ESRF	**Experiment title:** In situ high energy X-ray characterization of a new iron based shape-memory alloy with giant super-elasticity	**Experiment number**: **MA-1261**
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Report:

A novel Fe-based shape memory alloy was recently discovered by Tanaka et. al. [1]. This material has shown one of the highest recoverable superelastic strains ever reported. In addition, it shows a very high strength of ~1.0 GPa and very large damping capacity. In this study, we have characterized both the parent austenite and the reversible martensite phase responsible for the superelasticity. The texture of the parent material was characterized using neutron diffraction while in situ tension experiments were conducted in a synchrotron, high energy x-ray beam to characterize the crystallography of the martensite phase and to quantify the amount of martensite phase. Furthermore, processing of these alloys was investigated by rolling the polycrystalline samples to varying amounts and measuring diffraction patterns at several orientations.

[1] Y. Tanaka, Y. Himuro, R. Kainuma, Y. Sutou, T. Omori, and K. Ishida. Ferrous Polycrystalline Shape-Memory Alloy Showing Huge Superelasticity. Science 327, 1488 (2010)

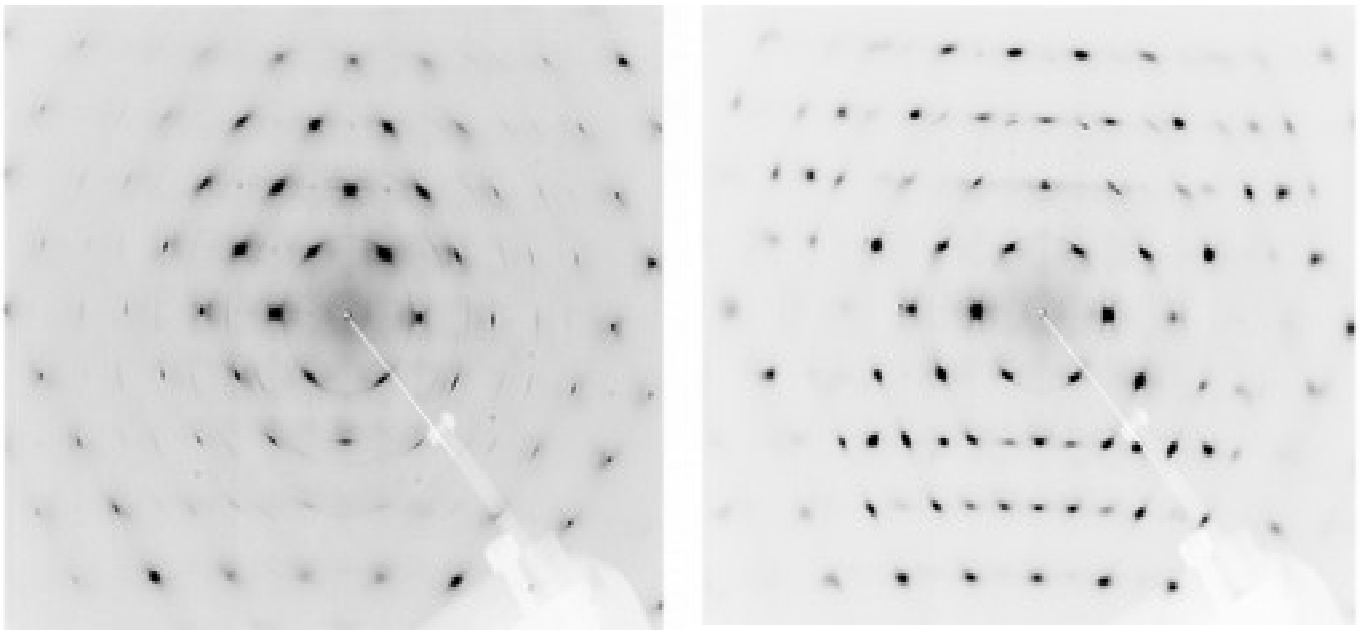

Figure 1: diffraction images of undeformed (left) and deformed specimen (right).

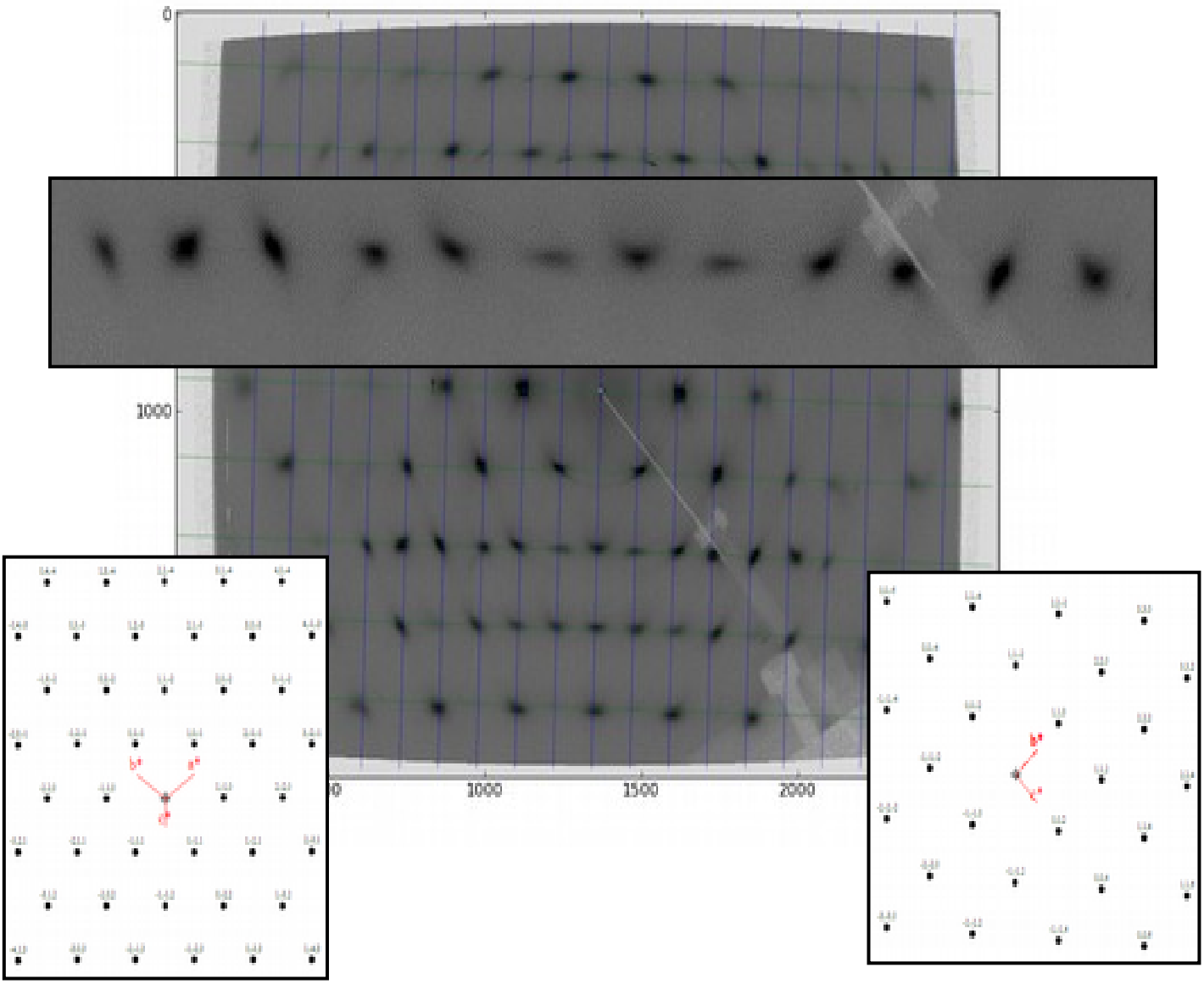

Figure 2: Diffraction images have been corrected to linear reciprocal-space maps and the tranformation from austenite (left scheme) to martensite (right scheme) is seen by additional sets of reflections, as emphasized. There are also diffuse scattring streaks revealing some mechanism of transformation.

Further analysis and publication under consideration.