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Conference report

The IEEE International Microwave Biomedical Conference 2020

Katia Grenier and Dominique Schreurs



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The 4th edition of the IEEE International Microwave BioMedical Conference initially scheduled 25 to 28 May 2020 in Toulouse, France, was finally held from 15 to 17 December 2020 in virtual mode due to the worldwide pandemic situation.

This conference was financially sponsored by the IEEE Microwave Theory and Techniques Society (MTT-S), and technically cosponsored by the IEEE Engineering in Medicine and Biology (EMB) Society, the IEEE Antennas and Propagation (AP) Society, the European Microwave Association, and the Gallium Arsenide Application Symposium (GAAS) association.

IMBioC is an international forum for the exchange of ideas and information on state-of-the-art research in microwave and RF theory and techniques that bridge the science and engineering gap as applied to biological systems. The themes involved relate to the interaction of electromagnetic waves with the living for biomedical and environmental applications, whether for medical imaging, diagnostic, treatments, health monitoring, as well as bioeffects, body area networks and communication issues.

After a first trip around the world, in Gothenburg, Sweden, in 2017, Philadelphia, PA, United States, in 2018, and Nanjing, China, in 2019, this 4th edition was expected to be back in Europe in Toulouse, France, in May 2020. Everything was prepared to make this conference a wonderful event for the bio-microwave community. However, due to the global pandemic situation, the conference was first postponed and finally organized in virtual mode in December 2020.

The initial conference prepared for the physical presence of attendees was totally rearranged with the precious help of the IEEE MCE Digital Events Team. An entire on-line conference interface (Figure 1) was created from scratch in a short time period, whereas the conference was restructured with on demand sessions and live scheduled sessions (Figure 2).



Figure 1. A view of the IMBioC 2020 online conference interface.



Figure 2. The interfaces of on-demand and live scheduled sessions.

The on-demand sessions, which were composed of pre-recorded presentations of the accepted technical papers, were made available to attendees by Dec. 9th, i.e., a few days ahead the start of the conference to allow watching the presentations in advance. The live sessions were scheduled during the afternoons, Central European Time, from Dec. 15th to 17th, to enable participants from all over the world to attend the conference together. These live sessions were dedicated to the plenary sessions, the keynote and invited presentations as well as the Questions and Answers of the technical sessions to enhance discussion between all participants.

In addition, the agenda and the proceedings of the conference were accessible in a resources section. A social lounge (Figure 3) was also present to facilitate exchanges between the attendees during the entire conference.

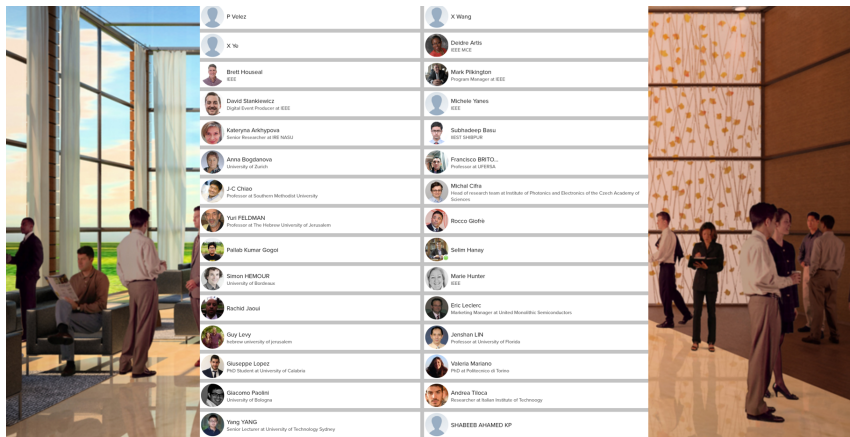


Figure 3. A view of one part of the IMBioC2020 Social lounge, which included 250 registered attendees.

In the end, the 250 actors of the conference, all world experts or researchers interested in themes related to the interaction of electromagnetic waves with biological and living matter, whether they were participants, presenters, guests or session chairs, got mobilized and adapted themselves very efficiently to this new mode of online communications and exchanges.

All papers submitted to IMBioC2020 conference were thoroughly reviewed by the IMBioC Technical Program Committee, which represented a diverse international group of 45 reviewers. A total of 84 papers were submitted, of which 66 (including those that were invited) were accepted for presentation. There were 10 technical sessions, 4 special sessions, 2 poster sessions, and 1 workshop.

The first plenary session, held Tuesday afternoon (CET), featured a welcome address by K. Grenier and D. Schreurs, General Chairs of IMBioC2020, with explanations of the new features of the virtual event, as well as greetings from the MTT-S President A. Abunjaileh, giving an update of the MTT society and the latest achievements.

The second plenary session, held Thursday afternoon (CET), integrated not only the review of the conference but also the competition results (see further).

At the end of the plenary sessions, attendees could enjoy the presentations of two renowned keynote speakers, Prof. Yuri Feldman of The Hebrew University of Jerusalem, Israel, and Prof. Nanshu Lu of Texas Univ. at Austin, TX, USA, on « Water and its dielectric signature. New marker for biosensing », and «Wireless Electronic Tattoos for Personalized Mobile Sensing and Therapeutics», respectively, providing different aspects of electromagnetic waves fundamentals and interests in biomedical applications (Figure 4).

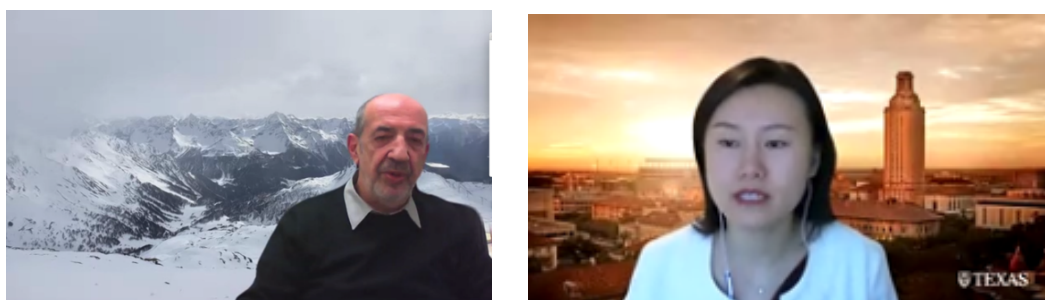


Figure 4. The keynote speakers Prof. Y. Feldman and Prof. N. Lu during their presentations.

Some technical and special sessions were also initiated by the live presentations of distinguished invited speakers: Prof. James Hwang of Cornell Univ., NY, USA, Dr. Rachid Jaoui of the French Direction Générale de l'Armement, France, Dr. Luis Mir from CNRS-Gustave-Roussy, France, Prof. Natalia Nikolova of McMaster Univ., Canada, and Prof. Yong Xin Guo of National University of Singapore, Singapore, on various themes, such as microwave cellular sensing, non-ionizing radiation assessment, wireless power transfer in medicine, cellular membrane electroporation, and microwave near-field imaging of tissues.

The final day of the conference included both the workshop Q&A session dealing with the "Evaluation of biological endpoints using innovative sensing and imaging approaches", a Young Professionals panel session, and the concluding Plenary Session. The Young Professionals panel session developed into an informal and friendly discussion between the attendees and 3 YP panelists, Prof. M. Cifra, Dr. P. Barmuta, and Dr. R.C. Conceição, on their respective experiences, the perspectives of the field, and the impacts of COVID-19 pandemic. The final plenary session integrated the results of the best student paper and two minutes thesis competitions. These ones were held to challenge students both technically and in terms of their presentation skills. The best student paper was kindly sponsored by the European GAAS association, and handled as traditionally by a pre-selected jury. The award was announced by Prof. R. Giofrè and was presented to Davi Valerio de Queiroz Rodrigues with co-author Prof. C. Li from Texas Tech Univ., TX, USA, for the paper entitled "Noncontact Exercise Monitoring in Multi-Person Scenario with Frequency-Modulated Continuous-Wave Radar". Besides this usual oral presentation award, some students took part in an "elevator pitch" experience, in which they were allowed 2 min only to present their work. All willing attendees had the possibility to vote for the best 2-minutes thesis presentation with an online survey. The winner of the two-minutes thesis competition was Hana Mozerova with co-authors Prof. J. Vrba from CTU, Czech Republic, and Dr. R. Scapatucci and Prof. L. Crocco from CNR-IREA, Italy, for the paper entitled "Monitoring Regional Hyperthermia via Microwave Imaging: a Feasibility Study". This prize was sponsored by the IEEE MTT-S French chapter.

Based on attendee feedback, the live invited presentations, pre-recorded presentations combined with live Q&A sessions, YPs panel session, and workshop were very much appreciated. Such an implementation encouraged interactions between all participants despite the physical distance imposed by the current pandemic conditions, contributing to the success of the conference.

All accepted papers were published in the proceedings, made available via a download site to those registered for the conference. Papers presented at the conference were submitted for archiving in IEEE *Xplore*. To conclude IMBioC 2020, authors were invited to submit extended papers to a mini special issue of *IEEE Journal of Electromagnetics, RF and Microwaves in Medicine and Biology (JERM)*.

Due to the Covid-19 pandemic situation at the end of 2020 and the uncertainties of the travel restrictions, IMBioC 2021, which was initially expected to be held in Montreal, Canada, at the end of June 2021, has been cancelled. The IMBioC 2021 Chairs, Prof. Milica Popovic and Prof. Alessandra Costanzo, have alternatively proposed a special issue of the JERM dedicated to the IMBioC 2021 conference.

Katia Grenier (grenier@laas.fr) was general chair for IMBioC2020. Dominique Schreurs (dominique.schreurs@kuleuven.be) was the general cochair for IMBioC2020. David Dubuc (dubuc@laas.fr) was the technical program Chair for IMBioC2020. Marie-Pierre Rols (marie-pierre.rols@ipbs.fr) and Yongxing Guo (yongxin.guo@nus.edu.sg) were technical program cochairs. Justin Teissié (Justin.Teissie@ipbs.fr) was the finance chair for IMBioC2020. Delia Arnaud-Cormos (delia.arnaud-cormos@unilim.fr) and Philippe Lévêque (philippe.leveque@xlim.fr) were student paper competition chairs for IMBioC2020.