

Study on Thermal Stability of Lysozyme Adsorbed on Hydrophobic Packing Surface

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Although the investigation of protein folding in solution has been reported a lot, that at the interface of a liquid-solid system is a very few. However, it is vital in life science, and calorimetry is one of the most important methods to accomplish it. During a process of a protein adsorption and folding on a solid surface, the important information of thermal stability and the changes in the molecular conformation of proteins varying with temperature, salt concentrations in solution, surface coverage, and denaturing degree of the protein can be obtained by differential scanning calorimetry (DSC) of the protein in the adsorbed state. For adsorbed lysozyme (Lys), which was obtained from adsorption of native Lys or the Lys denatured by 1.8 mol/L guanidine hydrochloride from the solutions (x mol/L ammonium sulfate, pH 7.0) onto the hydrophobic packing surface bonded with polyethylene glycol at 35 degrees celsius, the DSC studies showed that when the coverage degree of Lys on the packing surface increased, the adsorbed Lys existed in highly disordered alpha helix and beta sheet structure. The temperature of second structure conformation transition for adsorbed denatured protein is lower than that of adsorbed native protein. With increment of salt concentrations in solutions, the temperature of second structure conformation transition for adsorbed denatured protein is getting decreasing, while the molecular structure of adsorbed native protein is much more stable than that of adsorbed denatured protein. Based on both the change of scanning rate for DSC in this study and the principal of protein folding controlled by kinetics [1], the active energy needed for forming intermolecular beta-sheet structure, 51.9 kJ/mol, was calculated.

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[1] J.M. Sanchez-Ruiz, J.L. Lopez-Lacomba, M. Cortijo, and P.L. Mateo, *Biochemistry*, **27**, 1648 (1988).