

 <b>MLF Experimental Report</b>	提出日 Date of Report
課題番号 Project No. 2009B0012 実験課題名 Title of experiment Measurement of the slow dynamics of water molecules in lower alcohol solutions and its relation to the hydrophobic hydration. 実験責任者名 Name of principal investigator Kenji Maruyama 所属 Affiliation Niigata University	装置責任者 Name of responsible person Kenji Nakajima 装置名 Name of Instrument/(BL No.) AMATERAS (BL14) 実施日 Date of Experiment May 21-23, 2010

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.
Propanole-d7 water mixtures C3D7OH/H2O(1:5) at 268K, 283K, and 294K, Propanol-d7 water mixtures with KCl C3D7OH/H2O/KCl(1:5:0.02) at 268K, 283K, and 294K Water H2O at 268K, 283K, and 294K Vanadium cylinder at room temperature

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下さい。) Experimental method and results. If you failed to conduct experiment as planned, please describe reasons.
<p>The quasi-elastic neutron scattering (QENS) measurements for propanol-water mixtures were performed by using AMATERAS(BI-14) spectrometer. The methyl group of propanol was deuterized. Because of much larger incoherent cross section of light hydrogen of water, the the diffusive motion of water molecules was mainly observed.</p> <p>Sample cell is a double cylindrical cell made of aluminum in order to avoid the multiple scattering. Outer diameter of sample is 14mm and the sample thickness is 0.3mm .                  The sample cell was attached to the cryostat with an adopter.</p> <p>Temperature of samples is controlled by using a 4K cryostat (equipment of AMATERAS) and measured temperature were 268K, 283K, and 294K.</p> <p>The spectrometer was operated with the incident energy of neutron (Ei) at 7.73, 3.13, and 1.69meV. The accumulating time was 5 to 6 hours. The energy resolution was about 1% at low Q region (1.0A-1) for Ei=1.68meV.</p>

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

The dynamic structure factor  $S(Q,E)$  was derived using standard software. The contour map of  $S(Q,E)$  for propanol aqueous solution at 268K is shown in the figure below. The statistics and energy resolution was as good as we expected. With high incident energy, the QENS spectrum around  $3.0\text{\AA}^{-1}$  has been obtained at the first time. And also with low incident energy, we can observed the Q dependence of the line width of center peak even in low Q region. It is expected that slower diffusive effect for the samples with KCl can be derived from the QENS data.

