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Report:

Exp 08011007 aimed at the structural characterization of thin Sn film deposited on different substrates in order to detect the formation of Stanene on the sample surface. An analogous experiment (MA-1983) was previously carried out on Ge thin films on Ag and Ag/AlN and in this case the formation of Germanene was revealed by the detection of short Ge-Ge correlations only compatible with the presence of sp^2 hybridized bonds [daca-16]. Also in the case of tin the Sn-Sn bond length from ab-initio calculations and crystallographic data is expected to change from 2.81 Å of sp^3 Sn (white tin) to 2.77 Å in stanene (sp^2 hybrid.) so safely detectable by XAS.
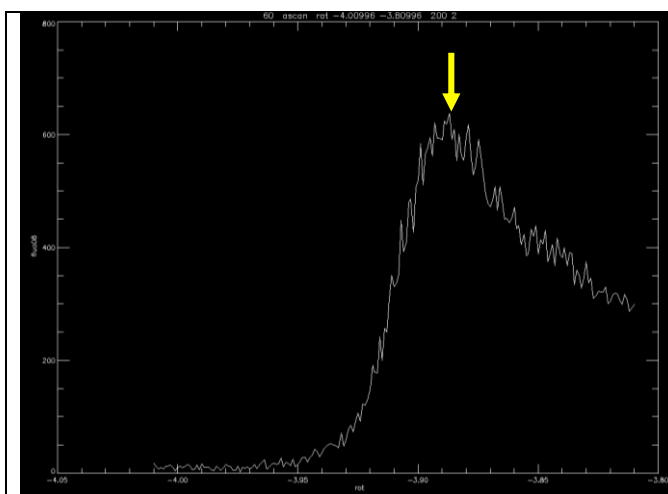
Fig.1: Typical plot of the Sn-Kα line yield from the sample versus the incidence angle. The arrow
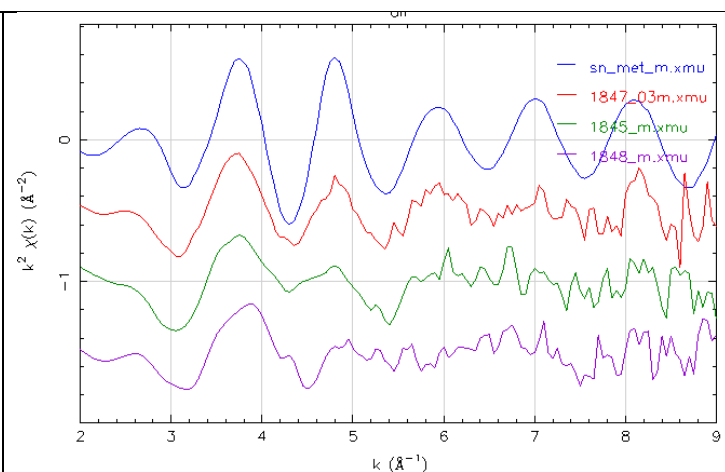
Fig 2: EXAFS spectra of thin Sn layers (4-8 Å) on different substrates (red: Ge, green AlN, purple: Bi_2Te_3)

marks the chosen angle for data collecion corresponding to an absolute value of 0.1 deg.	

The experiment was carried out in the ReflEXAFS facility of the beamline in order to minimize the signal from the substrate and maximize the signal from the sample. Typical grazing angle values used for data collection were about 0.1 deg (Fig.1). Fluorescence detection was collected using a 12 elements High Purity Ge detector array and several spectra per sample were acquired in order to achieve a good signal to noise ratio. The results are shown in Fig.2: differences are observed in different substrates respect to the metallic Sn model and the quantitative analysis is presently ongoing.

The experiment was supposed to use 18 shifts of beamtime split in 2 sessions in order to analyzed freshly prepared samples in different conditions. Unfortunately, problems with the deposition chamber prevented the preparation of the samples for the second session and at the end only 9 shifts were used.

References

[daca-16] d'Acapito, F.; Torrengo, S.; Xenogiannopoulou, E.; Tsipas, P.; Velasco, JM.; Tsoutsou, D.; Dimoulas, A., *Evidence for Germanene growth on epitaxial hexagonal (h)-AlN on Ag(111)* J. Phys. Condens. Matter, **28**, (2016) 045002. DOI: 10.1088/0953-8984/28/4/045002.