	Experiment title: Study of the local structure in chalcogenide Superlattice used for Topological switching Random-Access Memory (TRAM)	**Experiment number**: MA-3172
Beamline: BM08	**Date of experiment**: from: 10/19/2016 to: 10/25/2016	**Date of report**: 11/08/2016
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Report:

$GeTe/Sb_2Te_3$ chalcogenide superlattice samples have been investigated at the Ge-K edge in fluorescence mode. The machine was in 7/8+1 multibunch mode allowing EXAFS measurement thanks to the high flux. The samples were mounted on the GIXAS setup in order to make data collection at low incidence angle (2 deg) with a parallel polarisation. All samples were measured at 100K allowing an intensity exaltation of the EXAFS signal at high k. Different references and superlattices were successfully investigated, in particular:

- GeTe and $Ge_2Sb_2Te_5$ reference samples. $k^2\ \chi(k)$ spectra of crystalline samples are plotted in *Fig.1*.

- [$GeTe/Sb_2Te_3$] superlattice samples of 24 periods with optimized thickness of 0.7 nm for GeTe layer and Sb_2Te_3 spacing layer thickness of 1, 2, 4 and 8 nm respectively. Evolution of $k^2\ \chi(k)$ spectra depending of the Sb_2Te_3 layer thickness is given in *Fig.2*.

- [$GeTe/Sb_2Te_3$] superlattice samples as a function of deposition conditions (growth temperature, substrate preparation).

Finally, data on 16 samples were succesfully collected with sufficient signal to noise ratio to permit a complete quantitative data analysis. This should in principle permit to understand the Ge environnement in $GeTe/Sb_2Te_3$ superlattice samples.

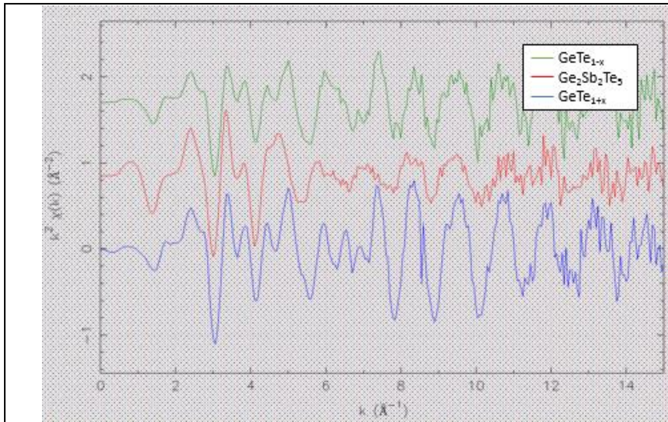

Fig.1: EXAFS spectra of references

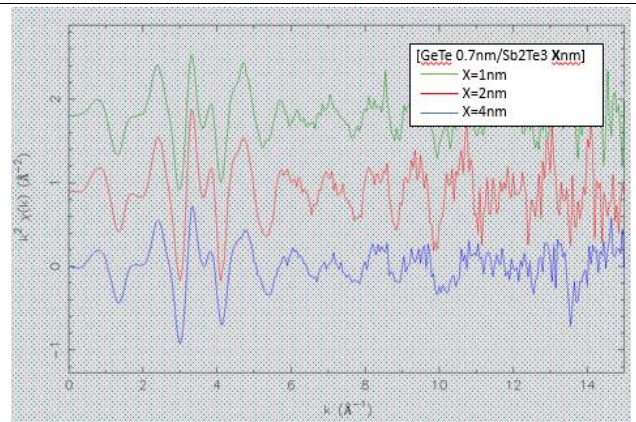

Fig.2: EXAFS spectra of $GeTe/Sb_2Te_3$ superlattices with different Sb_2Te_3 layer thickness

Prelimimary data on a GeSe device shows a possible analysis of Ge environment through TiN electrodes. The EXAFS spectrum of the device is given in *Fig.3*. It will be the object of a forthcoming proposal.

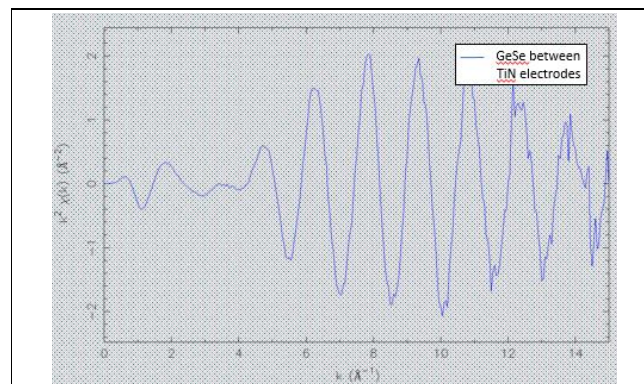

Fig.3: EXAFS spectrum of GeSe thin film beetween two TiN electrodes