

Concluding remarks

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1 Introduction

It is a great honor and pleasure to be given the opportunity to have been asked to give the concluding remarks for the eight International Symposium on the Industrial Applications of the Mössbauer Effect (ISIAME). Originally this international conference was to be held in Asheville, and I was to be the Chair of the event. With the closing of the Mössbauer Effect Data Center in Asheville, it was not possible to organize ISIAME to be in Asheville. With an abbreviated time allotment, the Dalian Institute of Chemical Physics has made an incredible effort to organize a most successful conference, which we have enjoyed both intellectually and personally this week.

In the early 1980s at the Mössbauer Effect Data Center we began to see a the appearance of papers dealing with the applications of the Mössbauer Effect, and thus proposed a special symposium at the International Chemical Congress of Pacific Basin Societies, which was meeting in Hawaii in December 1984. The title of the symposium was “Industrial Applications of the Mössbauer Effect”. It was envisioned as a one time only gathering of scientist to address the growing potential of using Mössbauer to address challenges in the industrial community. Researcher from over twenty countries participated, resulting in a book with the same title as the Symposium, containing selected papers from the Symposium [1].

In 1988 the International Symposium on the Industrial Applications of the Mössbauer Effect (ISIAME’88) was organized by Massimo Carbuicchio in Parma, Italy. An International Advisory Board was established along with a logo for ISIAME conferences. The decision was made to have a 5 day ISIAME every 4 years.

International Symposium on the Industrial Applications of the Mössbauer Effect (ISIAME 2012), Dalian, China, 2–7 September 2012.

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In the concluding remarks at ISIAME'96 [2], Carbuicchio outlined the principle aims for ISIAME, which is good to be reminded of these:

- Stimulate the attention of researchers towards the industrial applications of Mössbauer spectroscopy.
- Intensify contacts and collaborations between the industrial and academic worlds.
- Encourage all types of developments in the technology of Mössbauer spectroscopy, rendering the experiments as brief, easy and automated as possible.
- Stimulate industrial laboratories to include Mössbauer spectroscopy equipment in their analytical and diagnostic systems.
- Stimulate research and contributions in important but only partially covered fields.
- Encourage collaboration between scientists with different backgrounds who work in different countries, with attention focused on international research and development programs and exchange programs involving researchers, teachers and students.

2 The ISIAME series

Over the period of eight ISIAMEs (28 years) there has been a consistent program of common topics, which were key to ISIAME'84 and also key to this current ISIAME:

- Catalyst
- Metallurgy
- Glasses/Amorphous substances
- Mineralogy
- Surface Studies
- Investigation of Corrosion

Other topics covered at the current ISIAME, include nanotechnology, electrochemistry, superconductive materials, environmental questions, and energy challenges.

With the exception of ISIAME2000, each of the Symposia has each attracted over a hundred participants from over twenty countries. Combining the eight ISIAMEs, there have been over a thousand participants and over a thousand presentations. Over five hundred papers have been published resulting in over five thousand pages of proceedings publications. This represents a major contribution to the scientific community.

The listing of the eight ISIAMEs is as follows:

- **Industrial Applications of the Mossbauer Effect**, December 16–21, 1984 (Honolulu, Hawaii United States)—J. G. Stevens (G. J. Long)
- **ISIAME'88**, September 12–16, 1988 (Parma, Italy)—M. Carbuicchio and G. Principi
- **ISIAME'92**, August 24–27, 1992 (Otsu, Japan (Ryukoku University))—Y. Nakamura (T. Shinjo and S. Nasu)
- **ISIAME'96**, November 4–8, 1996 (Johannesburg, South Africa)—H. Pollak (U. Karfunkel)

- **ISIAME 2000**, August 13–18, 2000 (Virginia Beach, Virginia United States)—Desmond Cook (Gilbert Hoy)
- **ISIAME 2004**, October 4–8, 2004 (Madrid, Spain)—J. Ramon Gancedo (Mercedes Gracia and Jose Marco).
- **ISIAME 2008**, August 17–22, 2008 (Budapest, Hungary)—E. Kuzmann and K. Lazar
- **ISIAME 2012**, September 2–7, 2012 (Dalian, China)—Tao Zhang (Junhu Wang).

3 Presentations

Early in this Symposium, three sessions were in memoriam to recognize individuals who have had profound impact on the Mössbauer community. These are Rudolf L. Mössbauer, Attila Vertes, and Paetrovich Suzdalev. We miss these friends both intellectually and personally.

The presentations throughout this week were outstanding whether they were an invited talk or poster presentation. The conference organizers made an excellent selection of speakers and equally the presenters who participated in the week long symposium were engaging and challenging to us all.

Two talks help us in understanding the roll and contribution that Mossbauer spectroscopy can and has made to address industrial applications.

The first Keynote Lecture of the Symposium, titled “Industrial Applications of Mössbauer Spectroscopy” was given by Massimo Carbuicchio. He reviewed for us the numerous applications, including heterogeneous catalysts, metallurgy tribology, superconductivity, dilute magnetic semiconductors, multiferroics, engineered multi-layers, nanostructured materials, an almost endless list. Emphasis was the usefulness of Mössbauer spectroscopy in many industrial fields, and how it can be applied during every step of the industrial production process. It was noted of the numerous experimental arrangements that would allow in-situ analysis and the use of scattering geometry. The later has the advantage of no sample preparation, is a non destructive tool, and the possibility to analyze large-sized samples. Valuable information can be obtained, for example, on phase composition, grain size distribution, magnetic properties, interface phenomena, surface modifications and other both static and dynamics situations.

The other presentation of note was given by Jan Marc Greneche, titled “Applications of Magnetic Nanostructures and Relevance of Mössbauer Spectrometry”. Throughout Greneche’s presentation, he provided the bigger picture view. This was well demonstrated with his discussion of the characterization of nanoparticulate materials. He first expounded on the sub-topics of nanocapsules, ultrafine aerosols, quantum dots, nanotubes and nano-particles. He then proceeded to address the origin, chemical composition, the aggregation state, the dispersion, shape, and surface modification. With each of these subtopics he then went into further details on each of these. For example, for Chemical composition, he further discussed metals/metal oxides, polymers, semiconductors, biomolecules and others. When he was through the exercise, the bigger picture comes into view, versus the usual approach of narrowing into a particular detail without considering the whole system.

4 Recommendations

Poster sessions In general, over the years at conferences we have seen marked improvement with poster presentation. This week's poster presentations in general were outstanding. Many of us were asked to evaluate the posters of the students and young scientists for awards to be presented at the end of the conference. It was unfortunate that the students and young scientists were not identified on the poster. It also was unfortunate that during the poster session time, which was limited in time, over half the posters did not have anyone at the poster to a discussion. Also the posters were in a space that was at a distance from the lecture auditorium. The combination of the limited time for reviewing the posters and being in a place not in the vicinity of the activities of the symposium, made the effectiveness of the poster session marginal.

Oral presentations While the technology of the microphone has been with us for decades, their use was a challenge to many of the presenters, session chairs, and the audience when asking questions. Speakers and session chairs should check the microphones out before they use them. The organizers should ahead of time, have made sure the microphone systems are fully functioning and operating properly. The organizers should have had a main bulletin board to post changes that will happen during the symposium in terms of the program—there will always be cancellations and changes, but not being notified of these changes is not in the best interest of a well run meeting.

One of the reasons often given for there to be international Mössbauer conferences is to be certain that standards in the reporting of Mössbauer spectroscopy data are held those agreed upon by our community and established by IUPAC [3]. Based on presentations throughout this week, we are not upholding these standards. For example the symbol for the isomer shift is δ , not IS and the symbol for quadrupole splitting is Δ , not QS. Many plotted spectra were without units. Analyses were undertaken without corrections for the Mössbauer fraction differences due to differing atomic sites and temperature or taking into consideration thickness effects. Identifying the features of the curve-fitting program was almost never provided, as were the lack of error bars in spectra plots. In some cases, where when curve fitting is most important in identifying multiple atomic sites, it would have been helpful to have had a plot of residuals to help determine the ability to distinguish multiple sites. In one case, and there were other similar ones, there were 10 sets of six-line ^{57}Fe spectra being fit to the observed spectrum. In general, much more care must be given in the presentation of Mössbauer spectra.

For the future vitality of ISIAME the following recommendations are provided:

- International Board on the Applications of the Mössbauer Effect (IBAME) should review current Mössbauer Nomenclature and update, and broadly communicate with the assistance of the Mössbauer Effect Data Center, the Mössbauer Nomenclature.
- The Scientific Executive Committee should develop a statement clearly identifying what ISIAME is.
- The Scientific Executive Committee should develop guidelines for determining if a particular proposed ISIAME presentation is that of Industrial Applications.

- Future Conference Organizers should develop and implement plans to engage the industrial community in ISIAME.

5 The organizers

Special appreciation is extended to Chair of ISAIIME 2012, Tao Zhang and Co-Chair Junhu Wang, who under the challenge of organizing ISIAME in a relatively short period of time and at a location not familiar to most of the scientific community. The ISIAME Volunteers did an incredible job of assisting all the conference participants, which added significantly to hospitality we experience in Dalian. The Volunteers were Cai Haile, Guan Hongling, Guan Jingchao, Huang Chuande, Huang Fei, Li Jiahe, Lv Meiheng, Lin Qingquan, Li Shanshan, Mi Yuan, Pei Guangxian, Sun Ruiyan, Tang Hailian, Tai Zhijun, Wang Bing, Wang Jia, Wang Yanjie, Xiao Zihui, Yu Fuhai, Zhang Junying, Zhang Leilei, Zhang Xiaoyan, and Zhang Yan.

The facilities for this conference were outstanding, and the participants appreciate the social programs throughout the week that introduced us to the cultures of the region. The excursions, banquet, and dinners will be long remembered. The Dalian Institute of Chemical Physics, as the new home for the Mössbauer Effect Data Center, has gained through ISIAME 2012 much respect from the Mössbauer community in its leadership position.

References

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