The Effect of Phosphate Buffered Saline (1x PBS) on Induced Thermal Unfolding and Low Frequency Dielectric Spectra of Lysozyme

KLAIDA KASHURI, HEKTOR KASHURI, GERMANO IANNACCHIONE — It is well known that the folding / unfolding of proteins is related directly to their structure and functionality. Calorimetry (both AC and MDSC) studies as well as low-frequency (1Hz to 100 kHz) dielectric measurements have been performed on hen egg white lysozyme dissolved in PBS (pH 7.4) from 20 to 100 °C. From the heat capacity profile, the temperatures and related an enthalpy change of the protein denaturing is probed. The heat capacity peak broadens and new features are revealed as the temperature scan rate is lowered to +0.017 K/min for the AC calorimetric method. Significant differences are observed using the (M)DSC technique at scan rates of from 1 to 5 K/min. The temperature dependence of the permittivity, $\epsilon'$, and the loss factor, $\epsilon''$, at 100 kHz of the diluted protein show features associated with those seen in the heat capacity (AC and MDSC). All results are interpreted in terms of protein denaturing then subsequent gelation that depend on protein sample concentration, which is supported by the frequency dependence of the permittivity at room temperature after thermally cycling.

$^1$Worcester Polytechnic Institute (WPI)

Klaida Kashuri