ESRF	**Experiment title:** Erbium local environment in proton ion-exchanged glass: an EXAFS study	**Experiment number**: MA-815
Beamline:	**Date of experiment**: from: 27/01/2010 to: 31/01/2010	**Date of report**:
Shifts:	**Local contact(s)**: Chiara Maurizio	*Received at ESRF:*

Names and affiliations of applicants (* indicates experimentalists):

Francesco Gonella*, Physical Chemistry Dept., University of Venice, Italy

Elti Cattaruzza*, Physical Chemistry Dept., University of Venice, Italy
Enrico Trave*, Physical Chemistry Dept., University of Venice, Italy
Yano Tetsuji, Dept. of Materials Science, Tokyo Inst. of Technology, Japan
Chiara Maurizio, INFM, GILDA-CRG, ESRF
Francesco D'Acapito, INFM, GILDA-CRG, ESRF

Report:

The aim of the proposed experiment was to determine the local structure around the Er ions present inside glasses subjected to the proton ion exchange process. The monochromator was equipped with a couple of 311 crystals, working in dynamical focusing conditions. The harmonics rejection was achieved by a couple of Pd-coated mirrors working at an incidence angle of 3.6 mrad. The Er L_{III}-edge spectra of all of the samples were measured in fluorescence mode by a 13-element HP Ge detector, cooling the samples at 80 K to reduce thermal vibrations. The preliminary results obtained are summarized in the following points:

1) The effect of the applied electric field on the Er site is negligible: the XANES and EXAFS spectra of a virgin glass and of the back side of a field assisted ion-exchanged glass are the same. This is valid for all the matrices.
2) For the Li2O:Ba2O:La2O3:TiO2:SiO2:Er2O3 (TS) glass, the Er site is completely unaffected by the ion exchange process: the XANES (Fig. 1 left) and EXAFS spectra (Fourier transform moduli (FT) in Fig. 1 right) look the same before (red curve) and after (blue and green curves) the ion exchange process in different conditions.
3) In the Li2O:Al2O3:SiO2:Er2O3 (AS) glass, the first (O atoms) and second shell of the Er site are well visible. The ion exchange process can have an effect on the amplitude of the Er white line (Fig. 2, left); moreover, in both ion-exchange samples the amplitude of the EXAFS oscillation is increased with respect to the signal for the virgin sample (the effect is also visible for both shells in the FT moduli in Fig. 2, right); the Er-O correlation that form the first coordination shell around Er seems to be longer after the ion-exchange process.
4) In the Li2O:Ga2O3:GeO2:Er2O3 (GG) glass, the second shell indicates likely a different composition with respect to the AS glass. While the ion exchange process has a small effect on the white line (see Fig. 3 left), it induces an increase of the first and second shell signal (Fig. 3 right), as observed for the AS glass. Work is in progress to quantitatively analyze all these data.

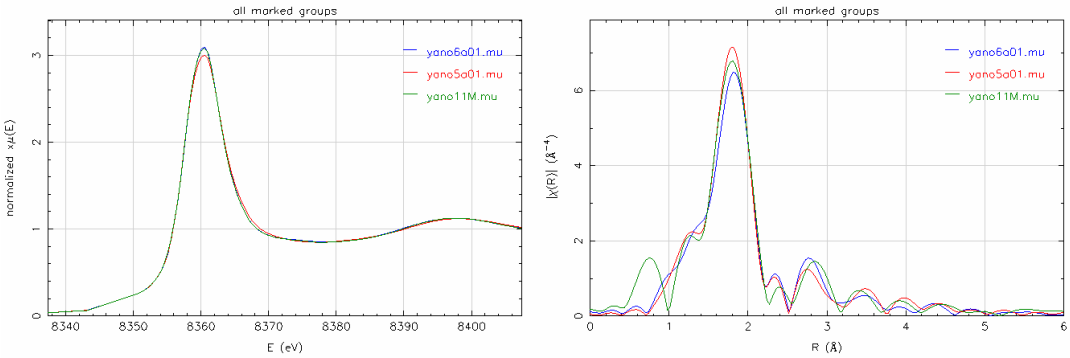

Fig. 1 TS glass

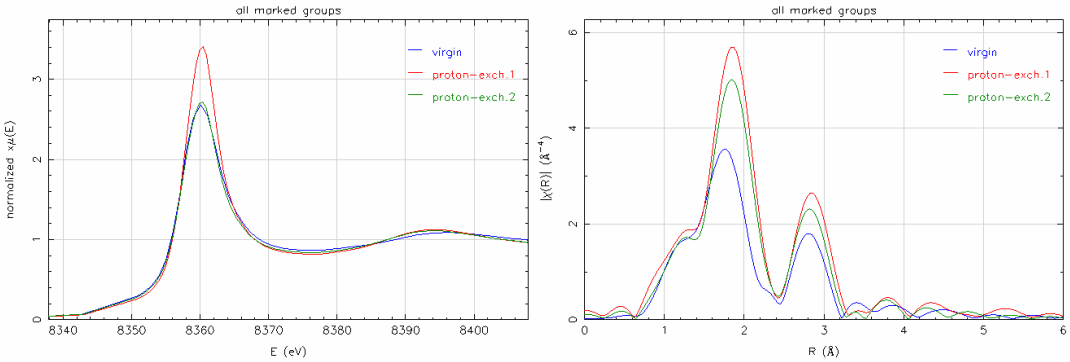

Fig. 2: AS glass

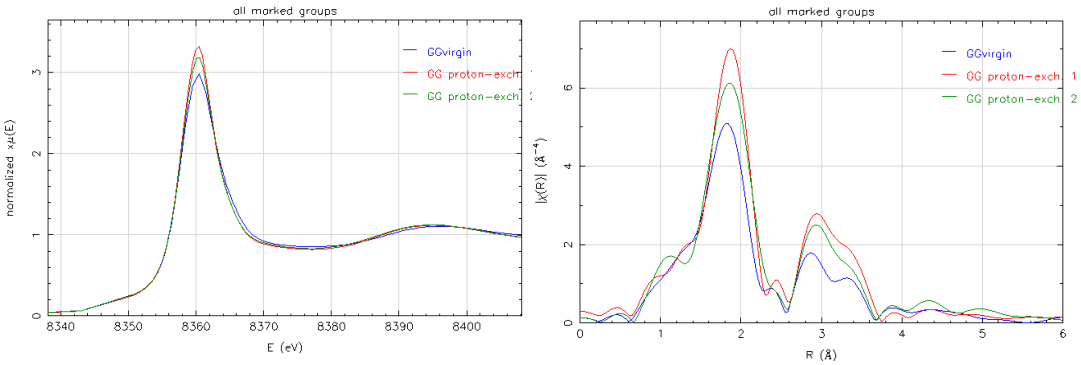

Fig. 3. GG glass