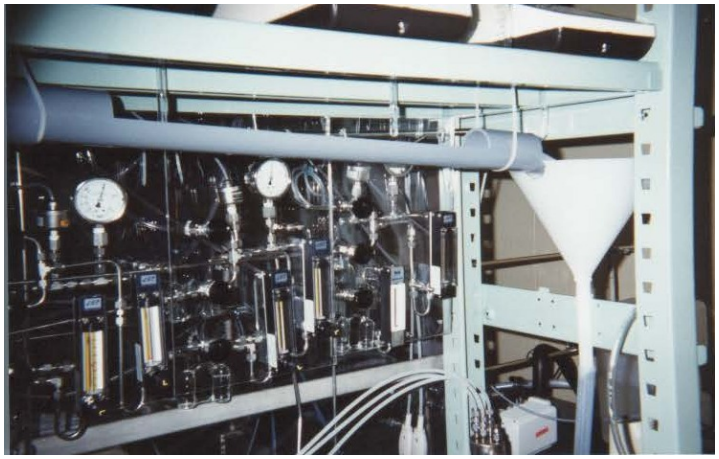

*Figure 6-6*
*Gas Manifold System for Addition and Evacuation of Gas in the Electrolytic Cells*

## 6.3 Energy Research Center Lab

After he retired from SRI in 2018, Dr. Tanzella developed his own private LENR lab in Belmont, California. His lab, the Energy Research Center, is shown in Figure 6-7[32]. The lab has an interior office on one end. Interior views of the lab are in Figure 6-8. A photo of Dr. Tanzella in his lab is in Figure 1-1. The lab is being prepared for LENR experiments.

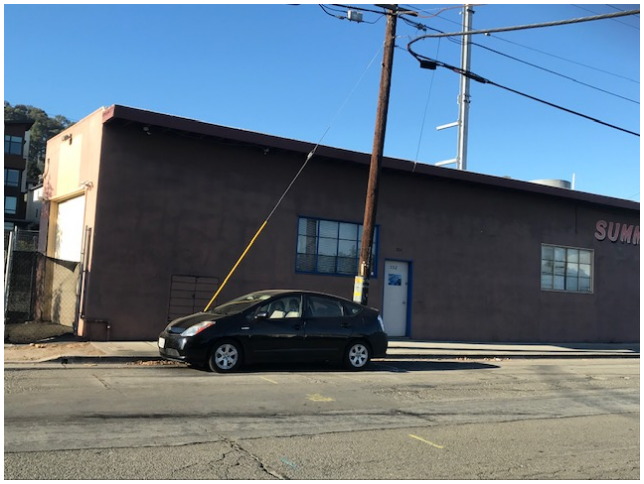

*Figure 6-7*
*Westward Exterior View of Energy Research Center Laboratory and Office*

[32] Exterior and Interior Lab Photos and Office Photos at "Energy Research Center". Memo to Fran Tanzella from Tom Grimshaw, January 8, 2020.

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*Figure 6-8a*
*Interior View of Dr. Tanzella's Laboratory and Office: View Toward Overhead Door*

*Figure 6-8b*
*Interior Views of Dr. Tanzella's Laboratory and Office: View Toward Office*

## 6.4 Lab Notebooks

Three lab notebooks have been documented for the TLRDP. The earliest notebook, shown in Figure 6–8, is a ring binder[33] with a label on the spine as follows:

Tanzella Raw Data for Post Experiment Analyses, Early Cells, 1989-90.
Single Cathode (P12).

The report title and opening paragraph on the first page of the binder are shown below.

EM and SALI analytical results for P12 and P12B

Introduction

Following calorimetric experiments, the rod from P12 was divided into two equal lengths. SEM and SALI analyses were carried out over the period 11/21/9 – 12/9/90. Similar analyses were carried out on a blank rod, P12B, which different from P12 only in that it had not been used in an electrochemical cell. Both rods had been subjected to helium implantation before use, receiving a dose of 12.8 mC. It had been estimated that the HE 4 access would penetrate to a depth of approximately 1μ.

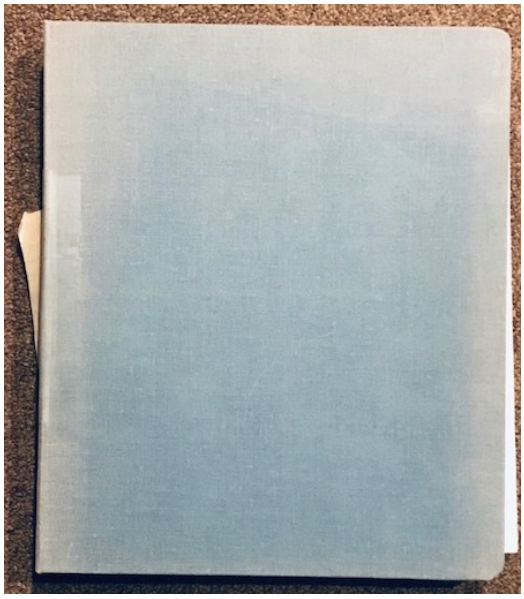

*Figure 6-9*
*Ring Binder for Cathode P12*

[33] Ring Binder Cathode P12. Memo to Fran Tanzella from Tom Grimshaw, December 20, 2019.

Two notebooks included in the Project (Figure 6-10) were dedicated to specific topics or experiments that were conducted while Dr. Tanzella was at SRI[34] They are labeled as follows:

1. P21785. MIT. X-rays. RF Stimulation of Hg on Cu for Nuclear X-Rays
2. "PdCls, Experiment". "Ben Earle CoDposition (Spazk, Boss). CR-39. Gallileo Project."

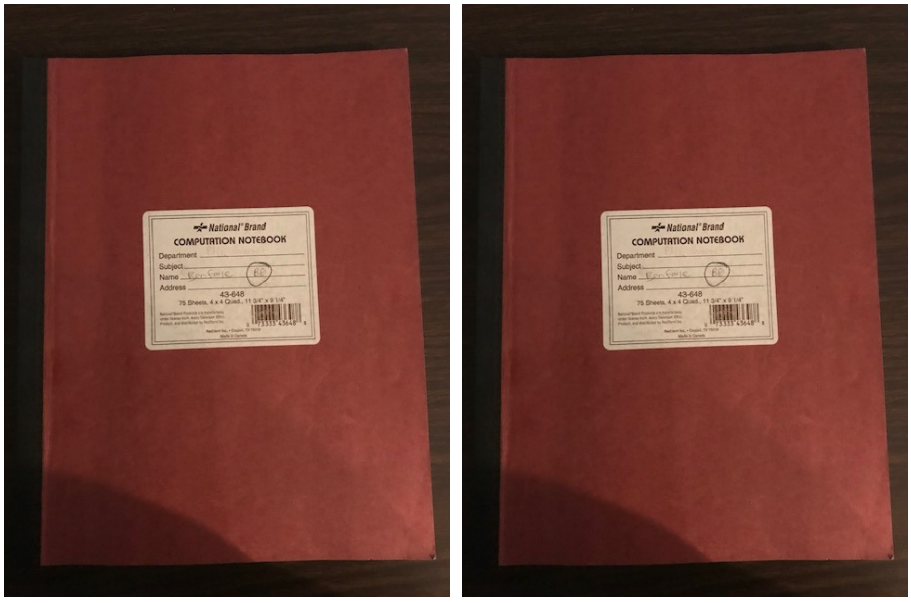


*Figure 6-10*
*Two of Dr. Tanzella's Lab Notebooks*

Dr. Tanzella has indicated that other lab notebooks for SRI LENR experiments are on file at the organization. Table 6-1 shows a list of notebooks that may that may be available to the Project in the future[35]. Other notebooks besides the ones listed may also be available.

[34] Two Lab Notebooks for the Tanzella LENR Research Documentation Project. Memo to Fran Tanzella from Tom Grimshaw, December 22, 2019.

[35] Record of Notebooks Issued by SRI International. Memo to Fran Tanzella from Tom Grimshaw, February 8, 2020.

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*Table 6-1*
*Lab Notebooks Issued by SRI International, as of October 26, 2015*

| No | Lab Book No. | CO Current Owner ID | Proj No. | Issued | Archived | BoxNo |
|---|---|---|---|---|---|---|
| 1 | 09418H | Tanzella Francis | 20552 8735 | 02/22/1990 | 06/14/2013 | 09936 |
| 2 | 09449H | Tanzella Francis | 20552 8735 | 03/14/1990 | 06/14/2013 | 09936 |
| 3 | 09462H | Tanzella Francis | 20552 8735 | 03/21/1990 | | |
| 4 | 09483H | Tanzella Francis | 20552 8735 | 04/04/1990 | 06/17/2013 | 09936 |
| 5 | 09516H | Tanzella Francis | 20552 8735 | 04/25/1990 | 06/17/2013 | 09936 |
| 6 | 09517H | Tanzella Francis | 20552 8735 | 04/25/1990 | 06/17/2013 | 09936 |
| 7 | 09522H | Wing Sharon | 14397 8735 | 05/03/1990 | 06/17/2013 | 09936 |
| 8 | 09578H | Tanzella Fran | 20552 8735 | 06/28/1990 | | |
| 9 | 09593H | Tanzella Fran | 20552 8735 | 07/13/1990 | | |
| 10 | 09643H | Tanzella Francis | 20552 8735 | 08/21/1990 | 06/17/2013 | 09936 |
| 11 | 09666H | Tanzella Fran | 20552 8735 | 09/04/1990 | | |
| 12 | 09741H | Tanzella Fran | 20552 8735 | 11/13/1990 | | |
| 13 | 09763H | Wing Sharon | 14397 8735 | 12/04/1990 | 06/17/2013 | 09936 |
| 14 | 09804H | Tanzella Francis | 20552 8735 | 01/16/1991 | 06/17/2013 | 09936 |
| 15 | 09857H | Williams Mark | 20567 8735 | 02/19/1991 | 06/17/2013 | 09936 |
| 16 | 09926H | Tanzella Francis | 20552 8735 | 05/01/1991 | 06/17/2013 | 09936 |
| 17 | 10044H | Wing Sharon S | 14397 8735 | 07/22/1991 | 09/12/2013 | 09937 |
| 18 | 10045H | Wing Sharon S | 14397 8735 | 07/22/1991 | 09/12/2013 | 09937 |
| 19 | 10197H | Williams Mark S | 20567 8735 | 11/21/1991 | 09/12/2013 | 09937 |
| 20 | 10392H | Wing Sharon S | 14397 8735 | 04/27/1992 | 09/12/2013 | 09937 |
| 21 | 10596H | Tanzella Fran | 20552 8735 | 09/09/1992 | | |
| 22 | 10670H | Wong Victor | 21645 8735 | 11/06/1992 | 09/26/1997 | 05450 |
| 23 | 10826H | Tanzella Fran | 20552 4035 | 04/05/1993 | | |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 24 | 10856H | Wing Sharon S | 14397 | 4035 | 04/26/1993 | 09/12/2013 | |
| 25 | 10896H | Hauser Alan K | 22873 | 4035 | 05/18/1993 | 09/12/2013 | |
| 26 | 10900H | Hauser Alan K | 22873 | 4035 | 05/24/1993 | 09/12/2013 | |
| 27 | 10952H | Wing Sharon S | 14397 | 4035 | 07/15/1993 | 09/12/2013 | |
| 28 | 10965H | Bush Ben | 99925 | 4035-93 | 08/02/1993 | 03/31/1994 | 03594 |
| 29 | 11034H | Tanzella Fran | 20552 | 4035-93 | 09/27/1993 | 09/12/2013 | |
| 30 | 11081H | Sharon S | 14397 | 4035-93 | 10/21/1993 | 09/12/2013 | |
| 31 | 11115H | Tanzella Fran | 20552 | 4035-93 | 11/16/1993 | | |
| 32 | 11116H | Williams Mark S | 20567 | 4035-93 | 11/17/1993 | 09/12/2013 | |
| 33 | 11170H | Srinivasan Mahadeva | 99950 | 4035 | 01/17/1994 | 09/12/2013 | |
| 34 | 11191H | Tanzella Francis | 20552 | 4035-194 | 02/02/1994 | | |
| 35 | 11221H | Srinivasan Mahadera | 99950 | 4035 | 02/22/1994 | 09/12/2013 | |
| 36 | 11248H | Tanzella Francis | 20552 | 4035-94 | 03/04/1994 | | |
| 37 | 11308H | Williams Mark S | 20567 | 4035-94 | 04/27/1994 | 09/12/2013 | |
| 38 | 11453H | Tanzella Fran | 20552 | 4035-94 | 09/01/1994 | | |
| 39 | 11454H | Hauser Alan | 22873 | 4035-94 | 09/01/1994 | | |

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## 7 Interviews

Two sets of interviews with Dr. Tanzela have been conducted regarding his long LENR research career. The first interview was recorded on November 19 and 20, 2019[36], and the second took place in two parts on April 21 and May 8, 2020[37]. Transcripts of these recorded interviews may become available for public release in the future.

[36] Interview for the Tanzella LENR Research Documentation Project. Memo to Fran Tanzella from Tom Grimshaw, November 27, 2019.

[37] Second Round of Interviews for the Tanzella LENR Research Documentation Project. Memo to Fran Tanzella from Tom Grimshaw, May 12, 2020.

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# 8 LENR Research Timeline

In support of the second set of interviews, Dr. Tanzella prepared a timeline of his LENR research at SRI. It is shown in Table 8-1. Additional detail may be added to the timeline in the future after review and annotation of the interview transcripts.

*Table 6-1*
*Dr. Tanzella's LENR Research Timeline*

| | |
|---|---|
| 3/1989 - 1/1992 | Small FPE effort funded by EPRI, Mass flow calorimeter development, P1 – P18, P2 autoradiograph, P14 vs P15 |
| 1992 | Fatal accident investigation - Reported at ICCF3; Preparation for next EPRI phase |
| 1993 - 1995 | Larger FPE effort funded by EPRI. Additives study, Pd annealing temperature study, Surface preparation study. |
| 1995 - 1997 | FPE studies funded by NHE group in Sapporo. Loading Studies and IMRA Engelhard Lot 1 Pd analysis and reproduction |
| 1997 - 1998 | Case reproduction with He measurements; Stringham cavitation experiments. Case first reported at ICCF7 (1998). Charge emission project (fA) with P. Hagelstein. |
| 1998 - 1999 | Arata double-structured cathode experiment reproduction. Arata first reported at ICCF5 (1995). Small Case cells. |
| 2000(?) | ONR funded FPE effort. Violante calorimetric analysis of small case cells – He-4 vs Pxs. |
| 2001 - 2004 | DARPA-funded efforts on various reproduction efforts. Laser triggering; ENEA collaboration. |
| 2004 | Project Cobalt (outside of SRI, Letts dual-laser experiment) |
| 2005 | Spindletop - ultrasonic stimulation of PdDx with thermal camera analysis |
| 2005 - 2006 | CR-39 work (SRI funded Galileo project) |
| 2006 | ONR (through MIT) - EM stimulated LENR |
| 2007 - 2008 | DARPA-funded Energetics Technologies Superwave® reproduction (phase 1) |
| 2009 | DARPA-funded Energetics Technologies Superwave® reproduction (phase 2, low temperature). |
| 2009 - 2013 | DTRA-funded Exploding metal hydride wire experiments with cryogenic calorimetry. Continued CR-39 work with Lipson, Russetski. Boss, and Forsley |
| 2013 | DARPA (through MIT)-funded Coherent X-ray generation |
| 2014 - 2015 | NRL-funded FPE and H(D) in zeolite experiments |
| 2013 - 2018 | Brillouin reproduction and independent verification experiments. Published CR-39 work in IJHE. |
| 2018 - Present | Supporting Brillouin work via the Energy Research Center LLC<br>Supporting at least 2 other LENR research groups that will remain anonymous. |

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# 9 Future Opportunities

There are opportunities for future progress on the TLRDP. Possible additions and expansions are listed below.

- Review and annotate interview transcripts
- Review and consolidate the lists of publications in Section 2
- Add the files of LENR experimental data that are not yet included in the Project

When the TLRDP is completed, a summary may be prepared for sharing with other members of the LENR research community – and beyond.

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## 10 Project Methods

The methods used in the TLRDP are based on general LRDI procedures that are modified to meet the specific requirements of individual LENR investigators[38]. The project is being performed according to accepted project management practices[39]. As noted above, the overall LRDI procedure is set forth in a recent article in Infinite Energy[40].

The TLRDP was initiated after discussions with Dr. Tanzella during the CF/LANR Colloquium on March 23-24, 2019 at MIT. The initial conversations took place after a presentation on the LRDI[41]. An early step was identification of Dr. Tanzella's publications on LENR-CANR.org. Visits to his lab in Belmont, California took place on the following dates.

October 29, 2019
November 29, 2019[42]
February 17, 2020[43]

During the visits, Dr. Tanzella provided copies of his professional resume, electronic files were obtained, hardcopy records were inventoried, and the contents of his LENR library were recorded. The procedure included scanning selected materials and taking photos of Dr. Tanzella, his LENR records and his combined office and laboratory. The interview that took place in November was recorded by phone.

[38] Grimshaw, T.W., 2019. Collection, Organization, and Documentation of LENR Research Results: Guideline. January.

[39] Project Management Institute, 2017. A Guide to the Project Management Body of Knowledge (PMBOK® Guide) — Sixth Edition and Agile Practice Guide (ENGLISH). Project Management Institute. Newtown Square, PA.

[40] Grimshaw, T., 2020. Documenting Cold Fusion Research: Preserving a Vital Asset for Humankind. Infinite Energy, Issue 150, March/April 2020, p. 9-13.

[41] Grimshaw, T., 2019. LENR Research Documentation Initiative: Objectives, Procedure, Participants, Future Opportunities. Presentation and Poster at MIT CF/LANR Colloquium. March.

[42] Summary of Visit for Tanzella LENR Research Documentation Project, November 24, 2019. Memo to Fran Tanzella from Tom Grimshaw, November 27, 2019.

[43] Summary of Visit on February 17, 2020. Memo to Fran Tanzella from Tom Grimshaw, February 18, 2020.

About 29 memos have been prepared[44] (Table 10-1). A Dropbox folder is being used to store the electronic files found and the memos and reports prepared for the Project[45] (Figure 10-1). The Dropbox folders were in general numbered sequentially as materials were located and progress was made. For records requiring a large amount of storage space, a supplemental external hard drive is being used. This hard drive is also utilized for periodic backup of the MLRDP and other LRDI project files.

*Table 10-1*
*List of Memos for the Tanzella LENR Research Documentation Project*

| Date | Memo | DBF* |
|---|---|---|
| 5/4/2019 | Tanzella in "All Authors" on LENR-CANR.org: Update | 20 |
| 11/24/2019 | Interview for Tanzella LENR Research Documentation Project | 40 |
| 11/27/2019 | Summary of Visit for Tanzella LENR Research Documentation Project, November 24, 2019 | 45 |
| 12/6/2019 | Hard Drive Contents for Tanzella LENR Research Documentation Project | 60 |
| 12/20/2019 | Ring Binder Cathode P12 | 80 |
| 12/22/2019 | Two Lab Notebooks for the Tanzella LENR Research Documentation Project | 70 |
| 12/23/2019 | Conference Proceedings for the Tanzella LENR Research Documentation Project | 90 |
| 1/8/2020 | Exterior and Interior Lab Photos and Office Photos at "Energy Research Center" | 100 |
| 1/19/2020 | Cold Fusion Research Team at SRI | 120 |
| 1/20/2020 | Packages of Photographs | 110 |
| 2/1/2020 | Contents of Bookshelves in Laboratory Office | 140 |
| 2/3/2020 | Professional Biographies for the Tanzella LENR Research Documentation Project | 160 |
| 2/4/2020 | SRI International Report for the Tanzella LENR Research Documentation Project | 130 |
| 2/5/2020 | Publications List on Sci Finder for the Tanzella LENR Research Documentation Project | 25 |
| 2/6/2020 | SRI International Report for EPRI | 135 |
| 2/7/2020 | List of Memos for the Tanzella LENR Documentation Project | 200 |
| 2/8/2020 | Record of Notebooks Issued by SRI International | 190 |
| 2/18/2020 | Summary of Visit on February 17, 2020 | 210 |
| 2/19/2020 | Photos Added During February 17, 2020 Visit | 240 |
| 2/20/2020 | PowerPoint Presentations Dated 2009 and 2019 | 170 |
| 2/21/2020 | Selected SRI and Related Reports | 230 |
| 2/22/2020 | References in Endnote and SciFinder | 220 |
| 2/23/2020 | Hardcopy Folders from File Cabinet | 250 |
| 3/1/2020 | SRI Reports for New Hydrogen Energy (NHE) | 260 |
| 3/2/2020 | NHE Photos | 270 |
| 3/3/2020 | ICCF-6 Reports and Photos | 280 |

[44] List of Memos for the Tanzella LENR Documentation Project. Memo to Fran Tanzella from Tom Grimshaw. February 7, 2020.

[45] Tanzella Files on Dropbox. Memo to Fran Tanzella from Tom Grimshaw. March 4, 2020.

| | | |
|---|---|---|
| 3/4/2020 | Tanzella Files on Dropbox | 290 |
| 3/25/2020 | Photos of SRI LENR Lab | 300 |
| 3/31/2020 | ICCF-1 Paper: Calorimetry and Electrochemistry in the D/Pd System | 180 |

*DBF = Dropbox Folder Designation


*Figure 10-1*
*Screenshot of "Tanzella – LENR at SRI 190330" Folder on Dropbox*