

We performed measurements at the D2AM beamline using the Kappa diffractometer equipped with a close-looped He cryostat. We report no significant problems and were totally satisfied regarding the x-ray source, the optics or the experimental set-up prepared by the beamline staff. One problem concerned a communication breakdown between the Lakeshore temperature controller and the SPEC session with the consequence of some beam time loss evaluated to about 8 hours. The ESRF staff in charge of the connectivity on the network responded and identified the source of the problem being one Lakeshore ethernet setting not properly supported by one ethernet switch, a fix was proposed and the problem did not occur again during our beamtime. The ARS cryostat operated steadily, but the base temperature was only 40 K, the problem was communicated to the ARS company, and will be investigated by the staff with our team. This base temperature was a limitation only for the last hours of our beam time because we could not go below the phase transition temperature of our second sample. In conclusion we are globally satisfied with the conditions of our experiment.

The goal of our experiment was achieved with the identification of the phase transition in a thin film consisting of a few unit cells, the low temperature phase being only 4 unit cells thick. In Figure 1 we show diffraction and thickness fringes telling about the high quality of our sample, the same had been fabricated by our team specifically for this experiment. Figure 2 shows the energy spectra at Q constant evidencing an electronic phase transition. The second sample, 5 unit cell thinner did not show such transition, down to 40 K. Some data are still being processed and a publication is in the writing stage.

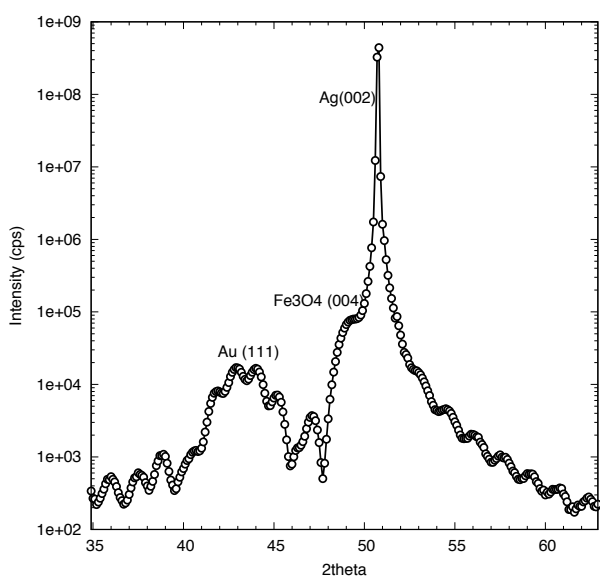


Figure 1. theta/2theta scan along (00L) direction of the (001)-oriented magnetite film.

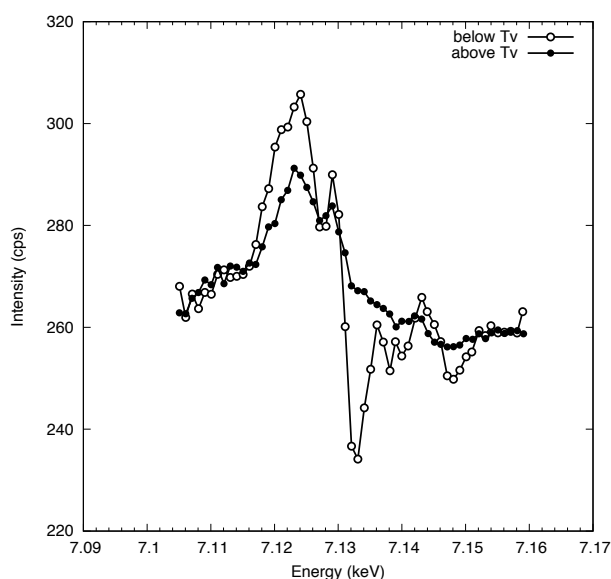


Figure 2. Energy spectra at fix Q, above and below the phase transition, evidencing the change in the electronic/structural properties.