

Workshop: PULSED ELECTRIC FIELD AND PLASMA TREATMENTS FOR BIOREFINERY AND FOOD APPLICATIONS

- preliminary agenda -

within:

FIFTH INTERNATIONAL CONFERENCE SUSTAINABLE POSTHARVEST AND FOOD TECHNOLOGIES (INOPTTEP 2017)

and

XXIX NATIONAL CONFERENCE PROCESSING AND ENERGY IN AGRICULTURE PTEP 2017

Vršac, Serbia, hotel "Srbija", April 23rd - 28th 2017

Organized by bilateral project between Serbia and Germany (2017-2018) “*Integrated pulsed electric field extraction and lactic acid bacteria fermentation for the production of microalgal extracts fortified with probiotics (PEF4AlgBiotics)*” and supported by The National Society of Processing and Energy in Agriculture (PTEP), Serbia

Date: 27th April 2017, 8.50-11.00 h

Place: INOPTTEP 2017 Conference, Hotel "Srbija", Vršac, Serbia

08.50-09.00

Welcome address: Prof. Dr. Mirko Babić, secretary general of INOPTTEP 2017 Conference and Dr. Aleksandra Djukić-Vuković, Serbian coordination of *PEF4AlgBiotics* project

09.00-09.30

Dr. Christian Gusbeth, *Institute for Pulsed Power and Microwave Technology, Karlsruhe Institute of Technology, Germany: Pulsed electric fields (PE) in downstream processing of algal biomass: a new biorefinery concept*

Abstract: In the last decades electric field pulsed techniques gained increasing importance in cellular biology, in gene technology, in medicine, in food production and in biotechnology. These versatile applications are based on the fundamental effect of polarization of the cell membrane and on the subsequent effect of membrane electroporation. This lecture starts with a brief introduction into the phenomenon of electroporation of cell membranes and gives a summary of the most important applications based on the use of millisecond and microsecond pulses with electric field amplitudes ranging from the upper tens of V/cm to several kV/cm. The main part of the lecture focuses on the pulsed electric field (PEF) treatment for bacterial decontamination of hospital wastewater effluents. The stringent necessity of decontamination of such wastewater effluents relies on the fact that these effluents are loaded with pathogenic and increasingly with antibiotic-resistant bacteria. One important issue addressed during the lecture is the safety of the PEF technology, related to mutagenicity and induced electro tolerance in reference bacteria. Finally, other possible applications of the PEF treatment are presented. Currently, the use of PEF treatment for extraction of valuable ingredients from

microalgae, for energetic purpose, is considered.

09.30-10.00

Dr. Urszula Tylewicz, *Department of Agricultural and Food Sciences, University of Bologna, Italy: **New opportunities of pulsed electric field (PEF) applications for fruit & vegetable processing***

Abstract: In the last years the use of pulsed electric fields (PEF) technology for food processing has been widely studied. PEF treatment leads to electroporation of the cell membrane by applying an external electric field to the cellular tissue. Electroporation of the cell membranes could promote reversible or irreversible pore formation and cell disintegration, depending on both the intensity of the electric field strength applied and the characteristics of the raw materials. PEF processing offers several advantages i.e. to improve extraction process, to enhance mass transport phenomena and to inactivate enzymes and microorganisms. Therefore, the potentiality of the PEF applications in the food industry is very huge. In particular, low intensity PEF treatments could be used to induce an impact on mass transport phenomena or to have an impact on cell structure modification. In fact, PEF pretreatment could enhance the performance of processes such as osmotic dehydration, drying, freezing etc., reducing process time and saving energy. PEF promotes the structural changes on a cellular level, thus resulting in changes in tissue material properties and consequently affecting the final product quality characteristics.

10.00-10.30

Dr. Aleksandra Djukić-Vuković, *Department for Biochemical Engineering and Biotechnology, University of Belgrade, Serbia: **Non-thermal plasma treatment in biorefinery processes***

Abstract: Non-thermal plasma or cold plasma is novel technique gaining significant attention of scientific community due to its wide potential application range. Plasma is defined as a neutral ionized gas, while non-thermal plasmas are type of plasmas generated at lower pressures and temperatures than thermal plasmas and these are less energy intensive. Non-thermal plasma could be suitable solution for decontamination of sensitive surfaces and it is studied for different biomedical, food and environmental applications. It has been used in food industry (surface decontamination, microbial inactivation in liquid and solid food etc.) or for environmental purposes (decolourization, biodecontamination, waste gas treatment etc.). Challenges in application of plasma treatment are related to equipment design, scale up of processes, monitoring of degradation products and maintenance of treatment uniformity and reproducibility of the treatment strongly influenced by substrate composition and physical characteristics. Effect of non-thermal plasma treatment on microbial inactivation in stillage from bioethanol production and potential of this technique for improvement of biorefinery processes on stillage will be addressed.

10.30-10.50

Discussion on cases, closing remarks

10.50-11.00

Coffee break

11.00-13.00

Conference program