TOKAI CROSS **Experimental Report** J-PARC

課題番号 Project No. 2012A0080 実験課題名 Title of experiment Static Structure of Staphylococcal Nuclease in Aqueous Solution 実験責任者名 Name of principal investigator Hitoshi Endo 所属 Affiliation Japan Atomic Energy Agency	提出日 Date of Report 2012/10/22 装置責任者 Name of responsible person Shinichi Takata 装置名 Name of Instrument/（BL No.） TAIKAN/BL15 実施日時 Date and time of Experiment 2012 May 19 - 22

試料、実験方法、利用の結果得られた主なデータ、考察、結論等を、記述して下さい。（適宜、図表添付のこと）
Please report your samples, experimental method and results, discussion and conclusions. Please add figures and tables for better explanation.

1. 試料 Name of sample(s) and chemical formula, or compositions including physical form.

Staphylococcal nuclease (16.8kDa): $C_{747}H_{1202}N_{208}O_{223}S_4$.

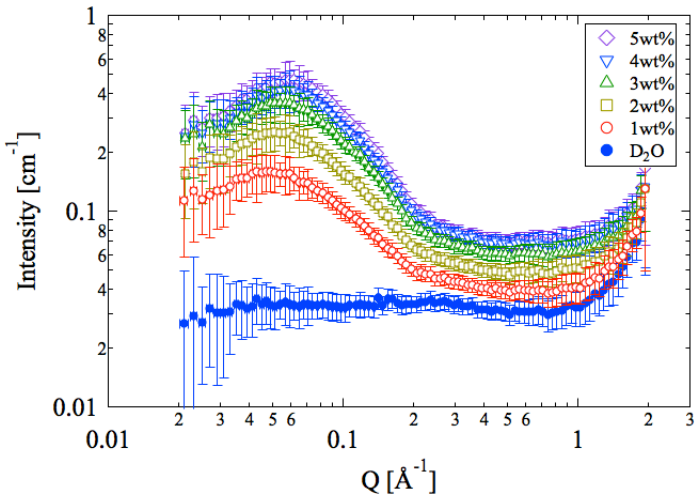
2. 実験方法及び結果（実験がうまくいかなかった場合、その理由を記述してください。）
Experimental method and results. If you failed to conduct experiment as planned, please describe reasons.

Experimental method: Staphylococcal nuclease (SNase) was dissolved in deuterated water, where the concentrations of SNase were tuned 1, 2, 3, 4 and 5 wt%. Since SNase is negatively charged, sodium chloride (NaCl) aqueous solution with 0.1 mol/L was also prepared as solvent, and SNase was dissolved with the same concentrations of those of pure solvent to compare the effect.

Results: Figure 1 shows the observed scattering intensities for SNase in aqueous solution (Figure 1a) and in 0.1 mol/L NaCl aqueous solution (Figure 1b). The intensities were converted to the absolute scale in cm^{-1} by using Glassy Carbon as a standard. In the case of pure water, the intensities show a prominent peak at $Q \approx 0.5 \sim 0.6$ $Å^{-1}$ (see Figure 1a), which is an evidence that the protein particles repel each other due to the electrostatic repulsion and don't aggregate. By adding NaCl, the peak becomes less visible with the screening effect of the salt. The intensities at high Q increase gradually ($Q > 1$ $Å^{-1}$) corresponding to the Bragg scattering of water molecules. As the results, we could successfully measure the scattering profiles from the protein molecules dissolved singly in water with wide Q range ($0.02 < Q$ $Å^{-1} < 2$) with reasonable statistics, which will be used for the quantitative analyses of the structure of SNase in aqueous solution.

2. 実験方法及び結果（つづき） Experimental method and results (continued)

(a)



(b)

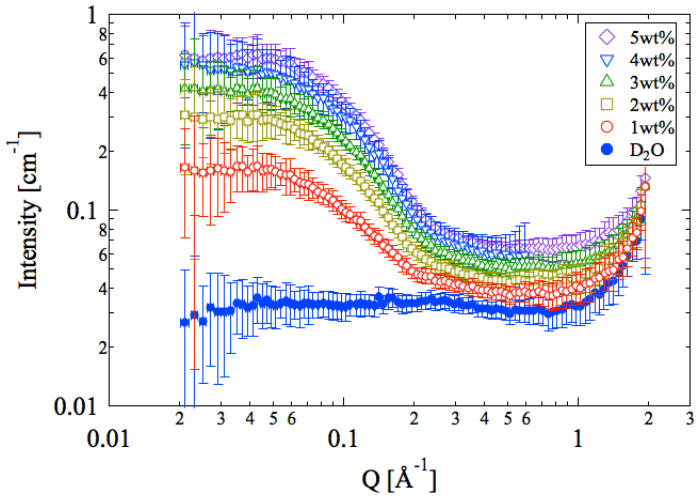


Figure 1. Small-angle neutron scattering profiles for SNase in aqua with various concentrations (1-5wt%) in (a) pure aqueous solution and (b) 0.1 mol/L sodium chloride aqueous solution.