

## Experiment Report Form

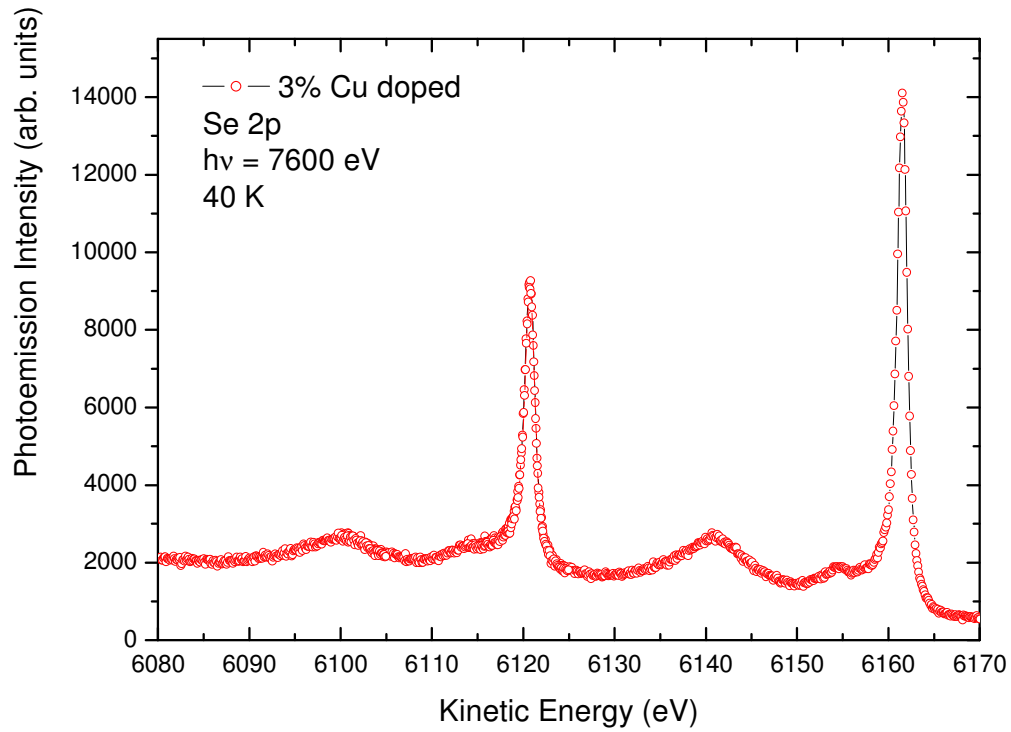


	<b>Experiment title:</b> Doping dependence in the anomalous metal $\text{Cu}_x\text{TiSe}_2$	<b>Experiment number:</b> HE2881
<b>Beamline:</b> ID16	<b>Date of experiment:</b> from: 24 Jan 2009                      to: 27 Jan 2009	<b>Date of report:</b> 05 Aug 2009  <i>Received at ESRF:</i>
<b>Shifts:</b> 9	<b>Local contact(s):</b> Laura Simonelli	
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### Report:

We have measured single crystals of  $\text{Cu}_x\text{TiSe}_2$  ( $x = 0.3$  and  $x = 0.6$ ) compared with parent  $\text{TiSe}_2$  compound, with photon energies  $h\nu = 7600$  eV; this photon energy corresponds to roughly 10 nm of information depth, and guarantee bulk sensitive information. Experiments have been performed on high quality single crystals with reflective flat surfaces, grown and characterized at Univ. Princeton. Sample have been cleaved in UHV, at both low (40K) and high (300 K) temperature. Due to the reduced amount of beamtime scheduled (9 shifts allocated with respect to the 18 shifts requested) we have focused our experimental plan on the Se 2p core level and on the valence band spectra vs. Cu doping.

Fig.1 shows Se 2p core level measured at 7600 eV of photon energy. One observes the presence of multiple satellite features at the high binding energy side of each spin orbit partner peak. The analysis of such satellite structures is now ongoing, with the aim of understand the nature of the satellites (extrinsic, intrinsic, plasmon features, etc..) and to evaluate the degree of metallicity of the system vs. doping, following the same approach of F. Offi et al, Phys. Rev. B 76, 085422 (2007), where Si 2p losses have been analysed.



*Fig.1: Se 2p core level as measured at  $h\nu = 7600$*

Fig. 2 presents the results obtained on valence band spectra, compared to ref. Fermi edge from gold. In this case, the doping dependence did not show important differences, apart a small transfer of spectral weight in the region about 2.5 eV, probably due to the relaxed energy resolution (250 meV).

We expect, after completion of data analysis, to submit a short paper with the main results

*Fig.2 Valence band spectrum with reference gold Fermi edge*

