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Applications of pulsed electric field for food processing – Special issue



A wide variety of applications of pulsed electric field (PEF) that are based on cell membrane electroporation have been developed. In the food area these are focused on nonthermal microbial inactivation for food pasteurization, treatment of vegetable, animal and microbial cells to enhance the efficiency of mass transfer of water and other valuable compounds, in drying, extraction and infusion processes. Over past decades, much research on basic and applied aspects of PEF for the food industry has been carried out contributing to a better understanding of this innovative food processing technology. The lack of reliable and viable industrial equipment limited the exploitation of PEF in the food industry for several years. However recent developments in pulse power generators have permitted the design of appropriate PEF equipment at an industrial scale. First commercial applications of PEF technology have been achieved and it is expected that new ones will be launched in the near future.

This special issue on the use of pulsed electric fields for food processing contains manuscripts on recent developments in the field of PEF prepared by participants of the first edition of the “Training School on Applications of Pulsed Electric Fields (PEF) for Food Processing” that was held at the University of Zaragoza (Spain) in January 20–23 of 2004. The School was organized in the framework of the COST TD1104 Action – European network for development of electroporation-based technologies and treatments (www.electroporation.net) and joined for four days, 13 lectures and 33 students coming from 15 countries of four different continents belonging to both academia and industry.

The aim of the School was to offer an overview of knowledge and understanding of the basic principles involved in food processing by PEF and to provide practical demonstrations in the use of PEF for liquid food pasteurization and improving mass transfer operations in the food industry.

The lectures given by world leading experts in the field coming from universities, research institutes and companies were grouped in four thematic topics:

- Fundamentals of electroporation and generation of pulsed electric fields;
- Techniques and methodology for conducting research on electroporation and PEF technology;
- PEF effects of interest of in the food industry;
- Applications of PEF in the food industry.

Closing lecture by Prof D. Knorr from the Berlin University of Technology was celebrated in the Paraninfo Building of the University of Zaragoza. At the end of the lecture, Prof Knorr received a certificate of appreciation from the group of “New Technologies of Food Processing” of the University of Zaragoza in recognition of his support and collaboration with this research group for more than 15 years.

Lectures were complemented with laboratory practical sessions, pilot plant demonstrations and short presentations of research conducted by students in their laboratories.

This School that was the first exclusively dedicated to PEF for food processing – this relatively new and exciting topic – offered the opportunity for networking and communication between young scientists, experts and industrial partners interested in this attractive technology. The success of the School was possible thanks to the professionalism of the scientific committee and lecturers, but above all to the enthusiasm of the team of Zaragoza, students who with their active participation motivated lecturers and organizers to give the best of themselves.

The success of this first edition of the “Training School on Applications of Pulsed Electric Fields for Food Processing” has reassured the Scientific Committee that new editions will be organized; and the second one was already organized in February 2015 in Italy by Prof. G. Ferrari and her team at the University of Salerno.

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