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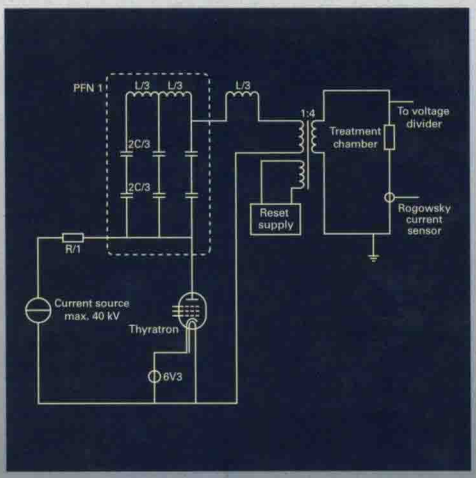

Food preservation by pulsed electric fields

From research to application

Edited by H. L. M. Lelieveld, S. Notermans and S. W. H. de Haan

CRC

WP

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Preface

Pulsed electric field (PEF) processing seems to be an ideal and relatively simple solution to the problem of producing shelf stable food products that retain the characteristics of fresh food. Preservation by pulsed electric fields destroys the microorganisms in the food, but colour, flavour and levels of vitamins and antioxidants are unaffected. The technology was conceived almost 100 years ago,[1] but was not pursued seriously until the 1960s. At that time, commercial application was far off and even scaling up of the technology must have seemed close to impossible. In the 1980s, however, when consumers started to question the quality of canned and other foods preserved by thermal methods, novel preservation technologies gradually received more attention from several research groups. Early results tempted Maxwell Technologies in the USA (through a subsidiary named 'PurePulse Technologies') to market PEF equipment for the preservation of food. It transpired, though, that this move was premature. The inactivation of microorganisms by PEF was more complex than envisaged and results of pilot plant studies were disappointing. Maxwell closed down PurePulse Technologies in 2002. In particular, the influence of the equipment on the microbiological results had been greatly underestimated. Attempting to meet consumer demands in Europe and military requirements in the USA, governments supported further research in collaboration with the food industry. In the Netherlands, a large research and development consortium was established, consisting of several research institutes and R&D departments of multinational food companies. They worked in co-operation with engineers from the High-Voltage Laboratory of the Technological University of Delft, who were to deal with the electrotechnical challenges involved in PEF preservation of food. The project resulted in the development and testing of a fairly large scale pilot plant and the establishment of rules for scale-up to production size.

Despite the significant progress made this decade, which is due to the co-

[1] A.K. Anderson and R. Finkelstein, Electro-Pure process of treating milk, *Journal of Dairy Science* 2 (1919), 374–407.

operation of many scientists, engineers and technologists, in particular in Europe and the USA, application is still very limited. It is hoped that this book will show that the technology is maturing rapidly and that it will help industry to overcome its hesitations regarding preservation of food by pulsed electric fields.

For a new food preservation technology to be introduced, insight is not only required into the effects of the technology on the inactivation of microorganisms and enzymes and on product nutritional and organoleptic characteristics; this book therefore also covers occupational safety, toxicological aspects, consumer acceptance, regulatory requirements and the promising economic aspects of PEF technology. Combining the technology with other preservation methods has not been forgotten and last, but not least, we have included a chapter discussing the potential future developments of PEF technology, which may include the preservation of food by PEF after packaging.

Huub Lelieveld, Servé Notermans and *Sjoerd de Haan*

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