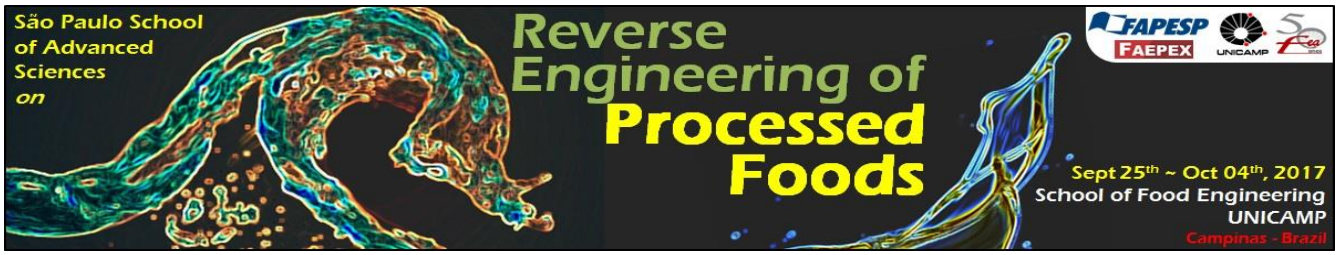

MODERATE ELECTRIC FIELDS EFFECTS ON WHEY PROTEIN´S STRUCTURE, INTERACTIONS AND GELATION

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Proteins are important food constituents with a high nutritional and functional value. They are one of the food constituents most affected by heat, causing their unfolding, aggregation and gelation. Ohmic heating's potential to improve the quality of foodstuffs have been demonstrated due to its uniform and fast heating, together with its presumed moderate electric field (MEF) related effects. The electric effects on foodstuffs, and particularly on proteins, are not yet fully disclosed and understood. Hence, the aim of this work was to evaluate the effects of MEF on denaturation, aggregation, structural and functional properties of whey protein systems, either on their commercial forms as WPI or in their purified fractions (i.e. β-lactoglobulin). Thermal and thermo-electric treatments were applied on whey protein solutions in a relevant range of conditions: protein concentration, pH, salt content, temperature and time of treatment. Protein denaturation, aggregation and gelation processes were followed by dynamic light scattering (DLS), rheology and microscopy techniques. The structural features of the proteins were accessed by fluorescence techniques, circular dichroism and reactivity of free sulfhydryl (SH) groups. Our results show that the presence of MEF gave rise to different denaturation kinetics, aggregation pattern and extent, structural and viscoelastic properties of the resultant hydrogels. Furthermore, the structural studies performed in β-lactoglobulin have unveiled significant changes in the protein's secondary structure, tryptophan exposure, surface hydrophobicity and free SH content caused by MEF in relation to a conventional thermal treatment. These findings evidence that electric effects related with this technology should not be overlooked and suggest that MEF may provide a novel method for production of whey protein-based systems with distinctive structural and functional properties.

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