



## Newsletter No. 64

Special issue “Pulsed Electric Fields in Biotechnology” in  
Frontiers

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Two years ago, in September 2019 the 3<sup>rd</sup> World Congress on Electroporation and Pulsed Electric Fields in Biology, Medicine, and Food & Environmental Technologies was held. We met in the wonderful Toulouse, France to exchange ideas and knowledge. Following the Congress, we organized special issues in distinguished journals in order to disseminate our results and accumulated knowledge also outside our society.

We are proud to present a long-awaited special issue “Pulsed Electric Fields in Biotechnology” in Frontiers in Bioengineering and Biotechnology (IF 5.890). This Research Topic collected 12 contributions from participants of the Congress, which are published as an E-book (please use the following link to access the E-book: [tinyurl.com/spec-issue-frontiers](http://tinyurl.com/spec-issue-frontiers)). The goal of this Research Topic was to review the current state of knowledge, and to open new insights regarding using electric fields for biotechnology purposes.

Nowadays, electroporation is used in different fields: clinics, food industry, and biotechnology. Especially pulsed electric fields (PEF) in biotechnology have attracted much attention over recent years. As the population grows, so does the need for a variety of dietary supplements and high-quality value compounds, which can be produced in microorganisms. Several physical or chemical methods are already established in order to disrupt microorganism cells and collect their content. Nevertheless, the main drawbacks are the use of expensive chemicals and the necessity of removing them from the final product, which requires a costly downstream purification process. Consequently, the cost of value compounds' extraction remains high, providing strong motivation for new extraction procedures. The most important advantage when using electroporation compared to other established methods for extraction was found to be the lack of co-extracting impurities (Haberl Meglič et al.; Eleršek et al.; Ganeva et al.). Although extraction by means of electroporation largely avoids total cell disintegration, the protocol still needs to be optimized in order to obtain a higher yield. Thus, a combination of electroporation with other methods, such as mild heating, was presented as a suitable approach for the efficient recovery of value compounds (Carullo et al.).

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Furthermore, the optimization of solvent media is crucial in order to obtain the wanted compound from the microorganism; therefore, the extraction was mediated by enzymatic esterase activity triggered by PEF (Aguilar-Machado et al.). Additionally, more accurate microdosimetric numerical models of cells were presented in order to investigate the electroporation phenomenon and to more precisely set up an efficient and controlled electroporation protocol (De Angelis et al.).

In order to facilitate use of PEF application on a large scale, the development of continuous treatments has been pursued and a treatment chamber with more homogeneous flow properties inside the chamber was proposed (Schottroff et al.). Since there is also a difficulty in comparing data obtained in different chambers or at different scales, kinetic modelling, and numerical simulations of treatment chambers were presented within this topic (Knappert et al.).

Hops are the most complex and costly raw material used in the brewing industry since they give the beer its flavour and preserve the beverage. Although different brewing technologies are used in order to enhance the extraction of acids from hops, the possibility of using PEF for this purpose was also presented for the first time (Ntourtoglou et al.).

Although the topic mainly focuses on electroporation in biotechnology, remarkable achievements can also be found in medicine. The likelihood of controlling the release of drugs from liposome vesicles using electric fields was presented with numerical simulations in order to optimize the electroporation protocol (Caramazza et al.). Also, the characterization of conductivity changes induced by electroporation was presented in order to simulate the electroporation process more precisely (Zhao et al.). A new technology that will with great certainty completely change cardiac ablation is pulsed-field atrial and ventricular myocardial ablation. Presented herein is a proof-of-concept work with clearly stated claims of feasibility and safety (Caluori et al.).

Enjoy the articles and enjoy what little remains of the summer!

## Forthcoming events

### ISEBTT General Assembly

online event, September 22, 2021

<https://www.electroporation.net>

### 2021 while-we-wait webinar (in time of the postponed World Congress)

online event, September 21 – 22, 2021

<https://wc2022.electroporation.net>

### 15<sup>th</sup> interdisciplinary postgraduate course and international workshop Electroporation Based Technologies and Treatments (EBTT)

Ljubljana, November 14 – 20, 2021 (on-site and on-line event)

<http://www.ebtt.org>

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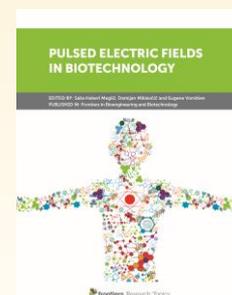
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