



Experiment title: Study of the influences of laser light on the absorption spectra of the $K_2[Ru(NO_2)_4(OH)(NO)]$ compound	Experiment, number: CH405	
Beamline: BM29	Date of Experiment: from: 5-12-96 to: 9-12-96	Date of Report: 27 - 2 - 98
Shifts: 20	Local contact(s): M.Borowski	Received at ESRF: 02 MAR. 1998

Names and affiliations of applicants (*indicates experimentalists):

A. Puig Molina*, Å. Kwick, H. Graafsma*

Report:

The experiment consisted of EXAFS spectra collections on the $K_2[Ru(NO_2)_4(OH)(NO)]$ compound at the Ru K edge (22KeV). We first tried to perform the experiment on a powder sample but the compound alone proved to be non-transparent to the light used for the excitation (blue light). Attempts to use dilution by KBr powder failed because KBr strongly absorbs X rays at 22KeV. Other products like BN or polyethylene turned out to be opaque to visible light. Therefore a first EXAFS experiment was done on a pellet of $K_2[Ru(NO_2)_4(OH)(NO)]$ thinner than 200 microns to allow laser light penetration. Eight spectra were collected from 21.9 to 23.3 KeV, 1420 steps with 4 seconds per point on the ground state. The sample was turned 90 degrees and excited through the glass window of the cryostat for 10 hours with the 457.9nm line of an argon laser with about $20mW/cm^2$ at 30K. Ten EXAFS spectra were collected on the excited sample with the same conditions as before. Nevertheless no difference could be observed between the excited and non excited spectra. Visible spectroscopy of the sample showed that it absorbed too much of the visible light and therefore it had not been efficiently excited. It was then decided to perform the experiment on a monocrystal oriented with the c axis vertical in order to optimize the excitation. EXAFS spectra were collected before and after excitation but they turned out to be highly sensitive to the sample orientation. The excited and non excited EXAFS spectra were not comparable because of the low reproducibility of the sample orientation mechanism when turning the sample 90 degrees to be excited through the glass window of the cryostat. The experiment strategy was subsequently changed. First the sample was irradiated and the EXAFS spectra on the excited state collected. Then the temperature was raised to 230K in order to de-excite the sample. After few minutes the sample was cooled down to 30K and finally EXAFS spectra on the de-excited sample were collected. Unfortunately we could not collect these data with sufficient statistics because of lack of remaining beam time. We could only collect i) two spectra on the excited state from 21.9 to 23.3 KeV with 1420 points and 2 seconds per point and ii) three spectra on the de-excited state with the same conditions.

We do observe an effect of the laser irradiation on the EXAFS spectra (see figure 1) but the statistics need to be improved. The data is being further analysed.

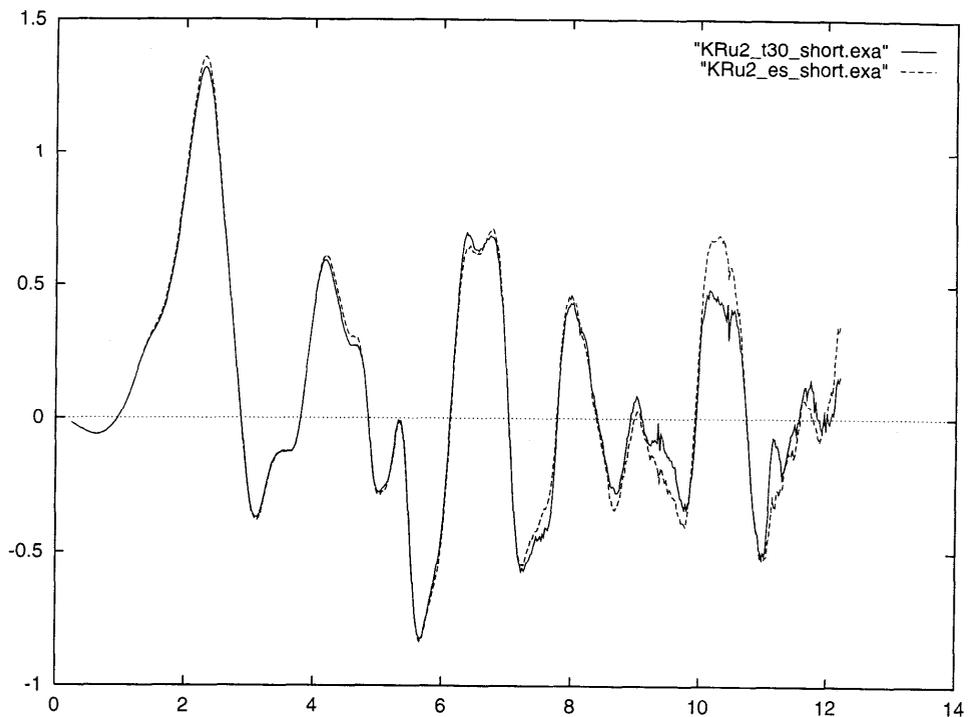


Fig. 1. Exafs spectra of de-excited (continuos line) and excited (dashed line) $K_2[Ru((NO)_2)_4(NO)(OH)]$ at 30K.