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Book of Abstracts

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- pp 143 Energy density reduction for nanoemulsion preparation by combining high pressure homogenization and high power ultrasound
Sonia Calligaris, S. Plazzotta, M. Alongi, M. Anese
 University of Udine, Italy
- pp 144 Novel application of hydrostatic pressure technology: effects on the extraction and modification of fruit peel dietary fibers
 V. Tejada-Ortigoza, **J. Antonio Torres**, J. Welti-Chanes
 Tecnologico de Monterrey, Mexico
- pp 145 High voltage electrical discharges in extraction processes: process optimisation towards sustainability
Anet Režek Jambrak¹, V. Stulić¹, S. Jurić², M. Vinceković¹, N. Rakotomanomana², F. Chemat²
¹University of Zagreb, Croatia
²Université d'Avignon et des pays de Vaucluse, France
- pp 146 Performance evaluation of thin layer-continuous flow high intensity pulse light system used for inactivation of Alicyclobacillus acidoterrestris in apple juice
Filiz İcier, T. Baysal, Ö.F. Çokgezme, Ö. Taştan, D. Bayana, D. Döner
 Ege University, Turkey
- pp 147 Influence of comminution degree on the PEF-assisted extraction of high-added value phenolic compounds from artichoke bracts
Daniele Carullo¹, G. Pataro¹, G. Ferrari^{1,2}
¹University of Salerno, Italy
²ProdAI Scarl, Italy
- pp 148 Valorization of the soy by-product okara by applying high pressure homogenization
 G. Fayaz, S. Plazzotta, **Sonia Calligaris**, L. Manzocco, M.C. Nicoli
 University of Udine, Italy
- pp 149 Selectivity of conventional and ultrasound-assisted extraction of phenolic compounds from apples
Lu Wang¹, N. Boussetta¹, N. Lebovka^{1,2}, E. Vorobiev¹
¹Sorbonnes Universités, Université de Technologie de Compiègne, France
²National Academy of Sciences of Ukraine, Ukraine
- pp 150 Effect of type and particle size of different native starches on the structure and mechanical properties of hydrogels produced by HHP
Dominique Larrea-Wachtendorff², G. Tabilo-Munizaga³, G. Ferrari^{1,2}
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INFLUENCE OF COMMINATION DEGREE ON THE PEF-ASSISTED EXTRACTION OF HIGH-ADDED VALUE PHENOLIC COMPOUNDS FROM ARTICHOKE BRACTS

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The concept of “agri-food wastes valorisation” has become of great importance in the last decades, due to the possibility of extracting valuable bioactive compounds to be potentially used as supplements and nutraceuticals in feed, food, pharmaceutical and cosmetic sectors. Pulsed electric field (PEF)-assisted extraction has showed the potential to improve the efficiency of conventional extraction processes, even though more investigation is needed including the effects of raw material properties (e.g., size, conductivity, moisture content) on the yield of the extracts.

In this work, the effect of the size of artichoke bracts of circular shape (0.5 – 3 cm in diameter) and of PEF treatment parameters ($E = 0.5 - 5$ kV/cm; $W_T = 1 - 20$ kJ/kg) on the cellular permeabilisation degree of tissue, as well as on the extractability of phenolic compounds, was investigated. Optimal PEF conditions (3 kV/cm; 5 kJ/kg) were chosen on the basis of impedance measurements and used for the subsequent PEF-assisted extraction tests, which were carried out for 6 h in pure water at room temperature. The obtained extracts were then analyzed in terms of total phenolics content and FRAP antioxidant power. Results showed that the permeabilization effect of cell membranes induced by PEF led to a greater extraction yield of phenolic compounds (+175% on average) with respect to the control samples. Moreover, the smaller the size of artichoke discs, the greater the initial diffusion rate. Coherently, FRAP values of extracts from PEF treated artichoke discs resulted to be higher (+190% on average) than those detected for untreated ones. However, the higher the comminution degree, the lower the percentage increase in the extraction yield from PEF treated samples as compared with the control ones. These results demonstrated the efficacy of PEF in avoiding the need for high comminution degrees of the raw materials, with subsequent reduction in operative costs and a better preservation of antioxidant compounds.