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Abstract

Structural and thermal properties of freeze dried nanofibrillated whey protein at different concentrations were studied in the glassy state. By increasing protein concentration to 5.5 g/100 mL, the formation of nanofibrils rose significantly, monitored by thioflavin T fluorescence. Atomic force microscopy images showed the formation of nanofibrils and their growth as a function of protein concentration. Studying the molecular morphology of the freeze dried nanofibrills, using X-ray diffraction showed that fibrillated whey protein have a semi crystalline structure. The extent of crystalline part increased with increasing protein concentration. Thermal properties of the proteins were monitored by differential scanning calorimetry (DSC). The results showed that both native globular and nanofibrillated proteins were in the glassy state at room temperature and underwent a glass to rubber transition over heating in DSC. The glass transition temperature of the amorphous parts was found to increase when the fibril concentration increased, which can be concluded that the mobility of the amorphous parts was restricted at higher fibril concentrations. Protein solubility dropped by protein fibrillization, and the