**Induction of whey protein fibrillar structures through high-temperature ohmic heating**

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Whey protein amyloid fibrils (WAFs) when formed under acidic heating conditions demonstrate improved functionalities, such as increased viscosity, superior foaming ability, and enhanced emulsifying activity1. The structural arrangement and functional characteristics of WAFs can be influenced by a range of physical and chemical factors, including the method of heating. There remains a significant knowledge gap regarding how the effects of ohmic heating influence the functional and structural properties of proteins when applied at ultra-high temperatures (UHT). Ohmic heating, characterized by its volumetric heating mechanism and the presence of moderate electric fields (MEF), has the potential to alter the dynamic and structural behavior of whey proteins, affecting the formation of advanced structures such as WAFs2. This study aims to systematically explore the effects of ohmic heating at UHT on the structural properties of whey protein.

Experimental treatments were conducted within a temperature range of 50 °C to 165 °C, allowing for a comprehensive analysis of structural transitions. Parameters assessed included intrinsic fluorescence, surface hydrophobicity, secondary structure distribution, hydrolysis rates, and the formation of fibrillar aggregates. The key findings revealed the following: (i) exposure of hydrophobic core occurred between 90 and 120 °C; (ii) an increased hydrolysis rate and the appearance of unordered structures were observed from 130 to 165 °C; and (iii) fibrillar aggregates achieved a maximum yield between 95 and 110 °C. This study brings a novel perspective on UHT ohmic heating drives structural modifications in whey protein, offering a novel approach to hydrocolloid functionality enhancement. As an emerging food processing technology, ohmic heating demonstrates considerable potential for advancing protein ingredient design and expanding its applications in functional food systems.

***References***

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