

## Diversity of protein dynamic structure observed by solution inelastic neutron scattering

H. Nakagawa[1], Y. Joti[2], O. Yamamuro[2], I. Tsukushi[3], K. Shibata[1] and M. Kataoka[1,4]

[1] JAEA, [2] Univ. Tokyo, [3] Chiba Inst. Tech. and [4] NAIST

Protein expresses biological functions under physiological conditions, generally in aqueous solution. So far, inelastic neutron scattering experiments of biological specimens are performed with the hydrated powder state to avoid the strong scattering from solvent. However, solution inelastic neutron scattering experiments are emerging in the literature recently, which is still challenging. We performed solution scattering experiments with the AGNES using Staphylococcal nuclease (SNase). We measured the scatterings from both native state and heat-denatured state. We also measured the scattering from the truncated mutant. The truncated mutant is SNase without C-terminal 13 residues, which takes a compact denatured structure under a physiological condition. Figure shows the scattering profiles of these three samples. Heat-denatured state as well as the truncated mutant showed larger quasi-elastic scattering intensity than the folded state, while EISF significantly decreases with the heat-denaturation. The appearance of quasi-elastic scattering indicates that the protein structure deviates dynamically within the observable time scale of a few tens ps. The difference in EISF suggests that the heat-denatured state can take wider conformational space. These results indicated that the truncated mutant is dynamically different from the heat denatured state, although the truncated mutant takes a denatured-like structure. The present preliminary data clearly show that the inelastic scattering study with solution sample is promising. The quantitative analysis of solution inelastic neutron scattering will make it possible to characterize the dynamical properties of proteins in natural condition.

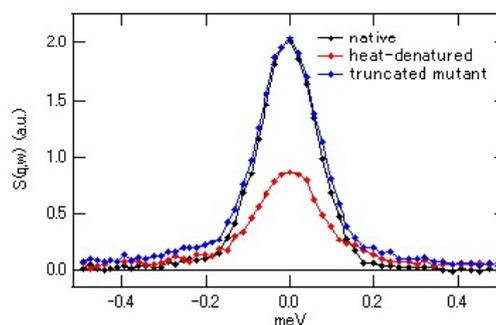


Fig. 1. Solution inelastic neutron scattering spectra of SNase in three states, native, heat-denatured and truncated mutant.