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EXPERIMENTAL COMPARATIVE STUDY OF DIFFERENT TREATMENT CHAMBERS FOR FOOD PROCESSING USING PULSED ELECTRIC FIELD

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ABSTRACT

The major challenge today lies in the application of PEF in the industry; it requires an ever-increasing processing rate by seeking ways to continuously reduce energy consumption. All treatment chambers (TC) currently used in industry and in research laboratories, the product to be treated is placed in one volume unit delimited between two electrodes energized by a pulsed voltage which the electric field lines which are perpendicular to the electrodes are monoaxial and oriented almost in only one direction. The objective of this paper is to study experimentally a new TC model comprising one, two or three monoaxial PEF units in parallel (TC1, TC2, TC3) and another biaxial PEF units (TC4) consisting of several "alternate ground-HV electrodes," in order to increase the processing flow rate and save more energy. The treatment chambers made of Plexiglas have a square paralelipedic shape, in which are placed either two (TC1), three (TC2), five (TC3) vertical and parallel stainless steel electrodes. One, Two or three of these electrodes are grounded and placed on the side walls of the chamber, while the high voltage electrode is placed in the central plane at equal distance between the ground electrodes. These chambers have been compared to biaxial treatment chamber comprising four identical metal plates placed on the side walls of a square shape (TC4). The obtained results have shown that the proposed model TC3 and TC4 are better than the two others in terms of extracted juice mass and energy consumption.
