A New Quantitative Method to Measure Activity of Ice Structuring Proteins[1]

Majid Hassas-Roudsari[2], Ian J. Tetlow[3], Rickey. Y. Yada[2] and H. Douglas Goff[2]

[2] Dept. of Food Science, University of Guelph, Guelph. ON. NIG 2W1
[3] Dept. of Molecular and Cellular Biology, University of Guelph, Guelph, ON. NIG 2W1

There are very few quantitative assays to measure the activity of antifreeze proteins (AFPs, or Ice Structuring Proteins, ISPs), which often suffer from various inaccuracies and inconsistencies. Some methods are relying only on unassisted visual assessment. When microscopy is used to measure ice crystal size, it is critical that standardized procedures be adopted, especially when image analysis software is used to quantify sizes. Differential Scanning Calorimeter (DSC) has been used to measure the thermal hysteresis activity (TH) of AFPs. In this study, DSC was used isothermally to measure enthalpic changes associated with structural rearrangements as a function of time. Differences in slopes of thermograms between winter wheat ISP or AFP type 1 containing samples, and those without ISP or AFP type 1 were demonstrated, as well as the effects of concentration, pH and other variables. The proteinaceous activity of ISPs or AFP type 1 was confirmed by demonstrating changes in samples with and without proteases. A proposed mechanism of this method will be discussed.

[1] This project was supported by the Natural Sciences and Engineering Research Council of Canada (NSERC).