

Can non thermal processing methods like pulsed electric field and cold plasma alter dairy protein functionality?

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Proteins in today's market are gaining more attraction from customers due to more significant shift on healthy and sustainable living. Dairy proteins serve as complete proteins however there is a problem of functionality especially with dairy proteins like milk protein concentrate 85 (85% protein) which hinders their use in the development of new products. In order to overcome this challenge with milk protein concentrates, the industry is looking into several alternative technologies. Among these alternative technologies, non thermal processing has been gaining a lot of attention in the food space owing to minimal processing labels which drives the consumer's interest. Non thermal technologies such as cold plasma and pulsed electric fields were currently studied to understand the effects of processing parameters on modification of dairy proteins for various applications. Plasma is the fourth state of matter and consists of electrons, proteins, atoms, and these particles together initiate a chemical reaction. The low temperature plasma is also called cold plasma or non-thermal plasma and it is known to modify the functionality using surface modification. PEF works on the application of short high voltage electric pulses through the food product for a few microseconds. Radio frequency cold plasma systems were employed at different combinations of time with constant Ar and CO₂ flow rates at 10 and 25 cm³/min and RF at 120 W to MPC85 spray dried powders. For the pulsed electric field treatment various combinations of temperature, electric field strength and frequency were tested for reconstituted liquid MPC85 followed by spray drying and various protein functionality analysis were carried out. The results from cold plasma treatment and pulsed electric field treatment showed improvement in functionality for product applications