

Report on experiment 32-02-772

In-situ micro-diffraction study of the current – induced metal - insulator transition in VO₂ materials and associated devices: thermal (Peierls) versus electronic (Mott-Hubbard) phase transition mechanisms.

31 Oct. 2014 – 4 Nov. 2014

The purpose of the present experiment was to map out the spatial distribution of the metallic (quadratic) and insulating (monoclinic) phases of VO₂ films epitaxially grown on sapphire substrates during the metal-insulator transition. The materials have been patterned with electrodes and mounted on a compact Peltier stage so as to monitor *in-situ* the diffraction signal and the electrical properties as a function of both temperature and injected current.

The materials have been characterized using laboratory XRD prior to experiments, and a clear diffraction signal from VO₂ was observed, even for the thinnest films.

Surprisingly, at the BM32 beamline in the micro-Laue configuration (beam size 0.5x0.5 μm²), absolutely **no diffraction signal could be recorded from the VO₂ films**. After 2 days, we aborted the run.

The reasons for this lack of signal is unclear (especially considering that a signal is observed on a laboratory diffractometer with a large conventional beam) and is still investigated.