



AMPERE NEWSLETTER

A newsletter devoted to RF & MW heating in the range 1 MHz to 20 GHz Issue 31 ISSN 1361-8598 December 2001

Editor's Comment

This issue is devoted solely to our impressions of the 8th International AMPERE Conference on Microwave and High Frequency Heating held at Bayreuth under the auspices of Professor Monika Willert-Porada and her very able team.

Dr David Sánchez-Hernández traces the events as they occurred and focuses on important issues and fond recollections. One aspect which must not be overlooked is the necessity of a number of "volunteers" which one must employ to make a success of such a major event and to that effect let me thank all those concerned who helped Professor Willert-Porada not least Bettina Kuppinger, Thorsten Gerdes and Jens Grosse-Berg.

Some tentative moves were initially made with a view to stage the next conference in Dijon but this turned out to be extremely difficult as France is currently undergoing major changes in the electroheat and electricity Utilisation area, not helped by the pending privatisation issues regarding the French utility EdF. At the recent Committee meeting at St John's College Cambridge, Professor, Jon Binner assumed the responsibility of organising the 9th in the series of AMPERE Conferences at Loughborough University and we, the Committee, wish him every success.

The AMPERE web-site is now well under way and I would like to thank Professors Elias de los Reyes and José Catalá-Civera and their team for their unfailing support in keeping the site up-to-date with all the new information that our members wish to introduce.


Please ensure that you visit the site at www.ampereurope.org and use the forum to participate in active discussions about anything you wish to bring to the attention of AMPERE members and items you wish to see included.

*Ricky Metaxas
EUG, Cambridge University*

A Reflection of the 8th AMPERE International Conference at Bayreuth: Résumé and future prospects

*by Dr David Sánchez-Hernández,
University of Cartagena, Spain*

In keeping with the tradition following each AMPERE conference, a *rappporteur* gives impressions of the biennial meeting. Just a few months have passed since we left Bayreuth 2001, hosted by Prof. Monika Willert-Porada and her team at the University of Bayreuth, in Germany. The Bayreuth team, ably supported by InVerTech, gained the backing of local and regional authorities and as a result the conference was run very professionally. Happiness must be earned, as they say, so many helpers were involved and a lot of work had to be done in order to make sure that the meeting, the companions' programme and the social events

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Dr David Sánchez-Hernández



*Local organising Committee with Prof. Monika Willert-Porada
at the entrance to the conference*

went off smoothly. The reward for all the work was the praise and surely heartfelt appreciation that the local organising team gained from participants of the conference sessions and the surrounding events. This appreciation is for all those involved in planning and organising Bayreuth 2001, and I am sure all AMPERE members and other attendees will wish to join me to extend our gratitude to the local organising committee. Thus, my proposal for a ranking, should there have to be one, would be 'deuce' with Valencia 1999.



Conference Secretariat: Bettina Kuppinger and Philip Bahke

For those who arrived during the weekend prior to the conference, it was a great opportunity to visit the marvellous treasury of Aachen Cathedral, one of the largest preserved Cathedrals north of the Alps and inseparably connected with the church of Charlemagne, today's Cathedral, and where the statue of Charlemagne, the Proserpina sarcophagus, the cross of Lothair the arm reliquary or the Ivory diptychon could be delightfully observed, among others. Other possibilities were the excellent city-centre shopping district of Nürnberg with its astonishing remains of the Nazi party rally grounds in the neighbourhood, and for those enthusiastic with history, the fantastic Bamberg castle.

During the conference, an excellent companions' programme was on offer, and with more than 20 museums, the Eremitage Palace, the Royal Court and many other attractions, Bayreuth had a lot to offer on top of official events.

Your news and views are always welcome

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The Conference and Exhibition

From Monday 3rd to Friday 7th September 2001, the 8th International Conference on Microwave and High Frequency Heating gathered us all at the cosy and well-organised city of Bayreuth, in Bavarian Germany. With its excellent bus service and extremely well kept streets, the people of Bayreuth received the congressmen and women with a warming welcome. A close look at its impressive straight main boulevard, small streets and bookshops soon demonstrated a clear enthusiastic character about music and philosophy for the citizens of Bayreuth.

The conference started, as it is becoming a classic for AMPERE Conferences, with a short course on fundamentals and applications of microwave- and RF-combined heating. About 20 student-delegates and interested researchers attended the course, which was smoothly directed by Dr. A.C. Metaxas, our AMPERE President, and Prof. Willert-Porada. The course attracts new students and researchers from other disciplines into microwave and high-frequency heating, which is of the utmost importance for the future AMPERE community. This year the course made an attempt to fill gaps of knowledge between theoretical aspects and practice by means of two hands-on training sessions at the University of Bayreuth research laboratories.

The programme of the 8th Ampere Conference was held in the quarters of *Universität Bayreuth*, Germany, and was divided into 30 lecture sessions, 9 poster sessions, 2 plenary lectures and an open discussion forum, each with several contributions focusing on the following 15 topics:

- Hardware
- Modelling
- Dielectric measurements
- Biomaterials
- Sintering
- Industrial applications
- Process development
- Microwave processing of ceramics composites
- Chemical engineering
- Synthesis and processing of powders
- New processes
- Environmental
- Organic chemistry
- Inorganic chemistry
- Heat-, mass- and charge-transfer.

There were three parallel oral sessions, which is a departure from previous AMPERE conferences where two have been the norm. In the nine poster sessions 47 contributions were presented by participating authors. As a novelty to other conferences, at Bayreuth 2001 poster papers were provided with a 2-4 minute oral presentation scheduled directly before the poster session. This had a good reception and I am sure will remain so for future events.



Delegates relaxing at the evening reception around the exhibition stands



As in previous AMPERE conferences, the oral sessions were dominated by European contributors, but with an increasing representation from USA and Australia. On Tuesday and Wednesday evenings eagerly welcomed Bavarian receptions took place, with the "amber liquid" and Bavarian sausages amongst other paunch-beguiling food playing an important role. These were most appreciated.



Conference attendees at the entrance to the Markgravia Opera House

Interesting new insights were often hidden in poster presentations receiving less attention because of the abundance of material and its clash with some social events. But there were also a minority of contributions clearly distinguished by form and/or their scanty contents from the otherwise high scientific standard of the meeting. Because of the great number of contributions, in the following I will concentrate on what might be seen as the highlights of the meeting from a scientific point of view, obviously apologising for the large amount of excellent papers not mentioned here due to the lack of space.



Conference attendees within the magnificent Bayreuth Markgravia Opera House

The opening ceremony took place on Tuesday 4th at the impressive Markgravia Opera House of Bayreuth (Markgräfliches Opernhaus). Of course, it is Richard Wagner who comes to anyone's mind when thinking about Bayreuth, and although there is, as I was informed at a Spanish consulate, a four-year queue for the Wagner operas, we managed to use it for the occasion and were delighted to easily recognisable tunes by Vivaldi and other composers by the Collegium Marianum, a splendid youthful ensemble from Prague.

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Collegium Marianum at the Markgravia Opera House

▶ In the session dedicated to general themes, three papers referred to the same topic complex, that of future prosperity of ISM applications and the possible spectrum allocation take-over by other disciplines. There was a vivacious discussion about the future and even more so about the potential threat of mobile and wireless LANs sectors intention to erase ISM from the current scenario, generally with the USA attendants less pessimistic than EU participants.

After Tuesday's lunch, Mr. Plaza (Spain) presented an interesting computer-controlled real-time auto-tuning 4-port matching system for which some of the attendees would have wished some more tuning speed. Prof. Lefeuvre (France) then told us that for some particular applications there is no need to fully assess ϵ^* , and that with absorbed power (P_{abs}) and power inside the sample (P_s) it is possible to get a grasp of microwave power penetration so that Z_{surface} can be evaluated and the applicator can be designed. Following Prof. Lefeuvre (France), Dr. Balbastre (Spain) presented an interesting novel quasi-planar applicator for high-loss materials. In a parallel session, Prof. Tran (Australia) presented a very interesting sandalwood characterisation and oil extraction application for microwave energy.

The Plenary Lecture was delivered by Prof. Reader (South Africa), who expressed his concerns about spectrum regulations and presented a detailed review of concerns and state-of-the-art hybridisation techniques of microwave energy, which are so important to achieve the success for a specific application. This was clearly outlined previously by Dr. Schertlen (Germany) with his applicator for nanoscale Zeolite processing, and a selection of multimode applicators and designs, electromagnetic modelling techniques, coupling of electromagnetic and thermal equations, among other topics. Dr. Yakovlev (USA) presented an examination of contemporary electromagnetic software capable of modelling problems of microwave heating, and there was good news, the number of packages is increasing, and the researchers have now more options to select from. Software vendors are paying attention to microwave heating, although some drawbacks were also outlined. He promised a microwave-heating benchmarking paper soon, similar to a recent 3-D electromagnetic software packages benchmark published by Microwave Journal regarding antennas. I am sure many of us are looking forward to glancing through it.

On Wednesday 5th, Mr. Schiffmann (USA) presented a good review of food applications and a glimpse at the food microwave market of the USA. More matured finite elements simulations of dielectric heating systems were introduced by Dr. Metaxas (UK), while a good improvement on heating uniformity for ready meals was illustrated by Dr. Ohlsson (Sweden). In addition an impressive method for increasing the permeability of Radiata pine wood with a newly created product (Torgvin) with reduced density and improved acoustic properties was described by Prof. Torgovnikov (Australia). The three after-lunch sessions were dedicated to interesting papers on microwave processing of ceramics and process development, with a high quality presentation of glaze sintering by Dr. Leonelli (Italy), a description of multilayer dielectric devices processing with microwaves by Dr. Binner (UK) and a laser- and microwave-assisted sintering of ceramics by Prof. Willert-Porada (Germany), among others.

An abstract thesis from Prof. Miyake (Japan) of using high-power mm-wave radiators for ceramic fabrication was perfectly demonstrated with examples of low-temperature (400°C in this case) sintering of bulk ceramics with increased relative density and lower weight loss of nitrogen pressure ($P_{\text{N}_2}/M_{\text{Pa}}$) compared to conventional processes. Similarly, a noteworthy contribution by Dr. Sousa (Brazil) dealt with a sensorial evaluation of microwave-dried bananas, which demonstrated a high acceptance, although some aspects of his methodology were questioned.

Among other novel applications presented at the conference, one can cite the drilling into hard non-conductive materials by using localised microwave radiation, clearly described by Dr. Jerby (Israel) and accelerating curing of cement-based materials, put forward by Dr. Levita (Italy).

Both in Fermo 1997 and Valencia 1999 there were some papers related to plasma applications. Likewise here at Bayreuth Thursday's 6th plenary lecture dealt with plasma impulse-CVD, delivered by Prof. Küpper (Germany), and the morning sessions were dedicated to heat, mass and charge transfer and chemical engineering. It is important to mention here that, unlike in Valencia, Bayreuth has an impressive number of contributions regarding ceramics and plasma applications.

Interesting papers were contributed by Dr. Omori (Japan), Dr. Jansen (The Netherlands),

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Prof. Breccia (Italy), Dr. Booske (USA), Prof. Semenov (Russia), Dr. Bradshaw (South Africa), Dr. Schubert (Germany), Dr. Brito (Japan) and Prof. Hájek (Czech Republic) focussing on specific areas.

Just before the excellent Gala Dinner at the Eremitage Palace, an open discussion about the present stage and future prospects of high temperature microwave processing took place in Lecture Hall H32, moderated well by Dr. Gerling (USA) and Dr. Clark (USA), although few European colleagues took part. At the dinner we were entertained by the Bayreuth dancers giving us an expert illustration of Baroque dancing, truly with feeling as evidenced by the photos shown below.



The Bayreuth dancers: Monika Willert-Porada, Bob Schiffman, Jon and Jane Binner



Why does Jon look so worried?

Sadly the conference ended on Friday 7th with Dr. Chudoba (Poland) giving the last paper followed by the Closing Ceremony. Dr. Metaxas, the AMPERE President, made some general remarks and cited Dijon as a possible future venue, however, the next AMPERE conference will be held at the University of Loughborough. Although no award was made at Bayreuth for best paper, perhaps in future conferences this interesting Valencia initiative will be reinstated. Similarly, the Exhibition was remarkable, with highly reputed

companies like Richardson Electronics GmbH, Sairem, Püschner Microwave Power Systems GmbH, Soliton GmbH, Fricke&Mallah, Microwave Technology GmbH, Coaxial Power Systems Ltd., Fiso Technologies, MLS GmbH Mikrowellen Laborsysteme, Nortech Fibronic and PlazmatroniKa presenting new products and discounts at the conference.

AMPERE COMMITTEE

The AMPERE Committee met early every morning where we were briefed by Professor Monika Willert-Porada of any outstanding issues and changes.



Committee members at work during early breakfast meetings

The General Meeting of the Association took place in Bayreuth 2001 during which three new members were elected to the Committee. Prof. Cristina Leonelli (Italy), Prof. Monika Willert-Porada (Germany) and Mr. John Bows (UK) were duly elected. After the election, Monika invited the new Committee and friends to her house where, after a hurried Committee meeting, we relaxed in the company of an excellent buffet accompanied by quality local wines. A jovial group photo was taken outside Monika's house at this event.

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The enlarged AMPERE Committee members after the Bayreuth election

The information contained in this newsletter is shown for the benefit of AMPERE members. All contributions are believed to be correct and AMPERE accepts no responsibility for any damage or liability that may result from information contained in this publication. Readers are therefore advised to consult experts before acting on any information contained in this newsletter.

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CONCLUSIONS

The biennial AMPERE meeting has again demonstrated its deserved reputation. Colleagues old and new met for interesting discussions and to focus on facts that seem to be important for an assessment on specific issues. Therefore, these meetings are necessary and very important for progress to be made in this area. In this respect the event in Bayreuth must be judged as a huge success. Future annual meetings will be compared to it. The number of participants is increasing, although a final steady number seems to be approaching. Unlike other world-wide events in similar areas, which have a decreasing number of participants, the AMPERE Conference has consolidated as the most important event in Europe for microwave and high-frequency heating-related topics. It is not easy to keep this momentum and the new AMPERE Committee has many important issues to discuss in their future meetings. With publications like IEE Proceedings on Microwaves, Antennas and Propagation opening up for microwave and high-frequency heating related papers, and with IEEE introducing microwave heating into their conferences, an AMPERE on-line journal must be a priority for our scientific community. Likewise, the establishment of AMPERE as a truly pan-European non-profit organisation is under way.

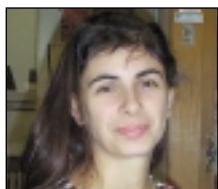
Until the next conference let us make use of all the successful presentations, fruitful discussions and take with us the many novel ideas emanated from the AMPERE 8th International Conference held at Bayreuth.

NEWS AND EVENTS

At the AMPERE General Meeting at Bayreuth, three new members were elected to join the Committee. These were:



Mr John Bows
Unilever Research
Colworth, UK



Prof. Cristina Leonelli
Universita' degli Studi Modena
e Reggio Emilia Modena, Italy



Prof. Monika Willert-Porada
University of Bayreuth
Germany

Warmest congratulations on being elected to serve the Committee. I have already had the privilege to work with them at the first Committee Meeting after their election held at St John's College, Cambridge, on 22-24 November 2001.

The AMPERE President

4th Workshop "Computer Modeling & Microwave Power Industry", January 7, 2002, Seattle, WA, USA

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Fourth International Conference on Computation in Electromagnetics, Bournemouth, UK, 8-11 April 2002

Further details from CEM, 2002, IEE, Event Services,
Savoy Place WC2R OBL

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<http://www.iee.org.uk/Conf/CEM2002/>

37th Annual IMPI Symposium, Sheraton Atlantic City Convention Center Hotel, Atlantic City, New Jersey July 17-20, 2002

For more details contact:

IMPI, 10210 Leatherleaf Court, Manassas Virginia USA
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or visit www.impi.org

EMC EUROPE 2002 - 5th International Symposium on Electromagnetic Compatibility September 9-13, 2002, Sorrento, Italy

The 5th International Symposium on Electromagnetic Compatibility (EMC) will be held in Sorrento, near the Amalfi coast and Mount Vesuvius is not far either. Nearest airport is Naples. Four similar EMC Symposia were previously held.

Authors are invited to submit original and unpublished papers. Prospective authors should submit a 100-word abstract and an anonymous four-page summary that clearly explains the contribution, originality and relevance to the EMC area. Abstract and summary - formatted Word or PDF - have to be sent by December 1, 2001 to: emceurope2002@aei.it.

Further details from

<http://www.aei.it/emceurope2002/index.htm>

3rd World Congress, Sept 22-26, 2002, Sydney Australia

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9th AMPERE International Conference on Microwave & HF Heating, Sept 2003, University of Loughborough

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