ESRF	**Experiment title:** Diffraction imaging investigation of the magnetization process in hematite, a weak ferromagnet with vanishingly small basal plane anisotropy.	**Experiment number:** HS-567
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Report:

The magnetization process in low anisotropy materials is interesting because it can differ from the transition elements compounds standard ones, where the predominant magnetization mechanism is the domain wall movement. A small anisotropy can lead to a situation where the rotation of the magnetic moments is a competitive mechanism in the presence of a non-negligible pinning of the walls.

The sample is a (111) plate of dimensions about 9x6 mm2 and thickness 1.2 mm. The experiments were performed on the beam line ID19, at the ESRF (Grenoble). The field was applied parallel to the $[01\bar{1}]$ direction (the second order axis in the basal plane) up to 2.4 105 A/m, from the demagnetized state to the saturation of our sample. Sections were taken with a 5 mm slits and images were recorded on Kodak Industrex SR films. Exposure times were around 30 seconds. The crystal-to-film distance was about 20 cm.

We have performed horizontal (parallel to [011]) section topographs in white beam at different heights in the sample by translating the slits . An example of a section appears in the figure. The experiment shows:

1) The walls are seen as dark lines roughly parallel to the surface.

2) The visibility of the dark lines depends on the region of the sample and on the applied field.

3) Walls are not very mobile, since the line position does not change a lot between images registered in a increasing field.

4) Walls are pinned by defects, which are also roughly parallel to the surface and are still visible in the saturated state.

The conclusions from these points are: i) The change in line visibility indicates a magnetic inhomogeneity. It could be related to a variation through the sample of the change in magnetization across the wall; ii) The magnetization process takes place mainly by spin rotation. Thus, we have checked that in this low anisotropy material the wall movement is not any longer the predominant mechanism, the rotation of the magnetic moments within the domains being competitive to build up the sample magnetization as soon as a non-negligible pinning is present.

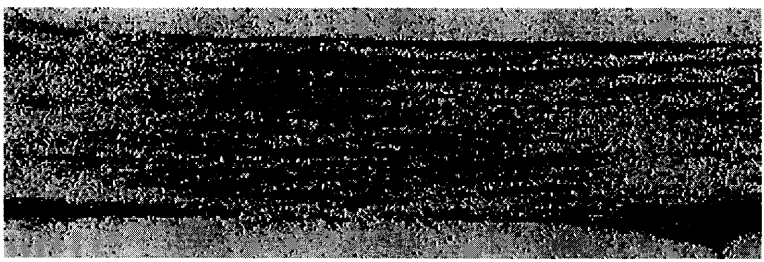

Figure. Section topography of hematite