

COMPARISON OF CONVENTIONAL AND INNOVATIVE PRE-TREATMENT FOR ACRYLAMIDE REDUCTION IN POTATO CRISPS

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Fried carbohydrate-rich foods, including potato crisps, contribute to a substantial proportion of the estimated intake of acrylamide in the European adult population (1). The EU Regulation (2017/2158) has recently established new “mitigation measures and benchmark levels for the reduction of the presence of acrylamide in foods”. Many strategies have been suggested for acrylamide reduction in potato crisps; one of the conventional pre-treatment methods includes the decrease of acrylamide precursors by blanching of potato slices (2), that have the drawback of being time-consuming and of promoting important modifications of the sensorial properties of the final product. The PEF application has been proposed as an alternative pre-treatment method for the removal of Maillard reaction substrates in food raw materials (3). Although the application of PEF could be used to enhance the diffusion of reducing sugars from potato tissues, it is necessary to understand how the rate of mass transfer can be influenced by further processing steps, and how the quality of the final product will be preserved. The aim of this study was to compare conventional blanching and the application of PEF as pre-treatment for potato crisps manufacturing in order to reduce the final acrylamide content. Moreover, the quality of the fried product in terms of structural properties and color was evaluated.

Raw potatoes (*Solanum tuberosum*, var. Lady Claire) were manually peeled and sliced and immersed in cold tap water prior to processing. Potato slices were submitted to two different pre-treatments, hot water blanching at 80 °C for 3 min and PEF. A lab scale PEF unit (Alintel, Italy) delivering rectangular-shape pulses and with a maximum output voltage of 8 kV was used. A commercial deep-fat fryer was used for the frying tests (175 °C for 3 min). The effect of PEF on raw potato slices was initially studied considering the influence of total number of pulses on the cell disintegration index. Color of potato crisps was analysed using a computer vision system. Hardness and crispness were determined using a Texture Analyser HDi 500 equipped with a spherical probe. LC-MS analytical method was used for acrylamide quantification.

Results showed a significant reduction of acrylamide content in PEF treated samples. Furthermore, the quality of the final fried product was well maintained, resulting in moderate changes, not affecting the overall acceptability. The study showed that PEF application for the mitigation of acrylamide on potato crisps has to be optimized considering the complete manufacturing procedure, particularly the steps affecting the rate of mass transfer. Further investigations are necessary in order to consider other important variables such as varieties, growing conditions, seasonality, storage conditions etc.

Keywords: Acrylamide, potato crisps, slicing, dipping, PEF, quality, industrial application