Abstract ID : **100**

Thursday 20 Oct, 12:05

Probing the structural and dynamical properties across the metamictization process in v-SiO2

Erica Alfinelli

The v-SiO_2 is the most widespread basis for all the glasses which can be found in plenty of fields.
Despite the large usage, there are still open questions on its structure and, more important, on the atomic rearrangements after being exposed to external perturbations such as strong radiation fields.
Recent experiments have shown that the strong x-ray beam of brilliant synchrotron sources activate atomic movements via radiolytic processes. In the phenomenon the photon creates a photoelectron which has sufficient energy to break atomic bonds and makes the nearest neighbours to rearrange and change the local configuration [1].
We have investigated this process by means of the X-ray Photon Correlation Technique (XPCS) which is based on the correlation of intensity data and it is sensitive to the density fluctuations providing information on the atomic motions. At the same time we collected also the partial diffraction pattern (the First Sharp Diffraction Peak (FSDP)) of the sample thanks to the extended 2D Eiger4M detector placed ~2 m downstream from the sample stage.
I will show how the metamictization process is evident from the gradual decrease in the intensity and broadening of the FSDP while its dynamics experiences a deceleration.
The glass ends up on a different, probably densified, amorphous configuration in which the ring size distribution changes towards smaller values. The accumulation of radiolytic events makes the glass to undergo a solid-to-solid transition via a non-thermal annealing, possibly corresponding to a different position in the Potential Energy Landscape (PEL) [2] or even to a landscape modification.

References

Hobbs, L. W. & Pascucci, M. R. *Journal de physique colloques*, **41**, C6-237. (1980)

Gupta, P. K . & Kob, W. *J. Non-Cryst. Sol. X*, **3**, 100031. (2019)(DOI: 10.1016/j.nocx.2019.100031)

Primary author(s) : ALFINELLI, Erica (Department of Physics, University of Trento (IT)); Dr. MARTINELLI, Alessandro (4Physics and Astronomy Department, University of Padova,); Dr. DALLARI, Francesco (Hasylab at DESY); ZANATTA, Marco; Prof. BALDI, Giacomo (Physics Department, University of Trento)