Chen Zhang et al., J Food Process Technol 2017, 8:9(Suppl)
DOI: 10.4172/2157-7110-C1-069

Effect of mild heating and freezing treatments on microstructure and pasting properties of various starches

Chen Zhang[1], **Jung A Han**[2] and **Seung Taik Lim**[1]
[1]Korea University, Republic of Korea
[2]Sangmyung University, Republic of Korea

Effects of physical treatments with mild heating and freezing (H: heating at onset gelatinization temperatures-T0 for 1hr; HC: heating at T0 for 1hr and then cooling at 4°C for 12hr; HFT: heating at T0 for 1hr, freezing at -20°C for 12hr and then thawing at 25°C for 1 hr; HCFT: heating at T0 for 1hr, cooling at 4°C for 12hrs freezing at -20˚C for 12hrs and then thawing at 25°C for 1hr) on normal corn, waxy corn, potato, and tapioca starches were investigated. After the treatments, starches recovered by centrifugation and drying were examined in their pasting/thermal properties and microstructure. Comparing with H, HC and HFT treatments, HCFT significantly modified the granule structure, crystalline properties, and pasting properties. HCFT-treated potato starch increased its final viscosity and onset gelatinization temperature for crystal melting, from 2773 to 3930cP and 60.2° to 66.0°C, respectively. However, the breakdown and setback in viscogram decreased. The change in gelatinization enthalpy was more significant than that of other HCFT-treated starches. No significant change could be observed in waxy corn starch, possibly due to the absence of amylose. Overall, B-type starches (potato and tapioca) were more significantly modified than A-type starches (normal corn and waxy corn), resulting in more changes in pasting properties and microstructure. Heating at T0 is the first key step to increase the amylose leaching and seduce more water molecules, while cooling treatment as a preparatory and necessary work to improve the effects of followed FT treatment and during FT-treatment the mechanical force was produced which acts as a final key step in this study. The physical treatment using mild heating and freezing (HCFT) could be utilized to modify granule structure of starches which may replace some of chemical modification processes.

Biography

Chen Zhang has his research work focused on clean-label physical starch modification. The objective of his research is to overcome many shortcomings (poor shear/thermal properties, high degree of retro gradation, and easily undergo syneresis) of native starch by using clean-label physical starch modification. From the food safety point of view, clean-label physical modification is safe, cheap, simple since no chemicals or biological reagents are involve in the final modified starch. Moreover, clean-label modification is an evolving new trend which could expend the industrial development of various new functional, new concept clean-label and value-added products.

zhanzhan2436@gmail.com

Notes: