ESRF	**Experiment title:** Direct observation of atomic-scale shear band dynamics in metallic glasses	**Experiment number**: HC-3749
Beamline:	**Date of experiment**: from: 19 july 2018 to: 24 july 2018	**Date of report**: 15/09/2018
Shifts:	**Local contact(s)**: Yuriy Chushkin, Federico Zontone	*Received at ESRF:*

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Report:

We measured samples of metallic glass Pd40Ni40P20 with different preannealing and mechanical deformation states. The main aim of the experiment is to unveil the differences in microscopic dynamics between the different states. We detail following some of the main preliminary results after the first analysis of the data.

1st sample (ann_ascast): Pd40Ni40P20 rod of 5mm diameter. After casting it was annealed at 250C during 6h. A disk was polished until approx. 40 microns thickness. The disks were cut in four pieces. One piece was introduced in the sample holder for XPCS.

Figure 1 shows and example of the change in dynamics at 150C and 200C.

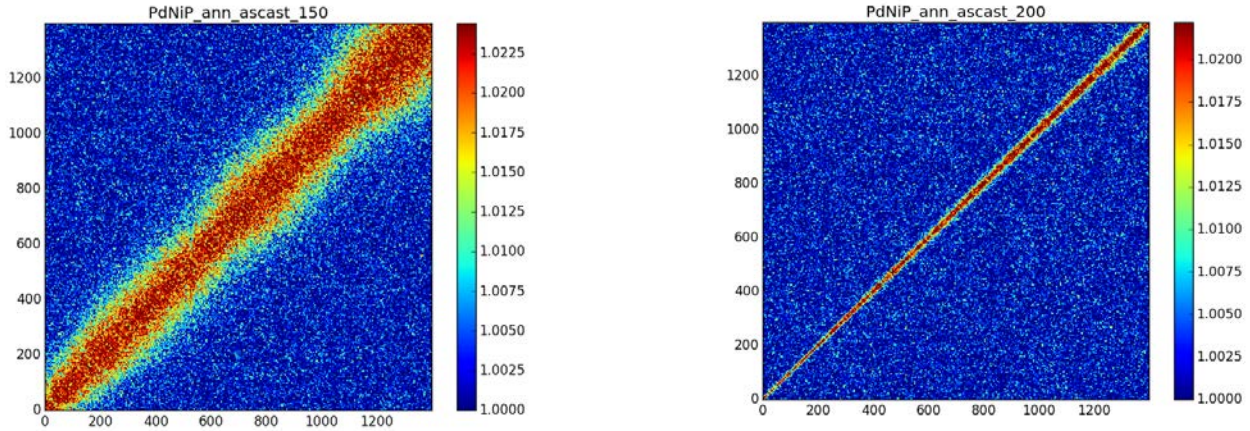

Figure 1

The g2 functions were calculated and analysed in terms of temperature and waiting time for all te samples measured. For the first sample we show below the obtained g2 functions (Figure 2) and the evolution of the relaxation time (Figure 3).

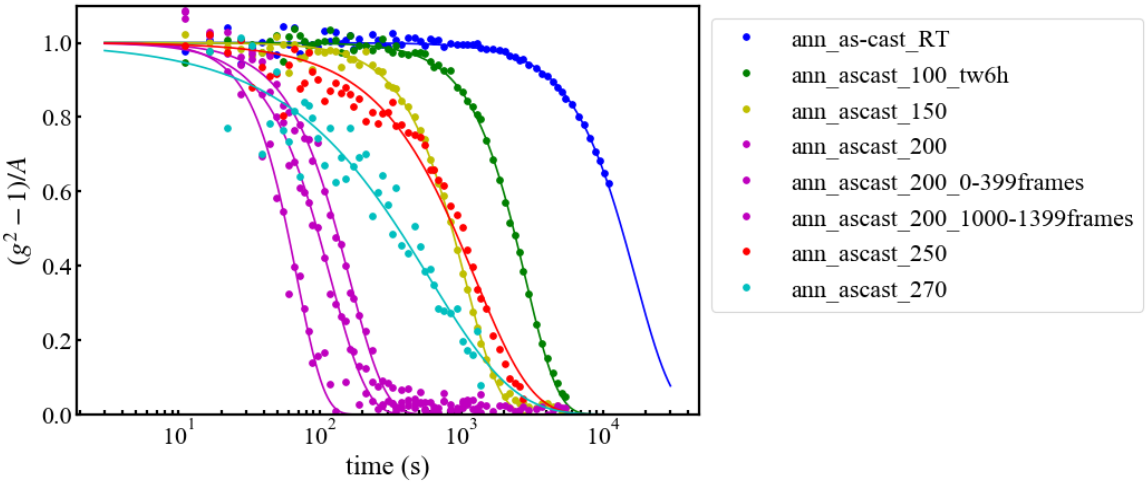

Figure 2

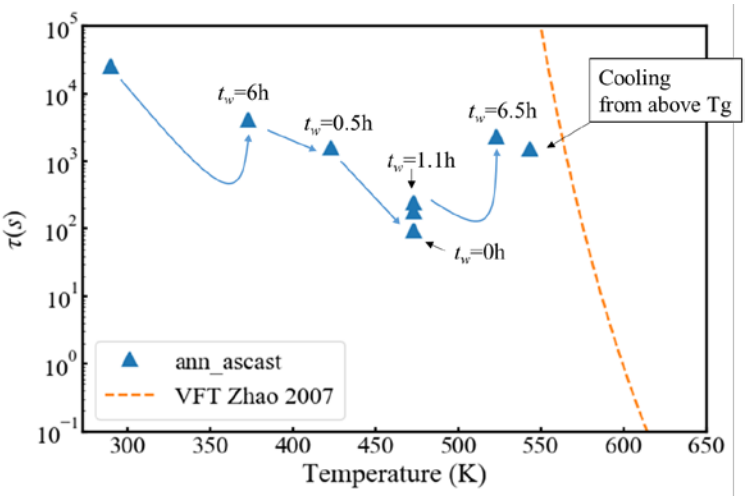

Figure 3

A similar study was performed for the following samples. **2nd sample (ann_100HPT):** Pd40Ni40P20 rod of 5mm diameter. After casting it was annealed at 250C during 6h. After annealing the sample was deformed by high-pressure torsion for 100 revolutions. Approx. 40 microns thickness. **3rd sample (ann_3HPT):** Pd40Ni40P20 rod of 5mm diameter. After casting it was annealed at 250C during 6h. After annealing the sample was deformed by high-pressure torsion for just 3 revolutions. Approx. 40 microns thickness. **4th sample:** Pd40Ni40P20 rod of 5mm diameter. After casting it was annealed at 250C during 6h. After annealing the sample was deformed by high-pressure torsion for 10 revolutions. Approx. 40 microns thickness. For this sample only room temperature was measured. **5th sample (asquenched):** Pd40Ni40P20 rod of 5mm diameter as-quenched. Approx. 40 microns thickness. Same protocol of sample 2 and 3 but only 200C can be reached before finishing the experiment.

Figure 4 compares the relaxation times observed for the different samples, indicating a clear rejuvenation effect in the deformed samples. A more fine analysis is currently being performed in order to determine if the deformation introduces changes in the shape of the decay of the correlation functions or the aging response in comparison with the states obtained by rapid quenching.

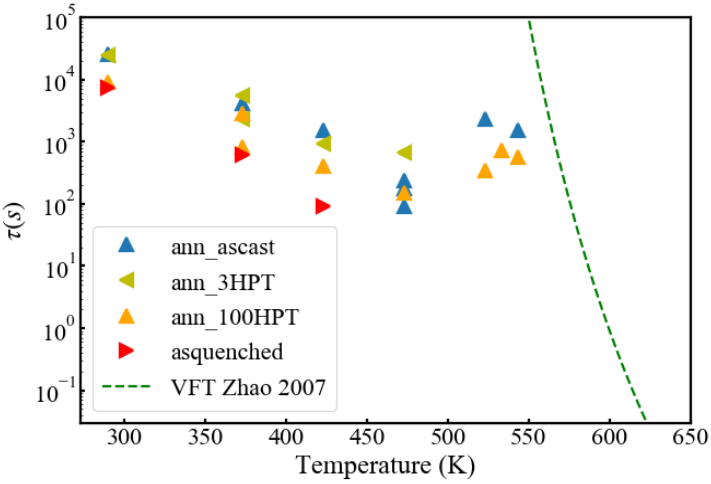

Figure 4

Due to some experimental problems during the first two days we could not follow long isotherms at high temperatures, as we decided that was better to see the differences between samples of different deformation and we had then no time for applying long protocols to various samples. It would be interesting to follow the aging by XPCS at certain temperatures and see the influence of deformation state in to the aging path and the final state reached in a new proposal.