 MLF Experimental Report	提出日 Date of Report
課題番号 Project No. 2013B0228 実験課題名 Title of experiment Structure of low-temperature water confined in ordered mesoporous carbon 実験責任者名 Name of principal investigator Toshio Yamaguchi 所属 Affiliation Fukuoka University	装置責任者 Name of responsible person Toshiya Otomo 装置名 Name of Instrument/(BL No.) NOVA/(BL-21) 実施日 Date of Experiment 31 Mar.-6 Apr. 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.
H/D substituted water (H_2O , D_2O , $M_2O:H_2O:D_2O=1:1$) loaded in ordered mesoporous carbon (OMC, C) and dry OMC

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.
Three samples of isotopically different capillary condensed water at $P/P_0=0.55$ (P and P_0 are the vapor pressure and the saturated vapor pressure of water, respectively) in OMC were prepared on an adsorption apparatus installed at Fukuoka University. The corresponding dry samples were also measured. The powder samples were sealed in flat Ti/Zr cells. A vanadium plate was measured for normalization of data. The empty cells and background were measured as well. Each sample with a cell was attached to an in situ hydrogen adsorbing apparatus installed on NOVA. The Q-range measured was $0.015 - 50 \text{ \AA}^{-1}$ which covers the small-angle, 20-degree and 40-degree detector banks of NOVA. Temperatures measured were 303 K (ambient) and 180 K. All the measurements were made successfully.

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

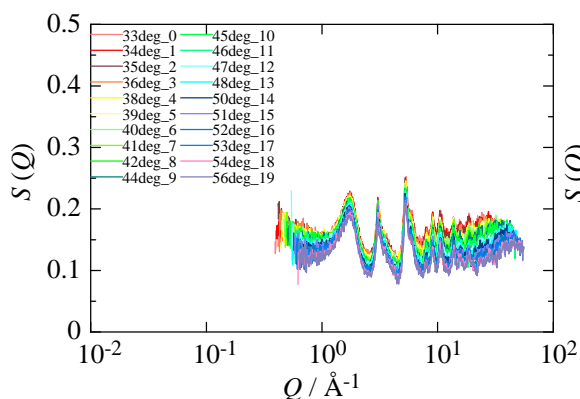


Fig.1. OMC-D₂O wet at 303 K

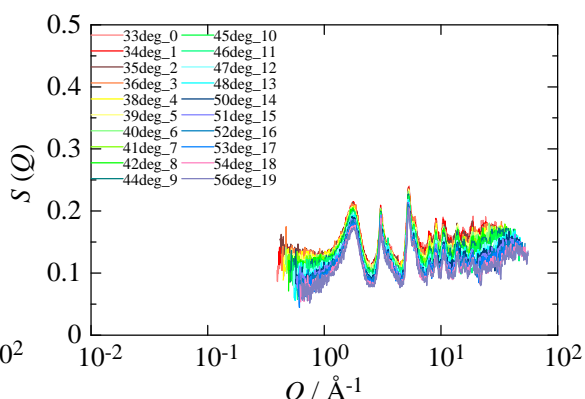


Fig.2. OMC-D₂O wet at 180 K

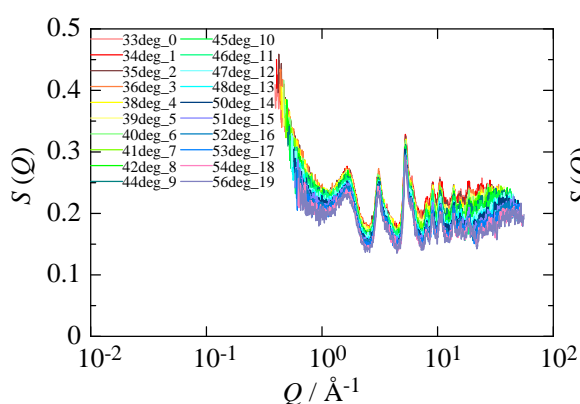


Fig.3. OMC-D₂O dry at 303 K

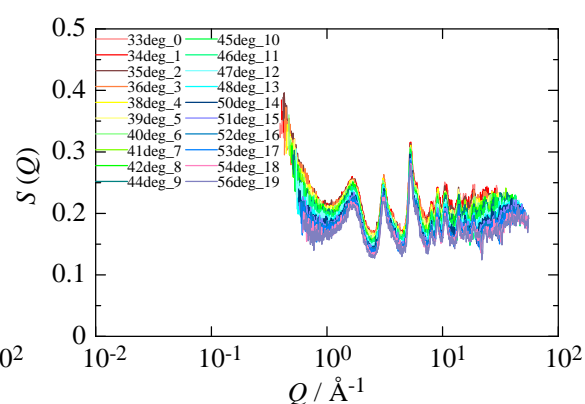


Fig.4. OMC-D₂O dry at 180 K

Figures 1 and 2 show the structure factors of D₂O in OMC at 40 degree detector banks at 303 and 180 K, respectively, whereas Figures 3 and 4 do those of dry OMC at the same detector banks at 303 and 180 K, respectively. Apparently the strong small-angle scattering due to meso pores of dry OMC is observed in Figs. 3

and 4. Figure 5 shows the structure factor of D₂O in OMC at 303 K after merging the data at all the detector banks. The structure factor of mesoporous OMC was successfully obtained over 0.015 - 50 Å⁻¹ in Q. Since the flat cell was used on NOVA for the first time, programs for absorption and multiple corrections are being made by the investigator group.

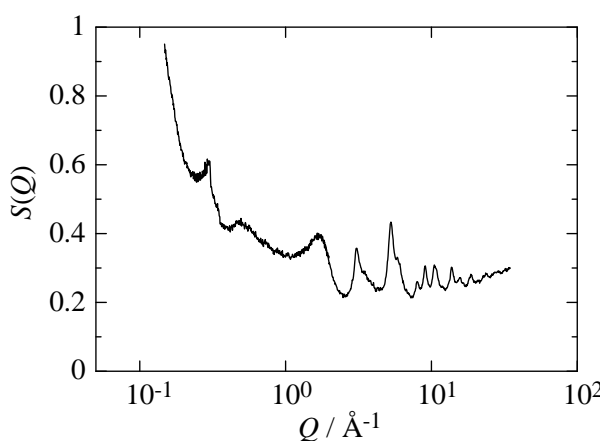


Fig. 5. Structure factor of D₂O in OMC at 303 K.