Supplementary information for 'Observation of surface states on heavily indium doped SnTe(111), a superconducting topological crystalline insulator'

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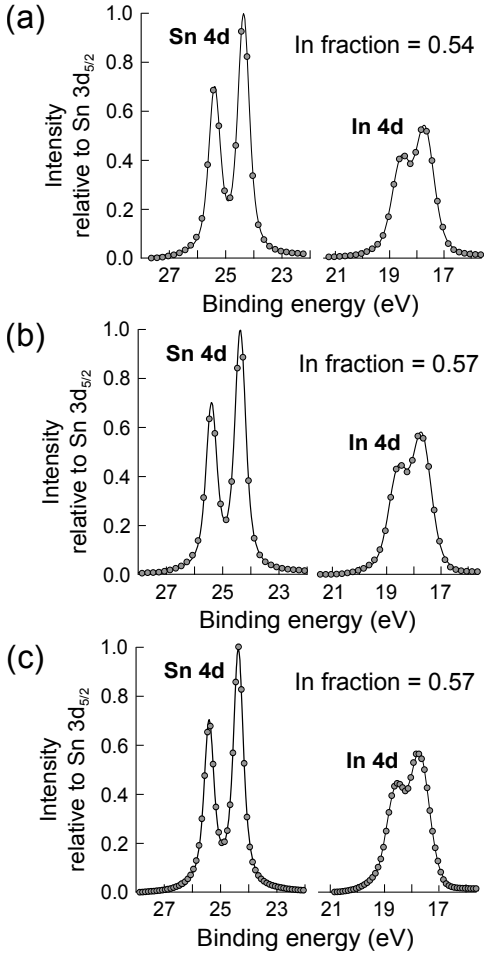

FIG. 1. Normal emission UPS spectra (hν=80 eV) of the 4d core levels of Sn and In for three different cleaved (001) surfaces of single crystal $Sn_{0.6}In_{0.4}Te$.

In Figure 1 we perform a UPS quantification analysis on bulk crystals of $Sn_{0.6}In_{0.4}Te$, grown from the same source material as the thin films in the manuscript, using a modified bridgemann technique[1]. In contrast to the thin films, here the composition is uniform and hence the true stoichiometry ($x = 0.40$) is easily established by energy dispersive x-ray spectroscopy (EDX) to within an uncertainty of 2%. The same UPS quantification technique as employed in the manuscript[2] yields an average indium fraction of $x = 0.56$, which is very close to the value initially obtained for Film 1 in the manuscript ($x = 0.58$). The discrepancy between the UPS and EDX measurements suggests that the theoretically calculated cross sections should be slightly corrected. Rescaling the result to match the EDX measurement and then applying the same scaling to the film measurements in the manuscript yields new indium fractions of $x = 0.41$ and $x = 0.23$.

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[1] G. Balakrishnan, L. Bawden, S. Cavendish and M. R. Lees, Superconducting properties of the In-substituted topological crystalline insulator SnTe, Phys. Rev. B 87, 140507(R) (2013)

[2] Area quantification was performed by fitting with a spin-orbit split Voigt doublet and Shirley background. The cross sections used were $In4d_{80eV}$=7.13 Mb, $Sn4d_{80eV}$=10.6, obtained from Elettra's "WebCrossSection" service