

Structure and Dynamics of Protein in Solution Investigated by Neutron Scattering

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The structure and dynamics of Staphylococcal Nuclease (SNase) in an aqueous solution were evaluated by means of small-angle neutron scattering (SANS) and neutron spin echo (NSE) techniques. SNase was synthesized and used as a model protein, which is known to be hydrophilic and very flexible and fluctuating a lot in water solution [1]. Fig. 1 shows the observed SANS profile, and the absolute forward scattering intensity proves that the molecule exists without aggregation in the water. The intermediate scattering functions obtained by NSE were exhibited in Fig. 2, and the evaluated diffusion coefficient depends on wave number. We have found that additional modes as rotational diffusion and internal oscillation must be considered in addition to the translational diffusion, which are evaluated by computer simulation.

References

- [1] S. Hirano, K. Mihara, Y. Yamazaki, H. Kamikubo, Y. Imamoto, and M. Kataoka. *PROTEINS: Structure, Function, and Genetics* **49**, 255–265 (2002).

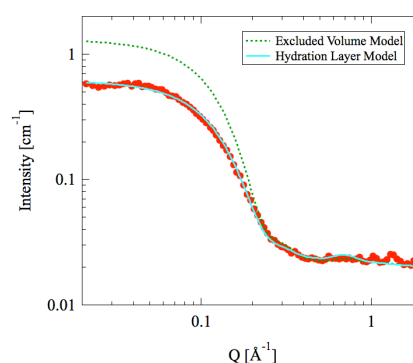


Fig 1. SANS profile for SNase in D₂O with 5wt% and 0.1N NaCl. The dotted line is calculated on the basis of the crystal structure, while the solid line is obtained by considering the hydration effect.

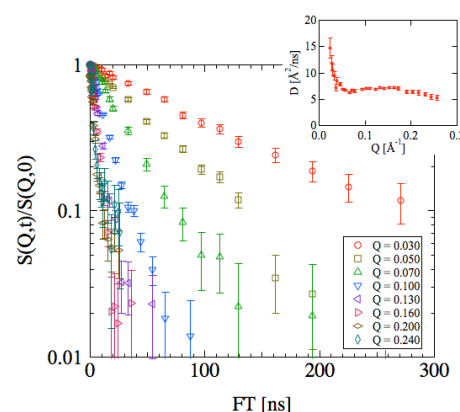


Fig 2. Normalized intermediate scattering for SNase in D₂O solution with 5wt%. The evaluated diffusion coefficient for different Q are shown in right upper inserted graph.