



実験報告書様式(一般利用課題・成果公開利用)

(※本報告書は英語で記述してください。ただし、産業利用課題として採択されている方は日本語で記述していただいても結構です。)

 <b>Experimental Report</b> 	承認日 Date of Approval 2015/9/15 承認者 Approver Jun-ichi Suzuki 提出日 Date of Report 2015/3/24
課題番号 Project No. 2014A0019 実験課題名 Title of experiment Distinct validation of the inhomogeneous hypothesis of water? complementary study by small angle neutron scattering of salt solution to x-ray diffraction results 実験責任者名 Name of principal investigator Kazuki Komatsu 所属 Affiliation The University of Tokyo	装置責任者 Name of Instrument scientist Kazuki Ohishi 装置名 Name of Instrument/(BL No.) BL15, Taikan 実施日 Date of Experiment 17/Jun/2014-20/Jun/2014

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.
MgCl <sub>2</sub> ·25D <sub>2</sub> O solution

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.
<p>The sample solution was filled into a newly designed sample holder made of aluminum with indium seals for evacuating, and attached within a cryostat. The small angle neutron scattering (SANS) for the sample was measured at elevated temperatures from 300 to 100 K with 20 K steps in the first run. The exposure time for each temperature was 3 hours. The rate to change temperature was 2 K/min, which was controlled by heater and monitored by a sensor directly attached to the sample holder. The SANS measurements for empty-holder and glassy carbon were also carried out in order to correct observed structure factors. Figure 1 shows the observed structure factors at elevated temperatures. A Bragg peak like feature denoted by an arrow in the figure was observed at around 0.011 Å<sup>-1</sup> with substantial intensity, even from 300 K. Ice crystallised at 220 K in this run (right in Fig. 1) so that the scattering at small angle region is increased correspondingly, whereas the Bragg peak like feature was relatively diminished. After Run1, temperature was increased up to 300 K and SANS spectra were measured again with longer exposure time (6 hours) at the temperature down to 220 K, as Run 2 (Fig. 2).</p>

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

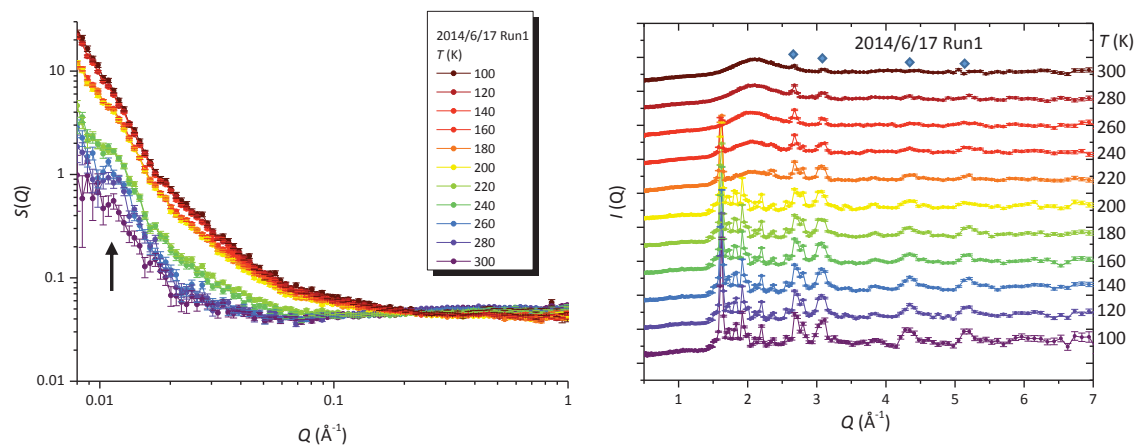


Fig. 1. Observed structure factors for small angle region (left) and high angle region (right) at elevated temperatures for Run1.

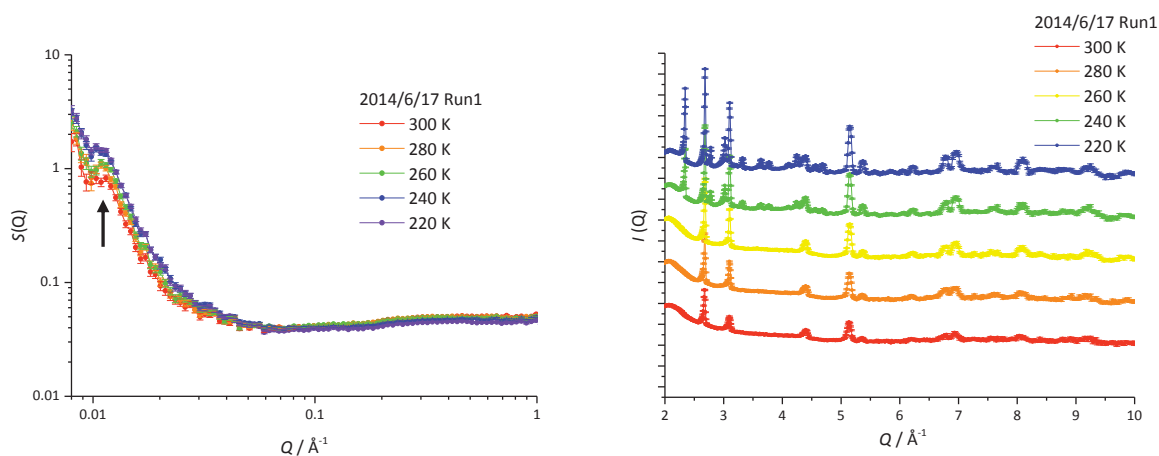


Fig. 2. Observed structure factors for small angle region (left) and high angle region (right) at elevated temperatures for Run2.

The peak denoted by an arrow in the left figure was reproducibly observed for Run 2 as shown in Fig. 2. If it is truly originated from sample, this result would bring a substantial impact to the understanding of inhomogeneous structure of water. Now we are carefully checking the possibility of contamination or other artificial effects to explain the Bragg peak like feature. Reproducibility check and measurements for solutions with other composition should also be conducted in future.