The numbers of countries from which attendees came for the ICCFs are shown in the table. Here again, it is not possible to draw any detailed conclusions. However, the overall picture is clear from the numbers given in the proceedings. Generally, 10 to 20 countries were represented at the conferences, and the larger delegations are usually from about six countries. There has been a significant number of attendees from the host country or continent. For example, at ICCF-3, held in Nagoya, 229 of the 346 attendees were from Japan.

The numbers of papers in the proceedings of the ICCF series varies between 35 and 110, with no strong trends over the years. The total for the first 12 conferences is 920 papers, an average of 77 published papers per conference. The total number of papers in the ICCF proceedings probably represents around one-third of the papers on the FPE since 1989. In addition to drawing most of the key scientists in the community, these conferences provide in their proceedings a primary repository of information in the field. There will probably be a need to reprint the proceedings from the earlier ICCFs as the number of scientists in the field increases. However, many of the papers presented at ICCF and published in their proceedings are available on the internet at LENR-CANR.org.

The total number of authors listed for ICCF-1 through ICCF-12, excepting ICCF-7 for which an author index is not available, is 2108. This gives an average of 192 authors for those 11 conferences. The total number over the years necessarily includes double counting of individuals who attended more than one of the ICCFs. It would be laborious to determine accurately how many individual scientists contributed to the papers in the proceedings. But, the number is at least several hundred.

There are significant factors and trends that cannot be gotten from the data in Table 2. The number of reporters present at each conference is not generally recorded. However, from attending these conferences, we know what the general level of press interest has been over the years. Initially, there was great and evident press presence, especially at ICCF-1 and -2. The number of general reporters in attendance declined to few or none throughout the following several conferences, which continued in the most recent conferences. Some researchers welcomed this absence of external scrutiny, which permitted work on the FPE to proceed without distractions from the press. We feel that this field, like any field of science, must be able to communicate its activities and results both to the broader scientific community and to the public generally. When the field is recognized and accepted as a subject for legitimate scientific inquiry, and public funds are made available to researchers in the field, then such communications will become necessary and routine.

Strategies for ICCF-14 and These Proceedings

As noted already, the ICCF series of conferences is on a three-continent rotation. Hence, it was appropriate to hold ICCF-14 in North America. We volunteered to organize ICCF-14 in Washington DC, a few minutes' walk from the national capitol and close to the regional Metro system, with two hopes in mind. One desire was to attract staffers from the nearby offices of Senators and Congressmen. The other was to make it easy for program managers from US government funding agencies to attend, especially those with responsibilities for science, energy and the environment. Such agencies include the US Departments of Energy and

Defense, the National Science Foundation and the Environmental Protection Agency. We also hoped that having the conference in the heart of the US capitol would attract mainstream press coverage. None of these possibilities materialized. However, the CBS TV show 60 Minutes did videotape part of the conference and a report on the field, not the conference, was broadcast in April 2009. The limited number of new local attendees was likely due to the conference being scheduled in August, when many people are on vacation. The ICCFs have uniformly been held in high quality settings that encouraged intense exchanges of ideas. Holding a conference in a capital city is generally expensive and ICCF-14 timing was chosen to reduce the hotel room rates, which were about half of what they are during other times of the year.

Regarding the agenda, conference organizers can be either reactive or proactive in their approach to obtaining papers for presentation. In the reactive mode, they form the agenda from the papers that have been offered in response to a Call for Papers. However, for most conferences, the organizers also invite presentations from important workers in the field that will be of broad interest to the attendees. These invitations are honorific, and they insure that the best work is highlighted.

We felt that some topics in the field needed up-to-date technical reviews at the conference. Hence, we commissioned a few reviews from key workers, in addition to inviting several luminaries in the field to give papers. The commissioned reviews were on:

1. Calorimeter design and performance for measurement of excess power and energy in the FPE experiments.
2. The experimental evidence of excess heat, the Fleischmann-Pons Effect.
3. Experiments using gas loading to produce excess heat.
4. Scattering of deuterons on deuterons within a metallic environment to assess the "screening" at energies below the coulomb barrier.

It is hoped that the commissioned papers will form the basis of later papers in a mainstream review journal, such as the Reviews of Modern Physics. These papers are identified in the introductions to the sections in which they are found in these proceedings.

The architecture of the agenda was chosen for a few purposes. One such goal was to provide during the first two days of the conference a broad overview of the field. The very important work on heat and materials was scheduled on the opening day. This was done to insure that people who could attend only one or two days of the conference would be able to get a sense of the breadth and quality of what has been done and found in the field. This strategy proved to be very successful.

Several people in the field, who have made major contributions to its development, are well past retirement age. It was felt that the chances to publicly honor such pioneers would likely be few. Hence, we scheduled two sessions on the second day to honor Professor Yoshiaki Arata from Osaka University in Japan and Dr. Stanislaw Szpak from the SPAWAR Systems Center in San Diego. The session for Professor Arata began with an overview of his work on cold fusion, and ended with a presentation by Professor Arata on his most recent and very provocative results. That session was organized by Dr. Talbot Chubb, who gave the overview.

The session for Dr. Szpak, who could not attend, consisted of an overview of the work he and his colleagues have done and published since the inception of the field. It was organized by Frank Gordon and presented by him and a few colleagues of Dr. Szpak's. We hope that future ICCFs will also include sessions recognizing key pioneers in the field.

The second day also included sessions on three very important topics: gas loading, particle measurements, and challenges facing the field. In the evening, the annual public session of the International Society for Condensed Matter Nuclear Science (ISCMNS) was held. It was organized and chaired by William Collis, the organizer and Chief Executive of the Society.

There are four classes of measurements done on FPE experiments: heat, nuclear ash, energetic particles, and low-energy phenomena, as already noted. The measurements of nuclear reaction products have tended to fall into two main classes, namely the detection of light products, such as tritium and helium, and the measurement of elements of moderate or heavy mass. The second type of research goes under the banner of transmutations, and is of widespread interest and major importance in the field. Hence, the opening session on the third day was on transmutations. However, there was too little time in that session to cover all the work in the sub-field. Hence, Professor George Miley from the University of Illinois organized a workshop on transmutations on Friday afternoon immediately after the conference. Approximately 50 scientists attended, which is a measure of the interest in transmutations.

Most of the third day was designed to serve workers in the field, both technically and for recreation. There was a session during which leading workers from several countries presented histories of work on the FPE in their countries during the almost two decades since the inception of the field. Presentations were made on work in China, France, India, Italy, Japan and Russia. This session was a major step forward in a separate project to produce and publish country histories for activities and results in the field. Some already exist in either English or the language of the country. Translations to English are in progress, with the goal of publishing a matched set of books, one for each country, in the near future.

The afternoon of the third day was devoted to the traditional conference outing. Most of the attendees participated in a visit to the Udvar-Hazy Center of the Smithsonian Air and Space Museum about an hour's drive from the conference hotel. The conference banquet was held after the tour on the third day. In addition to the meal and musical entertainment, the evening included the presentation of the Preparata Medal to Dr. Irving Dardik. The medal was prepared by William Collis on behalf of the ISCMNS. Dr. Michael McKubre gave introductory remarks, prior of the presentation to Dr. Dardik and his remarks. Several members of the Dardik family and other friends attended the dinner and award ceremony.

The fourth day of the conference included two sessions on modeling and theories that covered a very broad range of ideas. Theoretical ideas had the most papers at the conference. There were also full sessions on ion beam experimental results, on optical experiments and another partial session on materials. That Thursday included the last of three poster sessions, the other two being late on Monday and Tuesday of the conference.

The conference concluded with a half day of presentations. Several significant experimental papers, which did not fit well in the earlier sessions, were given in the first session. That was

followed by the concluding session, which included Dr. Thomas Passell's conference summary, followed by two panel discussions. The first dialogue was on Experimental Design and the second was on Realizing the Promise.

During this conference, the accumulated evidence was reviewed to show that the FPE is not an experimental artifact. The feedback from attendees indicated that ICCF-14 was a successful scientific conference. The 97 papers scheduled for oral or poster presentation included some very important new results. The information given at the conference and published in these proceedings adds significantly to the large and increasingly compelling evidence for the ability to trigger nuclear reactions, which give millions of electron volts of energy, with chemical energies on the scale of electron volts. This new and exciting scientific field is sufficient in itself. However, the possibility of clean and safe distributed nuclear power sources based on the FPE makes understanding, controlling and optimizing low energy nuclear reactions even more interesting and urgent.

This ICCF was the Fourteenth to present research results that have been developed and published by hundreds of investigators world-wide. The DOE has conducted within its national laboratories important experiments on the production of tritium in non-conventional FPE inspired configurations. The US Patent Office (PTO), as a matter of policy since the 1989 DOE Report, has rejected all devices that assume the existence of the FPE, citing the popular press accounts that say it does not exist. Clearly, the DOE and the PTO are now only occasional followers, and not leaders, of the limited understanding of the FPE. (Note added in proof: the World Intellectual Property Organization published a "cold fusion" patent on 15 October 2009.)

These proceedings depart from past documentation of the ICCF. As with the earlier volumes, the papers are binned into sections by topic. However, we seek to make the proceedings useful to a wider audience than the attendees and people already familiar with the field. Hence, we provide an introduction to each of the sections. Those introductions have two parts. The first is a technical overview of the subject of the sections. For example, the introduction to the section on calorimeters defines the various types of calorimeters discussed in the following detailed papers given at the conference. The second part of the introductory material for each section briefly cites or summarizes each of the papers in the section. It is hoped that both aspects of the section introductions will make these proceedings more useful, especially to students, who are needed to advance the field in the coming years.

Summary of the Field

The experiments in many countries over 20 years have given the field a very strong database. Part of that key data was presented at this conference. The experience to date has revealed both problems and progress. We begin with a "high level" summary of the current technical and other problems. Then, issues that have been resolved are summarized.

Unresolved Technical Issues

- Most fundamentally, the mechanisms at the heart of the production of heat by LENR are not understood, despite about two-dozen theories.

- Unknown material properties apparently play a key role in producing the FPE.
- The characteristics of the nanometer-scale locations at which LENR occur are unknown.
- Reproducibility of LENR is still below 100% in almost all experiments.
- While significant factors are known for triggering the FPE, the controllability of experiments to date is unsatisfactory.
- The net power levels from experiments to date are only on the order of 10 watts, well below what is needed for most applications or profitable commercialization.
- Continuous power production from the past experiments rarely exceeds one month.

Unresolved Support Issues

- Adequate government funding is not available for research on the FPE using modern tools, such as synchrotron radiation and atomic-force microscopes.
- Major journals and science magazines still refuse to publish papers from the field because it is still haunted by an early and poor reputation.
- The US Patent and Trademark Office generally has not approved patents on LENR based devices and processes, which deters investments by venture capitalists.

The last three problems are all due to the scientific community, which alone can legitimize the study of LENR, continuing to ignore the field for a variety of reasons. Negative statements by some prominent ex-scientists exacerbate the inattention problem. Because the study of LENR is still only a science and not yet a technology, products based on nuclear reactions at ordinary temperatures may take one or two decades to appear. However, predictions of this sort are notoriously dependent upon the cumulative man-hours devoted to studying these complex systems and the "luck" that investigators have in these largely Edisonian searches.

Resolved Issues

The above problems notwithstanding, major progress has been made on the characteristics of the FPE in the past two decades. Based on many measurements by credentialed scientists with good equipment, proper calibrations, adequate controls, and good signal-to-noise ratios, we now know that:

- It is possible to initiate nuclear reactions, each of which gives energies of about one million electron volts, by using chemical energies on the order of one electron volt.
- High temperatures are not needed to produce LENR, greatly simplifying the experimental study of the phenomenon and its potential applications.
- There are four approaches to FPE experiments, namely the use of liquids, gases, plasmas and beams to load hydrogen isotopes into certain solids, notably Palladium.
- Four types of measurements, heat that cannot be explained by chemistry, nuclear reaction (transmutation) products, low intensities of energetic particles and some low-energy phenomena, all point to the occurrence of nuclear reactions.
- Power gains in excess of ten have been observed in a few experiments
- Power densities exceeding those within nuclear fission fuel rods by 100 times have been measured.
- Values of generated energy (in electron volts per atom of the metal catalyst) in excess of 20,000 have been observed in FPE experiments.

- **The experiments do not emit dangerous radiation during their operation.**
- **No significant radioactive waste has been observed after FPE experiments.**
- **LENR do not produce greenhouse gases.**

Concluding Thoughts

As a result of the empirical knowledge now in hand, it is not unreasonable to imagine safe and green sources of nuclear power for homes, free of carbon emissions, which also will relieve stress on the power grid, because they might be small and distributed. LENR could be the basis for portable nuclear power sources, maybe even batteries. The production of clean drinking water by desalination or by purification of polluted river waters is one of the many, and perhaps the most attractive potential applications of LENR. The world health implications of clean water would be momentous. Those of us who work on the Fleischmann-Pons Effect find it an exciting and challenging field of research with remarkable practical potential. As a scientific effect, it is already historic. It remains to be seen if it will turn out to be a "game changing" practical source of energy. The field is indeed EXCITING NEW SCIENCE and it offers POTENTIAL CLEAN ENERGY.