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| | **Experiment title:**<br>High energy angle resolved photoemission study of V2O3 | **Experiment number**:<br>HE-2231 |
| **Beamline**:<br>ID08 | **Date of experiment**:<br>from: March 7, 2007 to: March 13, 2007 | **Date of report**:<br>2007-08-31 |
| **Shifts:**<br>18 | **Local contact(s)**:<br>Julio Cezar | *Received at ESRF:* |

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## Report:

The aim of the proposed experiment was to study the valence band dispersion of V2O3 and in particular the recently observed near Fermi edge resonance only observable at high photon energies. Unfortunately the experiment was highly unsuccessful for two reasons. First of all, the majority of the beam time was lost due to an electronics problem that prevented the running of the Scienta electron energy analyzer and only at sporadic occasions were we able to perform measurements. This matter of affaires made any systematic measurements impossible during the beam time and only at the very end of the beam time was a definite solution to the problem found. As a result, a very limited amount of data was collected. Since the aim of the experiment was to measure V2O3, which is a very difficult to cleave material, a specially designed sample holder (Fig.1) with an on-board sample cleaver had been manufactured. Despite the possibility of careful ex-situ alignment of the samples the few attempts of cleaving that were possible in the limited amount of time remaining did not result in any satisfactory cleave. One of the more promising results is shown in Fig. 2. The data in the figure has had a constant background subtracted from each momentum distribution curve (MDC) and the result shows a too poor data quality but in any case a distinct angular dependence. In this respect the result is promising and if further progress can be made in cleaving the samples and/or if a smaller beam spot can be obtained at the beam line another attempt to measure this system will be well worth the effort.

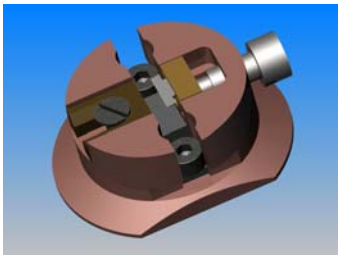

*Figure 1. Sample holder with on-board cleaver*

At the very end of the beam time, a test spectrum on ZnO was recorded in order to evaluate the possibility of performing a detailed study of this system at a later time. The result of this test was very promising and is shown in Fig. 3. Here a clear dispersion of two hole-bands of different mass can be clearly distinguished in going from the Γ point in direction of the K point at the Brillouin zone boundary. At higher binding energy the weakly dispersing Zn 3*d* bands can also be observed. Encouraged by this result and the fact that ZnO is a material with strong current interest for optical device applications and spintronics, a more detailed study of the electronic structure of this system is planned for the near future.

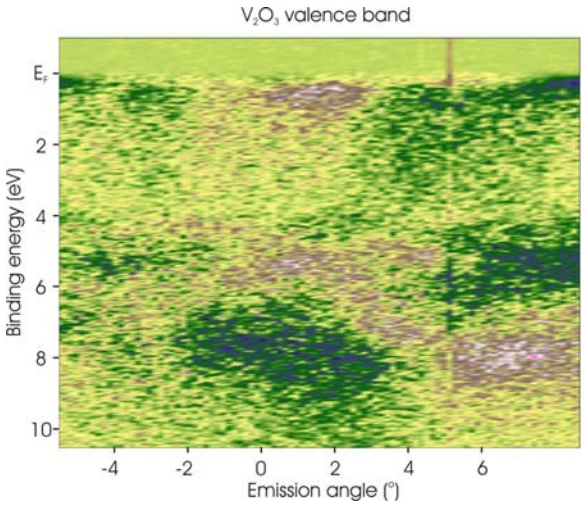


*Figure 2. Valence band data from V2O3 recorded with 600 eV photons at 200K*

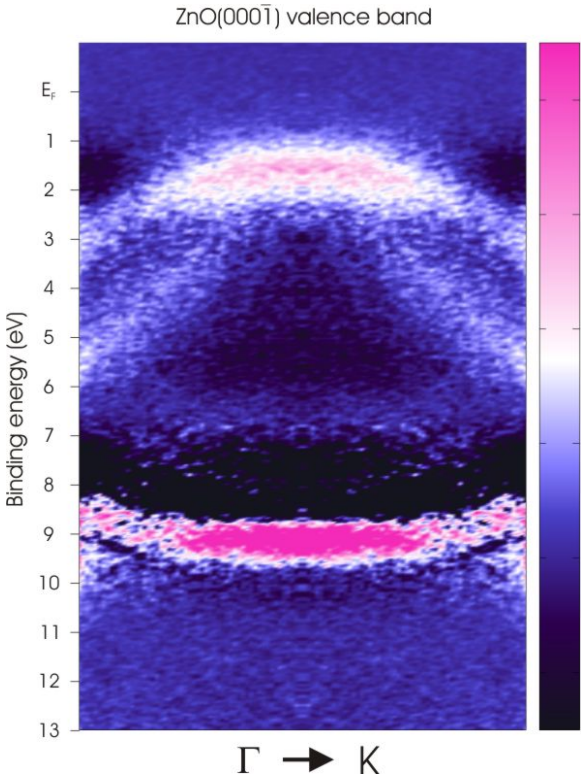


*Figure 3. Valence band data from ZnO recorded with 595 eV photons at room temperature*