

duced aggregates, highlighting the influence of non-thermal effects. Transmission electron microscopy unveils that MEF can be used to transform *e.g.* whey products, containing mainly β lactoglobulin in their composition, into *in vitro* small nano-fibrils, which can attract the interest from biomedical sciences. Electro-heating treatment can be designed together with cold gelation for the development of entirely biodegradable whey protein-based gels as potential devices for incorporating of nutraceuticals - *i.e.* up to 60% of association efficiency - thus creating novel applications not only for food industries, but also in the pharmaceutical area. Electrical and thermal effects were optimized into a single step treatment enhancing thermal stabilization (*i.e.* inactivation of microorganism and enzymes) and extraction of value added or bioactive compounds (*i.e.* anthocyanins and phenolic compounds) from vegetable and fruit tissues. High frequency (25 kHz) and electric field ≤ 30 V/cm combined with high temperatures (up to 90°C) were well suited for a significant effect ($p < 0.05$) on the extraction of phenolic compounds. Electro-heating capability of applying high heating rates with a precise temperature control together with putative electroporation effects in cell tissues (due to the presence of alternating electric fields), presents an interesting solution as a processing technology in biorefinery systems.

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Moderate Electric Fields – a processing biotechnological tool

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During the last decade, much research on Ohmic Heating (OH) as an electro-heating technology and the effects of its moderate electric fields (MEF) has been addressed with a view to combating pathogens and improving the nutritional and sensorial properties of food. In this research was demonstrated that MEF appears as an interesting biotechnological tool for the processing of foods as well as to be used in bioprocesses. Results show that the presence of MEF during heating contributes to a change in protein aggregation kinetics, as well in the shape of pro-