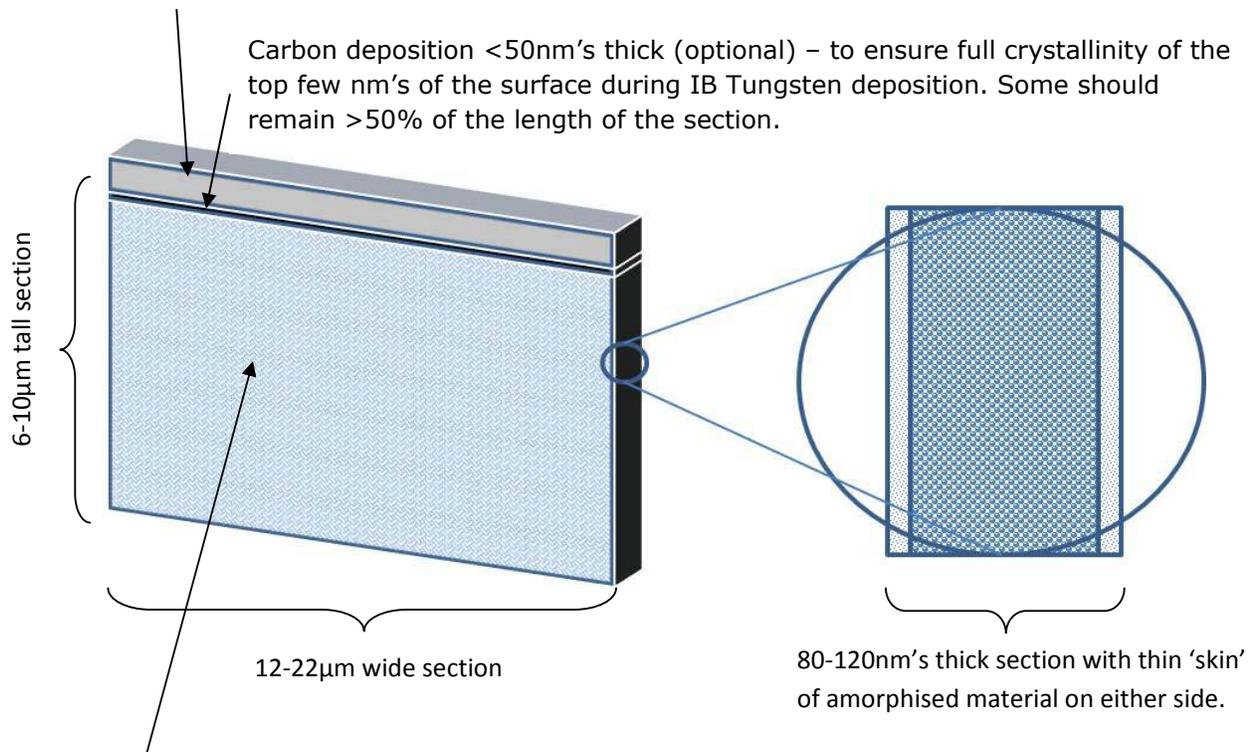


## Anatomy of a FIB prepared ultra-thin section for TEM

What will I see in the TEM?

An Ion beam deposited Tungsten layer  $<2\mu\text{m}$  thick (sacrificial protection required during polishing process) is applied to protect the sample during FIB – it is rarely electron transparent and appears dark under TEM bright field imaging. It is normal for this layer to be completely eroded during section thinning, although some should remain over  $>50\%$  of the length of the section thus guaranteeing full crystallinity in the sample below.



Your sample material, thinned to the target thickness, with parallel side walls

NB. All FIB sectioning is achieved by removing (sputtering) the material away from around the target location. This process leaves a thin 'skin' of material on either side of the polished section, where the crystal structure has been 'modified' by the sputtering process. For most sample materials this does not affect the quality of the TEM analysis, the operator may select a focal plane within the crystalline layer for collecting data from. Some types of TEM analysis may benefit from having this 'skin' to be made as thin as possible, and a low kV cleaning step may be added to achieve this. (see options)

Sample longevity – FIB sections have a very high surface area to volume ratio and therefore some materials may oxidise relatively quickly unless stored under the correct conditions. We recommend that each section be analysed promptly after receipt for best results.

TEM best practice tips - All TEM beams introduce heat and charge to any sample. The higher the kV - the higher the proportion of incident electrons that will pass through that section to form an image and help minimise these effects. FIB sections are mechanically extracted from their bulk material when transferred to a TEM grid, and therefore can have a lower conductance for both charge and heat away from the section. For these reasons we recommend that all TEM analysis is done at 200kV and above, and beam currents are kept to a minimum (at least during the collection of initial results).