ESRF	**Experiment title:** In situ study of the deformation behavior of “gum metal“	**Experiment number**: MA2266
Beamline: BM32	**Date of experiment**: from: 18.02.2015 to: 24.02.2015	**Date of report**: 27.02.2015
Shifts: 18	**Local contact(s)**: Dr. Jean-Sébastien Micha	*Received at ESRF:*

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Report:

Aim of the performed experiment was to study deformation mechanisms present in micron sized gum-metal pillars. Therefore, we produced 5x5x15µm³ sized micro pillars with focused ion beam milling (produced by Minjie Lai, MPIE). The samples were entirely single crystalline without any vissible FIB damage in the Laue patterns.

12 samples with different crystal orientation had been analyzed in the undeformed state by detailed mesh scans. Subsequently, the x-ray beam measuring 650x650nm² was placed in the sample center. Displacement (10nm/s), force and Laue patterns were recorded simultaneously.

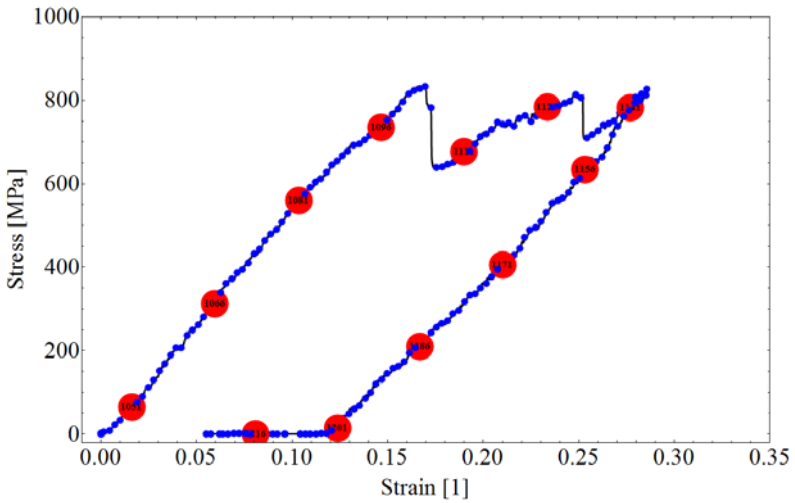

Figure 1: Stress vs strain curve with superimposed image numbers. At the first load drop (0.15 strain) a new phase appears.

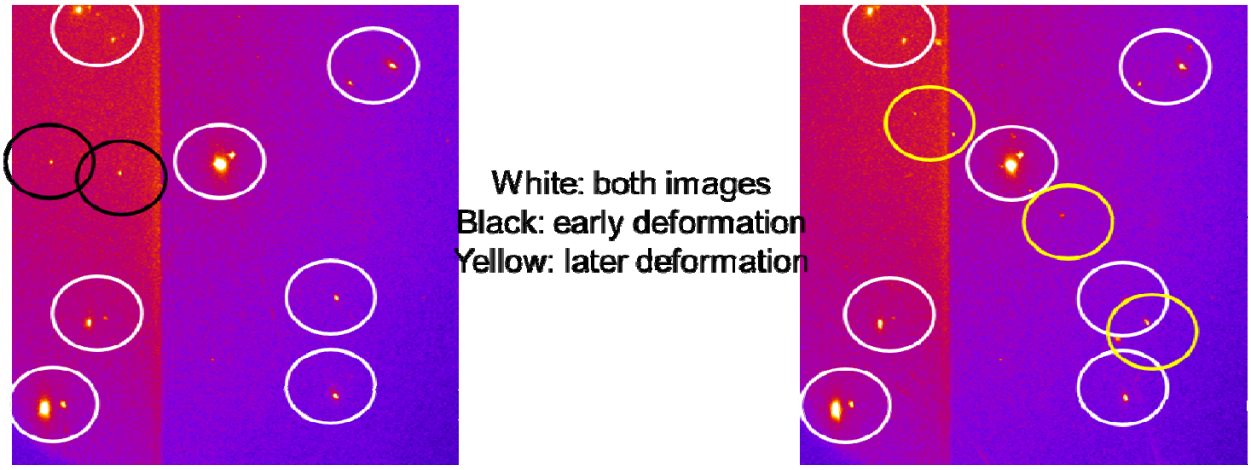

Figure 2: Most reflections (white) keep beeing vissible during deformation. Since the entire sample rotates due to slight misalignments in the mechanical experiment also the peaks slightly shift. However, yellow marked spots appear during load drops and black ones disappear. This is accoiated with a stress induced phase change. However, the data needs to be thoroughly analyzed and the phase needs to be unambigously identified.

The data well allows for analyzing the deformation behaviour of gum metal. Besides the phase change we were also able to see large peak streaking which is accociated with storage of geometrically necessary dislocations.

The experiment MA2266 went very well: The x-ray beam size, it´s position and stability was better then ever before. The observed beam drift was less than 3µm during 18 shifts! The interplay of our deformation rig (SSD) and the beamtime needs to be improved, since the strong airconditioning reduces the force resolution of the setup. Wind shielding of the load cell will therefore be implemented before the next beamtime.

The analysis of the data recoreded starts now. In the future we plan to test more sample orientations and also different heat treated samples.