



# ***AMPERE Newsletter***

## **Trends in RF and Microwave Heating**

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## IMPI's 56<sup>th</sup> Annual Microwave Power Symposium

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On June 14<sup>th</sup> to 16<sup>th</sup> IMPI hosted the 56th Annual Microwave Power Symposium (IMPI 56) at the DeSoto Hotel in the lovely city Savannah, Georgia, USA. After the 2021 IMPI Symposium was held virtually for the first time due to pandemic-related travel restrictions and limitations on in-person meetings in 2020, the international microwave community was happy to meet in person again this year. The IMPI 56 Symposium gathered 115 participants (107 in person and 8 virtual), representing 18 countries. A record number of 16 companies joined the symposium and presented their products in the industrial exhibition area (see Fig. 1). Four out of them sponsored the symposium: Muegge Gerling and Microwave Techniques were Platinum and Silver Sponsors, respectively, Odyssey sponsored the Group Dinner and Leanfa the VIP Reception.



**Figure 1:** Hall for industrial exhibition and poster sessions

After an optional workshop on computer modelling on the first day, the Solid-State RF Energy Section met for a common lunch followed by an exhibitor showcase, where each exhibitor was asked to provide a short presentation/demonstration.

48 papers have been submitted and presented in 2 parallel sessions on a diverse range of topics including: Microwave Plasma, Computer Modeling, Microwave Processing of Material, Dielectric Properties & Materials, Solid State Technologies, Microwave Chemistry, Industrial Microwaves, Microwave in Food Engineering and Biological Applications. Two keynote speakers and 8 other experts presented invited talks and provide a little deeper insight/overview into their interesting research fields. (Fig. 2)



**Figure 2:** Main Ballroom at Desoto Hotel

The potential use of solid-state microwave generators in industrial applications is a topic of growing interest and was discussed in numerous contributions. This also motivated a panel discussion on solid-state rf energy on the second day evening, where ideas and opinions about the future of solid-state technology were shared with the audience. The panel discussion was then followed by the IMPI Business Meeting where the Bob Schiffmann Leadership Award and Scholarship was given to John F. Gerling, the new IMPI president and successor of Bob Schiffmann. Bob Schiffmann, a founding member of AMPERE, passed away last

year<sup>1</sup> after having been president for over 22 years. Bob Schiffmann’s wife Marilyn and several members of his family were also present and received a commemorative plaque from IMPI.



**Figure 3:** John F. Gerling presenting a commemorative plaque to Bob Schiffmann’s wife Marilyn

Later we all enjoyed a short walk through the lovely green downtown of Savannah to the Cha Bella Restaurant where we celebrated the Group Dinner.



**Figure 3:** Group Dinner at Cha Bella Restaurant

At the closing ceremony four students were awarded for Best Poster (Sean Brown, West Virginia University), Best Oral Presentation (Morgan Chen, Carnegie Mellon University) and Honorable Mention (Megan Robinson, University of Colorado Boulder & Alazar Araia, West Virginia University). These awards included a certificate, a one-year IMPI student membership and some cash.

Furthermore, several forthcoming events have been introduced. The Microwave Group at Cardiff University will host the next AMPERE conference in UK, in September 2023. Daniel Slocombe of that group promoted the event with beautiful pictures of Cardiff and surrounding areas and kindly invited the audience to contribute and join the venue. IMPI’s 57th Annual Microwave Power Symposium was announced to take place in Denver, Colorado on June 27-29, 2023. The call for papers is already open<sup>2</sup>

**About the authors**



**Guido Link** received the Dipl.-Phys. and Dr. rer. nat. degree in physics from the Technical University Karlsruhe, Germany in 1990 and 1993, respectively. His diploma thesis and graduate research was devoted to the frequency and temperature dependent dielectric characterization of low loss ceramics and ionic crystals.

Since 1993, he has been working at the Karlsruhe Institute of Technology, Germany (formerly Forschungszentrum Karlsruhe) in the field of high-power microwave and millimeter-wave processing of materials, plasma chemistry, system and process design and dielectric characterization as a team leader at the Institute for Pulsed Power and Microwave Technology.



**Molly Poisant** has served as the Executive Director of the Int’l Microwave Power Institute (IMPI) since 2010. She has over 20 years of experience in event operations, business development, legislative affairs and sponsorship sales having worked for two former Governors and several U.S. and international technology conferences.

She received her Bachelor’s degree in Political Science from Longwood University.

<sup>1</sup> [https://impi.org/wp-content/uploads/2021/09/President-Bob-Schiffmann\\_Final.pdf](https://impi.org/wp-content/uploads/2021/09/President-Bob-Schiffmann_Final.pdf)

<sup>2</sup> [https://impi.org/wp-content/uploads/2022/09/2023\\_Call\\_for\\_Papers\\_IMPI57\\_Final.pdf](https://impi.org/wp-content/uploads/2022/09/2023_Call_for_Papers_IMPI57_Final.pdf)

## **CHENGDU stages 4GCMEA amidst worldwide audience**

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The 4GCMEA was due to be held in 2020 to follow the pattern of the previous Global conferences, however, due to the pandemic it was put back a couple of years and finally took place in Chengdu, China, on 17-20 August 2022. For international attendees the conference had to be held on ZOOM platform given the fear of persistent reports that Covid 19 was still prevalent in that region in China. Commendably, given that attendees would be from all over the world the organisers, headed by Prof. Kama Huang and very ably assisted by Dr Li Wu, managed to produce a first class event.

The conference started on Thursday 18 August at 18 hours CST (China Standard Time) or at 10 hours UTC (Universal Time Coordinated) set by the average of a number of atomic clocks, essentially the same as GMT (Greenwich Mean Time). Short introductions were presented by Liangyin Chu, Vice President of Sichuan University, China, followed by Kama Huang, Conference Chair, Sichuan University, China. The presidents of AMPERE, George Dimitrakis, JEMEA Satoshi Horikoshi and IMPI, John F. Gerling, then followed welcoming attendees to this global event.

Because of the time difference it was deemed to offer 4 short courses earlier that day and these included Multiphysics Modelling by Vadim Yacovlev, Heterogeneous Catalysis by Xinwey Bai, Writing a Good Paper by Raymond Boxman and Permittivity Measurements by Jose Catala-Civera.

There were 11 plenary and 12 invited talks, for example plenaries were presented by Satoshi Horikoshi on Microwaves on Biological and Food Fields using Solid State Generators, by Biao Jiang on Microwave Chemistry in Carbon Neutral Era, by Raymond Boxman on RF/Microwave Plasmas and Paolo Veronesi on Applicators for Metallurgical Applications. A special feature of this ZOOM-held

conference was the matching of the requirement of satisfying the bulk of the attendees which came from within China (over 300 strong) and the interests of the minority of colleagues from overseas. That was satisfied by holding various sessions in Chinese during the day in China and continuing with lectures in English during daytime in Europe and of course the equivalent times in Japan, the USA and Australia. Some overseas colleagues expressed the wish to have attended some of the lectures that were given to Chinese participants as they seem very interesting but without simultaneous translation that was not possible. However, overall the division of the lectures for foreign and local participants was very well received. What was also very impressive was that on the rare occasion that a difficulty arose, either by an overseas lecturer not being able to get through or problems with the sound recording, the local organisers were very quick to identify the cause and rectify the technicality within a very short time indeed.

AMPERE's Past-President Cristina Leonelli chaired Technical Session 5 entitled "Materials Synthesis & Processing". She was impressed by the quality of the scientific contribution of the 5 speakers, one of which was an invited lecturer, Hideoki Fukushima from Nagoya University, Japan. The materials processed, were GaN, graphene, metal bonded diamond and metallic powders indicating that the evolution of microwave materials processing is directed toward those advanced materials with high added value.

On the whole Chinese and Japanese researchers showed high degree of expertise in the materials processing technologies as well as in the understanding of the physical and chemical processes underling these applications.

A committee made up of members of the four major associations, chaired by IMPI President,

John Gerling, held various meetings on ZOOM prior to the start of the 4GCMEA to determine the recipient of the “Ricky Metaxas Pioneer Award” which was first offered by the organisers of the 1CGMEA held in Japan in 2008 and has been offered in every subsequent GCMEA. The recipient of this award was Professor Kama Huang, the Conference Chair of 4GCMEA (Fig. 1).



**Figure 1:** Image of the Ricky Metaxas Pioneer Award presented to Professor Kama Huang

Following a meeting by the Presidents of the four major associations on the penultimate day of this event it was announced that the 5GCMEA in the series will be held in Japan in 2024.

### About the authors



**Andrew C (Ricky) Metaxas** was born in 1942 in Cairo and completed his school studies in 1960 in Alexandria, Egypt. He graduated with a BSc in Electrical Engineering in 1965 and a PhD in Plasma Physics in 1968 from the University of London and following a 3- year postdoctoral study on fusion

research at Swansea University in Wales he joined the Electricity Council Research Centre (now C-Tech Innovation) specialising on the use of RF and microwave for processing various materials and troubleshooting in the industrial sector. In 1982 he joined the Engineering Department at the University of Cambridge where he founded the Electricity Utilisation Group. He co-authored Industrial Microwave Heating (1983) and authored Foundations of Electroheat: A Unified Approach, (1996) spanning topics from ohmic heating to laser welding. He was the prime mover behind the eventual formation of AMPERE, its President from 1995 to 2005 and from 2002 Director of AC Metaxas and Associates. He has in his name two awards: the Ricky Metaxas Pioneer Award which was established at the inaugural Global Congress on Microwave Energy Applications (1CGMEA) held in Japan in 2008 and the Ricky Metaxas Young Researcher Award which was formally established at AMPERE2019 in Valencia, Spain. He was the recipient of the Lifetime Achievement Award bestowed on him at the 2GCMEA in 2012 held under the auspices of the Materials Research Society in Long Beach, USA. He is a Fellow of IET and IMPI, corresponding member of Bologna’s Academy of Sciences, member of the Scientific Committee of AMPERE and Life Fellow at John’s College, University of Cambridge, UK



**Cristina Leonelli** is Full Professor in Principles of Chemistry for Applied Technologies at the University of Modena and Reggio Emilia. Her field of interest is in solid state chemistry with particular interest in the reactivity of ceramic powders and transition from amorphous to crystalline state. She has a personal experience in designing new composition, preparation and characterization of different inorganic powders and bulk ceramic materials as well as application developments. She has also been active in the field of several innovative preparation techniques and microwave heating applied to materials processing and synthesis.

## **Ricky's Afterthought:**

# **UK based researchers out of EU's Horizon Programme**

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### **Associate membership**

When the Brexit negotiations were reaching the final stages around November 2020 the efforts of David Frost, the UK Brexit chief negotiator, were applauded for securing agreement with the EU, in the form of a UK associate membership, in extending the Horizon funding to researchers based in the UK. This fund amounted to some €95.5 bn and researchers in the UK were promised a good chunk of this money after Brexit was completed.

Horizon Europe is a key funding programme for research and innovation. It tackles climate change, helps to achieve the UN's Sustainable Development Goals and boosts the EU's competitiveness and growth. The programme facilitates collaboration and strengthens the impact of research and innovation in developing, supporting and implementing EU policies while tackling global challenges. It supports creating and better dispersing of excellent knowledge and technologies. It creates jobs, fully engages the EU's talent pool, boosts economic growth, promotes industrial competitiveness and optimises investment impact within a strengthened European Research Area. Most importantly it encourages multidisciplinary projects and the exchange of information between scientists and engineers within the countries of the EU and its associated members.

### **Northern Ireland Protocol**

The Northern Ireland Protocol is a protocol to the Brexit withdrawal agreement which covers immigration issues at the border and indeed issues of trade between Northern Ireland, the UK and the rest of the EU. However, following Brexit, a serious problem has arisen with some politicians within the

Democratic Unionist Party (DUP) in Northern Ireland, protesting that what was agreed in the Brexit settlement fell far short of what they would have liked to have seen in the final negotiations and refused to take part in the Northern Ireland Assembly requesting that the Northern Ireland Protocol be renegotiated. Initially the British Prime Minister stated that a solution could be found and he was willing to discuss the matter with EU representatives. A deadline was set for 29 June 2022, by which time the UK promised to discuss the issue of the Irish Protocol with EU representatives and if successful their associate membership would stand. The EU really used the Horizon funding to put pressure on the British Government to abide by what was agreed initially when Brexit negotiations were completed.

Alas the Northern Ireland Protocol proved too difficult to resolve to the satisfaction of the DUP, the British Government and the EU and thus no such agreement could be reached by the deadline. Basically, ratification of the membership has been in limbo because the UK has not implemented the Brexit trading arrangements agreed under the Northern Ireland Protocol.

### **Horizon Funding agreed subject to relocation**

Following the PM action which in essence means tearing up the Northern Ireland Protocol, the European Research Council, which administers the Horizon Funding, informed UK based researchers that unless they were willing to relocate to Europe the funding promised to them would not materialise.

As I write this report some UK based researchers have taken this opportunity to relocate to Europe thus securing the EU Horizon grant allocated to them. One academic originally from Europe who decided to relocate to Europe and keep his £1.5m

grant was very pessimistic about the prospects of research in the UK and being able to collaborate with European colleagues. If many other academics follow suit and relocate to European universities or research institutions that will be very sad and would severely curtail the UK's ability to compete in first class research activity. It is rumoured that some 18 academics so far declared their willingness to relocate to Europe.

### **Coordinating role passed to Europe**

Other academics who are not able to relocate suffer severe curtailment of their projects, for example, Nicholas Walton, a Research Fellow at the Department of Astrophysics at the University of Cambridge was asked to relinquish his coordinating role in the £2.8m Euro Marie Curie project of the European Space Agency in their quest to map the Milky Way. His role was passed to a colleague from the Netherlands, which in essence is a direct action for the UK not being an associate member as far as Horizon is concerned. A European diplomat stated that, "If Britain threatens to suspend important parts of the withdrawal agreement it is hard for us to do business in other areas. Brexit means Brexit and it is a self-inflicted wound."

It is claimed the ERC has stopped funding to the tune of about £100m. Some 115 grants to UK based academics were scrapped thus severely

hampering the efforts of many young academics to continue with their projects.

### **Alternative UK based scheme**

The Department of Business, Energy and Industrial Strategy has pledged to meet the funding deprived to UK based researchers so long as they sign up to the new UK scheme by Dec 2022. When it was first announced that the EU were threatening to curtail agreed funding to UK based academics, the UK Government promised to allocate some £2 bn per annum for three years to bridge the gap (so called plan B programme), however, my understanding is that this funding is slow to materialise owing to disagreements between the Treasury and the Science Minister. This plan would involve Switzerland, Israel, USA, Canada, Australia and New Zealand.

The promise from the UK Government to fund projects which were scrapped by the EU or the establishment of a new research fund in the UK with the six partners stated above is very encouraging indeed, however, given the enormous task of the UK Government, and indeed many European Governments, to assist families with doubling or trebling of their annual energy costs, one wonders whether research funding drops way down the priority list of projects from the Treasury. That may be the pessimist's view but it is I am afraid the reality academics and researchers based in the UK are facing.

## Upcoming Events / Call for Papers

**IMPI'S 57<sup>TH</sup> ANNUAL MICROWAVE POWER SYMPOSIUM**  
The Premier Industry-Wide Microwave Power Event

**2023 CALL FOR PAPERS**

Submission Deadline: *January 20, 2023*

The International Microwave Power Institute invites scientists, engineers, industry professionals and users to submit papers in all areas of research, development, manufacture, engineering, specification and use of microwave and radio frequency energy systems for non-communication applications, including industrial microwave and RF, solid state, food technology, plasma, chemical, material processing, and new emerging technologies.

**June 27-29, 2023**

The Curtis Hotel  
Denver, Colorado, USA

## Categories & Topics

IMPI 57 will bring together researchers, technologists, engineers and industry professionals from across the globe to share the latest research and developments in microwave and radio frequency power applications, including food technology, industrial applications, solid state, chemical, plasma, materials processing and emerging technologies. Topics include, but are not limited to:

### FUNDAMENTALS AND MODELING

- Dielectric and Other Material Properties
- Dielectric Sensing and Imaging Techniques
- Modeling, CAD and Optimization

### INDUSTRIAL PROCESS EQUIPMENT

- Industrial High Power Equipment and Process Control
- Solid State Microwave Technology
- Microwave Process Scale Up

### INDUSTRIAL APPLICATIONS

- Biomedical & Medical Applications
- Microwave and Plasma Chemistry
- Chemical Engineering and Catalysis
- Hydrogen Technologies
- Biomass and Waste Processing
- Metallurgy and Mineral Processing
- Material Science and Engineering
- Biological and Environmental Applications
- Microwave Plasma Applications

### FOOD SCIENCE & TECHNOLOGY

- Biological Applications
- Industrial RF & Microwave
- Processing of Food
- Microbiological Testing
- Microwavable Packaging
- Microwave Ovens: Design, Standards and Safety
- Product Validation
- Food & Agriculture
- Nutritions
- Trends in Microwave Cooking
- Food Safety Using Microwave Technology

### RESEARCH AND EMERGING TECHNOLOGIES

- High Energy Research (e.g. accelerators)
- Wireless Power Transfer
- Directed Energy (e.g. weapons)
- Deep Space Applications (e.g. thrusters)

**IMPI Fall Webinar 2022: Part III****Role of Microwaves in Industrial Decarbonization****“Powering the Green Chemistry and Hydrogen Revolution”**

November 10, 2022, 11am-12pm EST

Instructors:

Alex Shanosky, Director of Business Development, Transform Materials

Nathan Ashcraft, VP of Research and Development, Transform Materials

Free of Charge and Open to the Public. **Registration Required.**

Event website: <https://impi.org/events/event/impi-fall-webinar-2022-part-iii/>

**AMPERE 2023 in Cardiff**

Call for papers is coming soon.

Conference website: <https://ampere2023.com/>

## **About AMPERE Newsletter**

AMPERE Newsletter is published by AMPERE, a European non-profit association devoted to the promotion of microwave and RF heating techniques for research and industrial applications (<http://www.ampereurope.org>).

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## **Call for Papers**

AMPERE Newsletter welcomes submissions of articles, briefs and news on topics of interest for the RF-and-microwave heating community worldwide, including:

- Research briefs and discovery reports.
- Review articles on R&D trends and thematic issues.
- Technology-transfer and commercialization.
- Safety, RFI, and regulatory aspects.
- Technological and market forecasts.
- Comments, views, and visions.
- Interviews with leading innovators and experts.
- New projects, openings and hiring opportunities.
- Tutorials and technical notes.
- Social, cultural and historical aspects.
- Economical and practical considerations.
- Upcoming events, new books and papers.

AMPERE Newsletter is an ISSN registered periodical publication hence its articles are citable as references. However, the Newsletter's publication criteria may differ from that of common scientific Journals by its acceptance (and even encouragement) of news in more premature stages of on-going efforts.

We believe that this seemingly less-rigorous editorial approach is essential in order to accelerate the circulation of ideas, discoveries, and contemporary studies among the AMPERE community worldwide. It may hopefully enrich our common knowledge and hence exciting new ideas, findings and developments.

Please send your submission (or any question, comment or suggestion in this regard) to the Editor in Chief in the e-mail address below.

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