Experimental Report

Proposal: **INTER-267** **Council:** 10/2012

Title: ILL experiment in Internal Time

This proposal is a new proposal

Researh Area:

Main proposer: **FOUQUET Peter**

Experimental Team: BAHN Emanuel
AGNESE Fabio
CALVO ALMAZAN Irene

Local Contact: FOUQUET Peter

Samples: 10 g Graphite (C)
100 mg Water (H2O)
100 mg Heavy Water (D2O)

Instrument	Req. Days	All. Days	From	To
IN11	4	4	23/03/2013	27/03/2013

Abstract:

Inter 267 – Experimental Report

Experimental Team: Peter FOUQUET, Fabio AGNESE, Emanuel BAHN, Irene CALVO-ALMAZAN

Local Contact: P. FOUQUET

Water monolayer diffusion on exfoliated graphite

This experiment was a proof-of-principle experiment for the feasibility of NSE studies on the diffusion of water adsorbed on Papyex exfoliated graphite. We used the 30 degree detector bank set-up IN11C at the highest flux wavelength 5.5 Å. We used a detector setting with the middle of the detector bank at 25 degrees, covering a Q-range of 0.2 to 0.7 $Å^{-1}$.

1 monolayer of D_2O was adsorbed on exfoliated graphite using a micropipette and the sample container was sealed off with a mechanism similar to the principle of Conflat flanges.

We obtained spectra at the base temperature of the cryostat 2 K and then at 100 K, 120 K, 136 K, 200 K, 270 K, and 290 K. The measurement times were 16 h for the resolution and the spectra above 200 K and 8 h for the spectra below 200 K, respectively. An overview of the exemplary spectra is given in Fig. 1. Slow incoherent dynamics are clearly visible at 290 and the deviation of the data from 1 at small times evidences fast incoherent dynamics at very small times. The latter can easily be related to librations of the hydrogen atoms in the water molecules, whereas the slower motion is possibly related to diffusive motion.

At the present data rate these experiments are not viable on IN11, but could be performed on WASP in future.

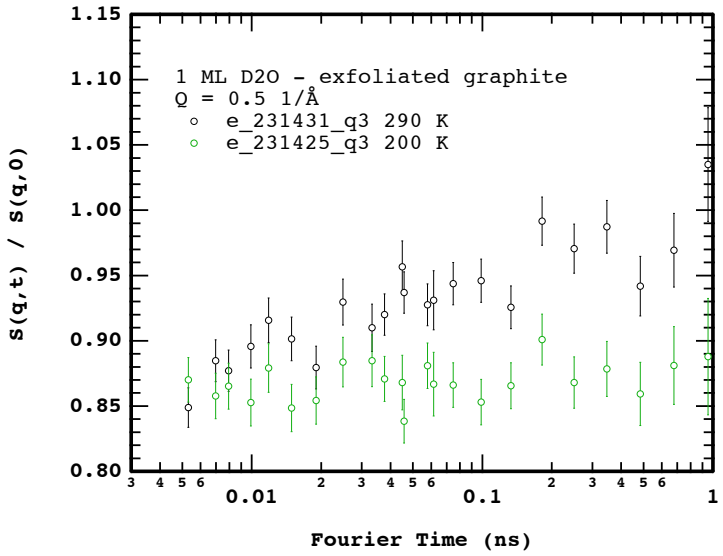

Figure 1: NSE spectra for 1 ML deuterated water adsorbed on an exfoliated graphite sample.