

THE WAVE



The newsletter publication of the International Microwave Power Institute

January/February 2017



IMPI 51 SYMPOSIUM SLATED FOR MIAMI IN JUNE 2017

The 51st Annual Microwave Power Symposium (IMPI 51) will be held June 20-22, 2017 at the Sonesta Hotel Bayfront in Coconut Grove, Miami, Florida, USA. The **abstract submission deadline has just been extended until Wednesday, February 1st** and the Call for Papers contains all the details for submissions. Registration is now open.

IMPI 51 will offer two optional short courses the morning of June 20th (Microwave 101 and Industrial Microwave Applications). The official program will kick off at 1pm on the 20th with an afternoon Spotlight Session focusing on "Solid State Applications." The Welcome Reception will be held that evening on the Grove Terrace of the hotel with picturesque views of the Biscayne Bay.

Wednesday, June 21st and Thursday, June 22nd will feature a combination of Keynote speakers, Invited Speakers and oral and poster presentations on a full range of topics, including: Industrial Applications, Agriculture, Food Safety, Dielectric Properties, RF, Microwave Equipment, Plasmas and much more. Additionally, IMPI 51 will feature an Exhibit Hall, various networking opportunities, a Group Dinner at a local restaurant and a Spouse/Guest program.

The Technical Program Chairmen for IMPI 51 are Dr. Graham Brodie of the University of Melbourne and Dr. Ric Gonzalez of Conagra Brands.

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PRESIDENT'S MESSAGE

When you've been working with microwave ovens for as long as I have (a little over 55 years) you've seen a lot of changes as the industry grew; changes in oven design and features, its adoption by the food industry, increasing knowledge of how microwave ovens heat foods, the peculiarities of microwave ovens, etc. One thing that stands out in my mind is microwave standards. First let me be clear of what I mean by standards: I'm speaking here of the development and use of performance standards, i.e. the amount of energy (watts) that is available within the microwave oven to heat things, i.e. the oven's microwave power output. Now, in the early days of microwave ovens, going back into the 1970s, there was no such thing as universally accepted performance standards. Rather, the microwave power output was measured in many different ways without coordination between manufacturers. *Continued on Page 3*

The Sonesta Hotel Bayfront, Coconut Grove, Miami, Florida, USA



Clockwise from top left: Grove Terrace (site of the Welcome Reception), Meeting Room at Sonesta Coconut Grove; Sleeping Room at Sonesta Coconut Grove; Rooftop pool at Sonesta Coconut Grove.

Cover Photo: Aerial view of Coconut Grove Miami, the Sonesta Hotel is seen on the top left of the photo.

IMPI 51 Symposium *Continued from Page 1*

The Food Science & Technology Committee Chairman is Bob Schiffmann.

Hotel details, registration and program updates can be found at: <http://impi.org/symposium-short-courses/> A limited number of sponsorships and exhibit spaces are available. Contact molly.poisant@impi.org for more details.

PRESIDENT MESSAGE *Continued from Page 1*

So, for example, one manufacturer might use 1000 ml water load at 20° C in a plastic bowl, while another might use a 2000 ml water load again at 20° C in a similar bowl, or it might be a totally different type and shape of bowl and perhaps a different amount of water, and/or a different starting temperature. The results from all these measurements were different; so one manufacturer's 600-watt oven might be 700 watts when measured by another manufacturer's method. It eventually became a marketing game since manufacturers kept trying to find ways of advertising higher and higher wattage output numbers to gain market advantage. Imagine the chaos on the road if each auto manufacturer used a different method to measure and define speed! Well, similar chaos reigned for years in microwave ovens.

Finally, in 1981, the International Electrotechnical Commission (IEC) published the first edition of its 705 standard "Methods for measuring the performance of microwave cooking appliances for household and similar purposes". At last some sanity was provided to the microwave oven market since it defined all the essential requirements to measure the power output in a microwave oven under very specific conditions. This IEC 705 procedure was amended several times thereafter and has now been supplanted by the IEC 60705 procedure. The good thing about this is that if all the manufacturers followed this procedure it would describe the kind of heating performance to be expected from each oven, thereby assisting food processors to provide better heating instructions for consumers.

Unfortunately, there are fundamental problems with these procedures. First, microwave oven output varies from oven to oven even within the same model, and even from the same production run. If one were to take 50 microwave ovens straight off the production line and run the IEC 60705 test on each one, we would find a dispersion of at least +/-15% around the mean. Hence, the oven being sold as a 1000 W oven could be as low as 850 W or as high as 1150 W. (By the way, I've never found an oven that was on the high side of the manufacturer's claimed 1000 W – I've discussed this with a number of colleagues around the world who all agree.

Another major problem is that 1000 grams of water bears little relationship to the amount of water in most foods heated in a microwave oven, particularly prepared foods. Most of these are on the 10 to 12 ounce range and might have a water equivalency of 200 to 400 g, far less than the 1000-gram water load used in the IEC tests. So, even if all the manufacturers in the world used these procedures to define the power output and labeled their ovens accordingly, because of something called "load factor" it wouldn't be sufficiently accurate in describing how much power is available to heat this smaller food load and give helpful heating instructions.

But probably the most serious issue is that there is no mandatory requirement for manufacturers of microwave ovens to use either the IEC 705 or 60705 procedures, it's totally voluntary, and as I and others have seen in our testing, whatever the manufacturer's claimed microwave power is, it usually bears little relationship to what we measure using the standard procedures. So when a manufacturer tells a consumer that this is a 1200 W oven, he or she really has no idea of what that power output is.

All of this leads me to the discussion of the British microwave oven power output procedure that uses both the 1000 g water load, as well as a 350 g water load which more closely resembles the water equivalency of most of the foods that go into the microwave oven. Here, microwave oven manufacturers and food processors agreed to a labeling scheme whereby microwave ovens are rated on a scale from A to E, and this rating is used by the food product manufacturers to provide heating instructions for the consumer, i.e. if you have an A oven heat for x minutes C oven = y minutes, etc.

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PRESIDENT MESSAGE *Continued from Page 3*

My friends in the UK say it works very well. But now it appears to be under threat since the some of the microwave oven manufacturer members of the IEC Committee refuse to adopt this procedure to label ovens accordingly, while food manufacturers prefer it be there. I wish we in the USA had a similar scheme. Those of you who attended IMPI 50 heard about this in an excellent panel discussion presented by Gordon Andrews, Greg Hoper & Nigel McCulloch from the UK and Per Risman from Sweden. Now, chaos looms once again on the horizon. I am hoping that IMPI can provide some useful assistance to our UK colleagues in this matter.

Finally, I learned last month that a dear friend and colleague, Dr. Monika Willert-Porada died on December 11 after a long struggle with cancer. Her obituary appears, courtesy of AMPERE, elsewhere in this Newsletter. She was a brilliant scientist and lovely person who her colleagues and I shall miss.

Best wishes to all for 2017!

Bob

IMPI End of the Year Survey Results

Thank you to all of you who took the time to take part in IMPI's end of the year survey. We received an excellent response. Congratulations to Mohammad Kamarehi of MKS who won the \$50 Amazon gift card drawing! Here are the major findings:

- IMPI Members perceived value in their membership (weighted average was 4.15 out of 5 stars)
- The most important benefits to respondents were: Networking Opportunities, Annual Symposium, the Wave Newsletter, IMPI as an Information Resource and the Webinar Series
- Over 95% of respondents feel their programming needs are being met by the Annual Symposium, Fall Short Course and Webinar Series
- Topics most important to respondents included: RF Applications, Open Source/Non Proprietary Software for Modeling, Microwave-based Plasma Applications, Appliance Market, Food Safety, Product Development, Solid State Applications and Nutrition.
- 87% of respondents felt IMPI was responsive to their needs.

Your feedback is essential to the future success of the Institute. If you have not yet replied to our survey and would like to, please click here: <https://www.surveymonkey.com/r/5FTX9SJ>

Obituary

Prof. Monika Willert-Porada

1955 - 2016



Monika A. Willert-Porada, professor of material science and processing at the University of Bayreuth, Germany, died on Sunday, Dec. 11, of cancer at the age of 61.

With great sadness we take leave of a highly esteemed person who has worked with unflinching dedication during her academic career to pushing forward the materials processing and microwave society.

Monika Willert-Porada was born on Aug. 28, 1955, in Gliwice, Poland. She obtained a diploma in chemistry from the Ruhr University of Bochum in 1980. In 1983 she earned a Ph.D. in chemistry from the same university. After a post-doctoral fellowship at the University of Iowa in the group of Prof. Donald J. Burton, she returned to Germany in 1989. At the University of Dortmund, she set up a research group at the Chair of Materials Science at the Faculty of Chemical Engineering. She habilitated in 1995 on the use of microwaves on processing of ceramic materials, and qualified as a University lecturer. In 1997, she founded the research institute for Engineering, Microwave & Plasma Technology, InVerTec e.V., at the University Bayreuth. Since 1997, she was the Chairwoman of the executive board of InVerTec. In 1998, she joined the University of Bayreuth as a professor for materials processing. During 2000-2001, she was the Founding Dean of the faculty of Applied Sciences at the University Bayreuth. Since 2012, she was co-chair of the Glass-Technology Center in Spiegelau, and board member of the Deggendorf Institute of Technology (both in Germany).

Monika Willert-Porada was awarded the Bennigsen-Foerder-Award for young scientists in 1990, the KESS-Award in 1997, and the European Energy Industry Innovation Award with Kennametal-WIDIA in 2000.

Prof. Willert-Porada's research dealt with the development of new processes, by implementation of new sources of energy, like lasers, microwave radiation, and different types of plasma, into processing of materials with the aim at selective heating, low temperature processing and synthesis of materials for energy conversion. Her teaching focused on environmental aspects of raw materials synthesis as well as on high quality materials for batteries, fuel cells and PV systems.

The development of sustainable and energy efficient technologies was another major motivation for her scientific work which explains her broad interest in multi-disciplinary research initiatives. She initiated and coordinated several national and European research associations like FORGLAS (multi-functional materials of glass for energy efficient building technologies), ForOxiE² (new catalytic active and stable materials for electrochemical energy systems) with the Bavarian Research Foundation, and the EU projects HarWin and InDeWaG on energy-efficient technology for building application.

Prof. Willert-Porada's studies contributed to substantial progress in the use of microwave radiation in material processing and chemical processing. She wrote more than 200 journal and conference papers, and supervised 38 doctoral students

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Willert-Porada Continued

Monika Willert-Porada was member of the board of Ampere from 2001 to 2005. Her colleagues at Bayreuth University mention “her joy on intellectual exchange and her generous hospitality, which has always been the intention for inviting scientists from all over the world to Bayreuth”. One example was the Int’l Ampere Conference that Monika Willert-Porada organized and hosted in Bayreuth in 2001.

Colleagues at Karlsruhe Institute of Technology (KIT) recall how “Already in 1993, Prof. Monika Willert-Porada and her team provided important guidelines to Prof. Dr. rer. nat. Dr. h.c. Manfred Thumm and his team for the start of the research activities on microwave materials processing at the former Nuclear Research Center Karlsruhe (now Karlsruhe Institute of Technology, KIT). This was underlined by the first personal contact during the first European Workshop on “Microwave Processing of Materials” organized by Prof. Dieter Vollath at Karlsruhe in 1994, for which Prof. Monika Willert-Porada was providing a very inspiring keynote lecture.

As an important impetus for many microwave processing activities in Germany and worldwide, she was always interested in related activities ongoing at the other teams and she was always outstandingly supportive in the information sharing and discussion on latest research results among these teams. Highlights have been the two excellent German Microwave Workshops she organized in Dortmund, Germany in 1995 and 1998.

In 2009 and 2010, as member of the appointment committee and in charge of finding a successor for Prof. Manfred Thumm as the director of the Institute for Pulsed Power and Microwave Technology (IHM) at KIT, her strong support for the continuation of the microwave materials processing activities within the KIT was essential for the continuation of those activities until today. Since 2013 she was an advisory board member of the Helmholtz Programme “Energy Efficiency, Materials and Resources”. She strongly supported the strategic development within the programmatic research activities of the Helmholtz Association.

The fact that Prof. Monika Willert-Porada passed away, is an extremely painful loss for the University of Bayreuth and KIT, in particular, but, also for the microwave materials processing community worldwide. We lost an open minded, highly interdisciplinary and innovative expert and a very kind person at the same time. With all her resolute efforts, we all owe an immense debt of gratitude to Prof. Monika Willert-Porada. We mourn with her relatives and will always keep her in honourable memory.”

Prof. Cristina Leonelli, the President of AMPERE, also wrote in memory of Prof. Willert-Porada that “Monika had a natural sympathetic attitude that turned her colleagues into affectionate friends. She was an excellent scientist with courageous attitude towards opening new fields of research and with a sincere critical thought on her own results. As teacher, she has always had a respectful and encouraging approach to young researchers. I remember her asking questions to students presenting oral contribution at AMPERE conferences, while asking questions she always directed them towards deeper understanding and awareness of their own work. A colleague, a friend, an advisor and an active member of our small community, this is the Monika I want to remember.”

Mr. Bob Schiffmann, the President of IMPI, adds his personal slant: “The Monika I knew was both a serious and very capable scientist, and a fun-loving person. I have two strong memories to share - the first when my wife and I attended her wonderful 50th birthday party at her house and with her family and friends. My second memory is from the 2001 AMPERE meeting in Bayreuth. Monika decided to entertain the delegates at the banquet with a Renaissance dance and she got Jon and Jane Binner and me to agree to perform. The three of us went into town to pick out our costumes, but Monika was too busy to come along. I put together a dance and the three of us rehearsed, but no Monika... She arrived at the banquet location with her costume minutes before we were to perform, but with no rehearsal - I did my best to quickly teach her the dance and then we did it twice for the audience, each time I whispered the steps to her. It was a great success and afterward I complemented her to which she replied - “You know, I wanted to be an actress...” I will miss Monika forever!”

Monika Willert-Porada is survived by her husband, Gottfried Porada, her son Philipp Porada, and her two grandchildren.

On behalf of the AMPERE and IMPI Associations:

Dr. Guido Link and Prof. John Jelonnek, Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany

Dr. Andreas Rosin, Bayreuth University, Bayreuth, Germany

News from Around the Web

Top 5 Futuristic Technologies Poised to Disrupt Care ([Microwave Radar Breast Imaging](#))

[Global Built-In Microwave Oven](#) Consumption Market Report

[Global Microwave Trays](#) Market Driven by Increasing Customer Preference Towards the Ready to Eat Foods

[Microwave Oven Market](#) in the US 2016-2020

Global [Microwave Food](#) Industry

Smart Oven Market – [Manufacturers have Introduced Ovens with Probes](#)

Ask the Members

Longtime IMPI Member Dr. Ron Hutcheon, whose company Microwave Properties North has been doing contract dielectric properties measurements for many years sent us this message asking for your assistance:

“My interests (and my abiding passion, except for my wife and my horse) are to understand the ‘why’ of some of the dielectric properties that I measure That is, trying to understand what is going on in the material, and how can I develop a simple model to reproduce (ie., calculate) what I measure with simple approximate models. I have a few specific systems that I am working on, all to do with high temperatures (where our measurement technique allows us to measure what almost all others cannot!).

Right now I have three areas I'm thrashing with:

- 1) The reponse of high temperature (> 500C) single crystal quartz
- 2) The strange behavior of dielectric properties above 400C during the pyrolysis of coals and most biomass materials (400C to 800C)
- 3) The understanding and modeling of the dielectric response of the dissociation reaction (usually of the release of water from the crystal structure) of goethite and bauxite crystals above 200C

I would dearly love to get some theoreticians interested in these problems, as I am not really a competent theoretician, and most of my models are simple-minded and heuristic. But trying to get anyone interested (or maybe just getting the data and the questions in front of the correct people) is difficult! Could IMPI present a forum for ‘posting’ these problems and maybe stirring up interest?

I'm usually available for a phone chat after 3:00 pm, afternoons.

Regards,

Ron Hutcheon

Ph. 613 584 1029 e-mail: hutcheon@magma.ca

CALENDAR OF EVENTS

Call for Papers Abstract Deadline: Extended until February 1, 2017 for The 51st Annual Microwave Power Symposium (IMPI 51), June 20-22, 2017 at the Sonesta Hotel Coconut Grove, Miami, Florida, USA. Additional details can be found at <http://www.impi.org/>

Webinar: “Danger! Do Not Microwave This Product! Non-Food Products Can and Do Injure People!”

Presenter: Bob Schiffmann for the TASA Group on April 11, 2017 @ 2 PM (ET) : Information on how anyone can attend free will be provided soon.

IMPI Spring Webinar Series: February, March, April 2017 (exact dates TBD). <http://www.impi.org/>

AMPERE, September 18-21, Delft, The Netherlands. More details at <http://www.ampere2017.nl/>

Do you have an upcoming event you would like added to our Calendar of Events? Please email to molly.poisant@impi.org



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THE INTERNATIONAL MICROWAVE POWER INSTITUTE

PO BOX 1140, MECHANICSVILLE, VA 23111, USA

+1 804 559 6667 / INFO@IMPI.ORG / WWW.IMPI.ORG