

Reflections on AMPERE 2023 in Cardiff

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AMPERE's 19th International Conference on Microwave and High-Frequency Applications was held for the first time in Wales, in the capital city of Cardiff. The venue at the new Centre for Student Life (CSL) in Cardiff University was a modern, open plan design, and after an 80 step climb to the fourth floor, we were provided an ideal setting to network before and after presentations, mingle amongst the exhibitors and poster sessions, and take on board refreshments & lunch.



F. Hutira, J. Fayos and V. Bilik



The Platinum Boys

We were blessed with (mostly) good weather following a long wet UK summer, and the balcony setting on the fourth floor provided a pleasant

opportunity to sit in sunny conditions with old friends and new acquaintances.



The Poster Session

As usual, the day before the conference itself, there was a 1-day Short Course to introduce participants to the principles of microwave heating, dielectric measurements, modelling and applications by leading experts.

We were back together fully in-person for the first time since the 2019 conference, and the programme did not disappoint. Over 3 days, we had plenaries followed by 3 parallel sessions, and 170 attendees from over 20 countries could pick and choose from around 100 technical talks. I was impressed by the strength and breadth of the technical programme – biomass processing, chemistry, energy, environmental, plasma, applicator design, measurements, modelling, food and industry focus all had at least one session.

Our conference chair was Dr Daniel Slocombe, head of the Centre for High Frequency Engineering at Cardiff University, very ably supported by his team. AMPERE President Georgios Dimitrakis and Daniel welcomed us and opened the conference.

We kicked off the conference with three captivating plenaries. Mike Mingos reviewed his 20+ years of pioneering work on microwave-assisted

chemistry from the 1980's and his seminal publications, Satoshi Horikoshi entertained us with a range of applications from microwave chemistry to insect snacks to fish calming, and Neil Alford gave a fascinating scientific review of the MASER ("microwave laser") and his vision of Star Trek tricorder sized device!



Launching of the Conference

The rest of day 1 was taken up by 3 parallel sessions split across the CSL Lecture Room and a very short walk to the main University building lecture rooms, which took planning to be at the right lecture room for the right session. Fortunately, session chairs were well disciplined to ensure the programme schedule was respected. A couple of presentations which stood out for me included Ryu Murata (Sophia University) on optimum conditions for Honey Worms to digest plastic (apparently low temperatures and very low microwave irradiation inhibits metamorphosis processes and enhance motor chewing process in pupae!), and Mariana Patrascu on a microwave-assisted process to recover valuable pure crystalline Hydroxyapatite from chicken bones. The stunning Coal Exchange venue hosted the Day 1 evening drinks reception.



A friendly group of attendees



Evening event at the Coal Exchange

This historic building was built in 1888 and became the hub for the global coal trade. Delegates were treated to a spine tingling performances by the Welsh National Opera Orchestra, with arias and a duet taken from La Traviata which were truly breathtaking. Ed Ripley was also co-opted to provide some impromptu close-up magic tricks, entertaining and bewildering in equal measure!



The Welsh National Opera Orchestra: La Traviata



Magical Ed Ripley

John Gerling kicked off the Day 2 plenary with a review of solid-state RF cooking, from the first 1969 patent on multiple solid-state oscillators, to commercial announcements of solid state cookers in

2012 to the first product introductions in 2017 by Miele (the 915 MHz “Dialog” combi home oven) and the IBEX 2.45 GHz food service oven. Interesting to note these ovens are called “RF cookers” not microwave ovens, to differentiate from magnetrons and perceived limitations perhaps.

Further parallel sessions were followed by a Lab Tour of the Centre for High Frequency Engineering, and after lunch, a panel was held on the role of microwaves in sustainability. Panellists Guido Link, Robert Mueller, Jose Catala-Civera, David Vennin and Shunatro Tsubaki agreed the increased global sustainability pressures are a natural fit to well-known benefits of microwave heating, though microwave technology adoption will still be challenging with large incumbent capital infrastructure.



Panel on the role of microwaves in sustainability

One theme I noted throughout the conference was the opportunity for more industrial end users to present their case studies on microwave adoption to allay fears around technology disruption and demonstrate commercial benefit.

Several presentations in the Food session highlighted the nutrient-retentive benefits of microwave-assisted heating, including clinical studies to back-up research findings. Working in food production myself, I am pleased to see other research groups taking a scientific, peer-reviewed approach to nutritional benefits of microwave heating of food.

The Gala dinner closing Day 2 was held at the National Museum of Wales, well located near the venue and the centre of Cardiff. Drinks were served

in an exhibition room allowing delegates to roam around a few rooms containing classical paintings, modern art and sculptures. Quite a refreshing change from the scientific and technical content of the past 2 days!

Following a delicious meal, Daniel Slocombe kicked off the Gala presentations with a review of the conference and of course a reminder that “microwave oven” in Welsh is *popty ping*.



M. Celuch and C. Leonelli at the National Museum of Wales before Gala dinner



Group photo of the delegates at the Gala dinner venue



During the Gala dinner



The iconic photo of Cristina, Jean Paul and Marilena



During the Gala dinner

Following a brief introduction by our President, Georgios Dimitrakis, the first award of the night was the Ricky Metaxas Pioneer award and it was introduced by John Gerling, the president of IMPI who is the chair for the selection committee of this award. It is usually presented at the 4-yearly Global Congress on Microwave Energy Applications conference. As 4GCMEA was held virtually in 2022, the recipient of this award Prof Kama Huang was presented in-person by Ricky with a memento, made of welch slate with a brief inscription.



During the Gala dinner



Daniel Slocombe



During the Gala dinner



G. Dimitrakis and John Gerling introducing the Ricky Metaxas Pioneer Award



The winner of Ricky Metaxas Pioneer Award: Prof. Kama Huang



Cristina Leonelli welcomed into the AMPERE Fellowship

The AMPERE Medal is AMPERE’s highest award, made to an individual who has demonstrated continuous and significant contributions. I was shocked and extremely humbled to win this award!

The AMPERE Fellowship award was made to Cristina Leonelli of the University of Modena and Reggio Emilia, following her sterling work for AMPERE over the past 20 years.

The Ricky Metaxas Young Researcher Award was made to Sam Hefford from Cardiff University. His research uses microwave resonant structures to develop new measurement and processing techniques for metal powder compacts, additive surfaces and 3D printed structures. He is seen smiling as he held the framed certificate and the yellow bible. Day 3 saw plenaries from Duncan Gregory (an overview of the microwave syntheses of inorganic materials) and Prof Steve Cripps on 50 Ohm RF amplifier design and how solid-state microwave generation may require a move away from 50 Ohm technology.



John Bows receiving the AMPERE Medal



Sam Hefford receiving the Metaxas Young Researcher Award



John Bows’ acceptance speech



A smiling Sam Hefford

Ricky Metaxas provided a fascinating journey on the origins of AMPERE, a story intertwining microwave personalities spanning IMPI, European Universities, and World Congresses. Ricky organised the first (and what became) AMPERE conference in 1986 at Cambridge University and it is a testament to his vision and tireless work that we enjoyed our 19th conference in Cardiff. Ricky called on us all to preserve AMPERE as an independent organisation, and support activities led by the management committee, to maintain AMPERE’s unique place in the global microwave community.

Further parallel sessions then followed covering a diverse range of topics from measurement and metrology, modelling and material properties.

The conference concluded with AMPERE’s Ordinary General Assembly where the President and Treasurer reviewed past activities and accounts respectively. AMPERE’s finances are in a sound state, with some discussion on how AMPERE might use cash reserves to support future conferences or other microwave-related activities. The management committee was re-elected for the next two years. We learned that the Microwave Working Group has been incorporated into IMPI, and the newly formed Indian Microwave Association will join MAJIC (the global group comprised of regional microwave associations such as AMPERE and IMPI). The next conference will be in September 2025 in Bari, Italy co-chaired by Paolo Veronesi, of the University of Modena and Reggio Emilia. The next Global conference (5GCMEA) will be held in Japan and following the OGA Prof Yoshio Nikawa introduced the venue and other details. Best student presentation prize was awarded to Diret Tang'an (University of Nottingham) and best student poster prize was awarded to Parvathi Vasudevan (Loughborough University). Several times during the conference, we remembered microwave giants Bob Schiffman and Bernie Krieger who both passed away within a year of each other. They were sorely missed, and will be in our thoughts and stories at AMPERE conferences to come!



Ricky Metaxas during his plenary lecture



Prof. C. Leonelli and Prof. J. Monzó-Cabrera



Prof. Y. Nikawa introducing 5GCMEA

It was a pleasure to be in Cardiff for the 19th AMPERE conference, memorable for the great programme, well attended by delegates from around the world, the many lively discussions, and of course the excellent venue. Congratulations to Daniel and team!



Daniel Slocombe and his team

Partners and accompanied persons’ programme

This year the Conference Partners’ Programme was skilfully arranged by Professor Adrian Porch, not your regular tour guide as he readily confessed! However, he arranged a comprehensive itinerary in and around Cardiff which included visits to the National Museum, Cardiff Castle, the Victorian Arcades, Bute Park with a boat trip to Cardiff Bay. We also enjoyed a morning at the National Museum of History with the choice, the following day, of Castell Coch or Caerphilly Castle. We certainly could not have achieved all this on our own, particularly the splendid lunch at the unique Coffee Barker in the Arcades where we relaxed and enjoyed each-others company. A memorable sojourn for which we are all indeed grateful.



Finally, during the Gala Dinner I saw John looking at his AMPERE Medal with great amazement so could not help myself but take a quick shot of him!

Margaret Metaxas