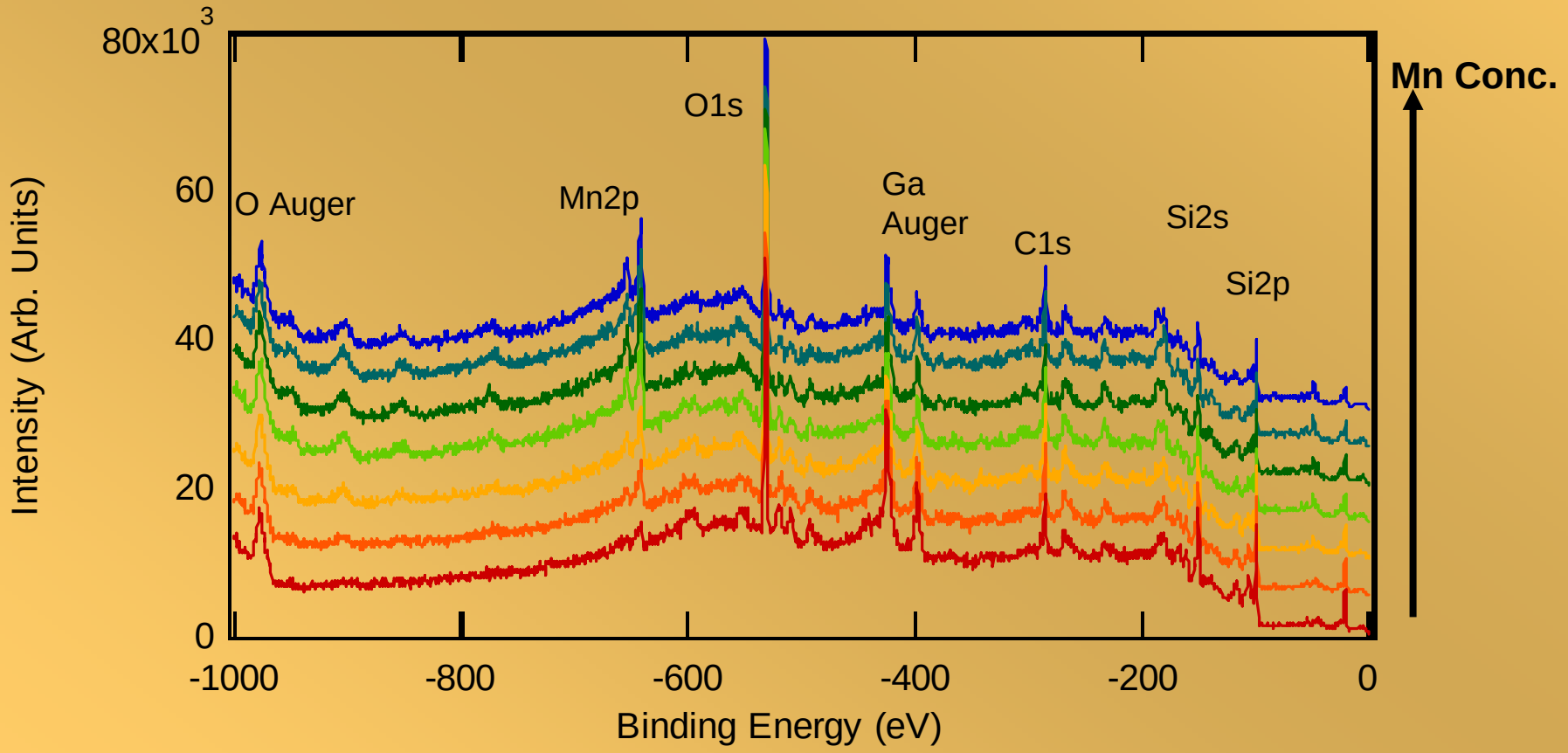
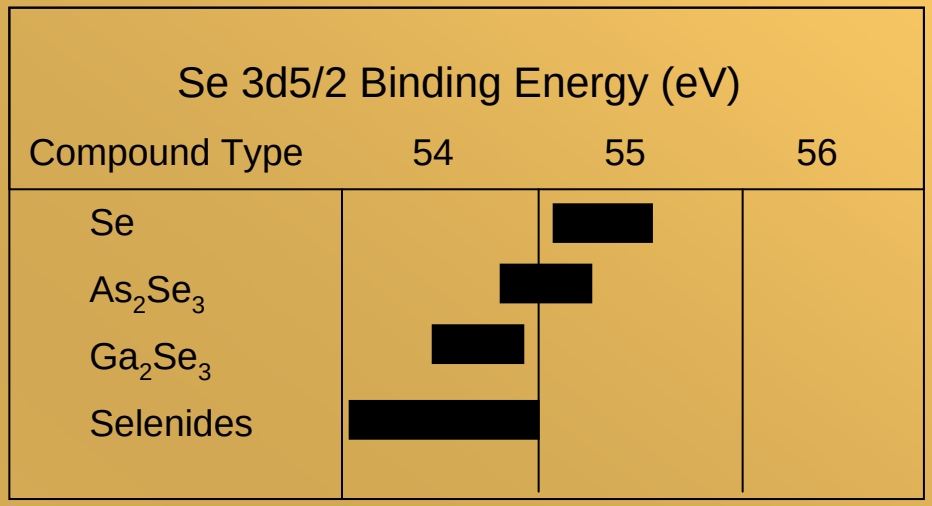
Mn-Doped Ga_2Se_3

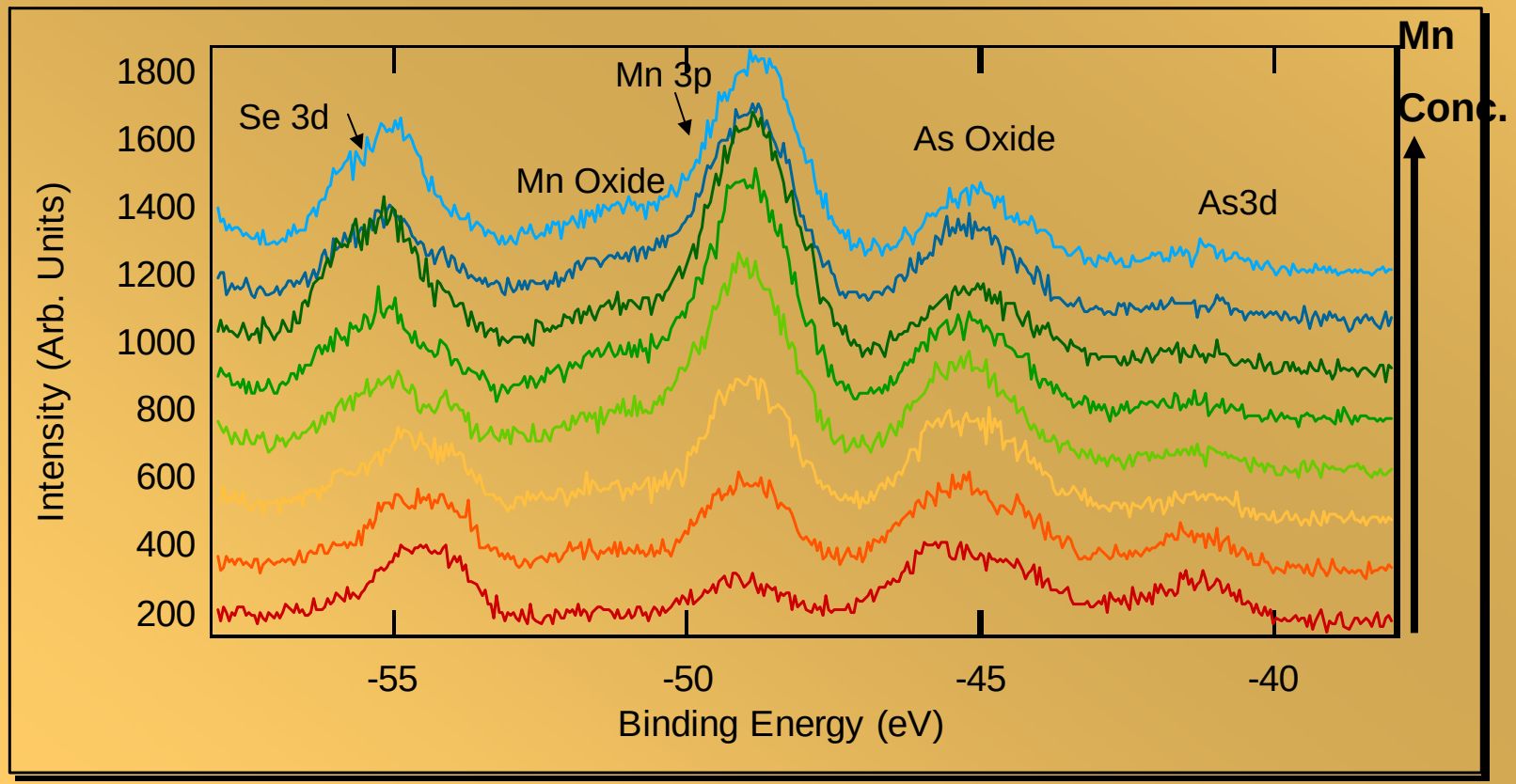
Samples examined were thin films of TM:Ga_2Se_3 grown on an As-terminated Si wafer via Molecular Beam Epitaxy (MBE) at the Advanced Light Source ~1 year ago. Note Oxygen dominance, and presence of oxide peaks.

Mn Gradient across sample ranges from 0 to ~10%. 1mm point spacing.



Mn Doped Ga_2Se_3



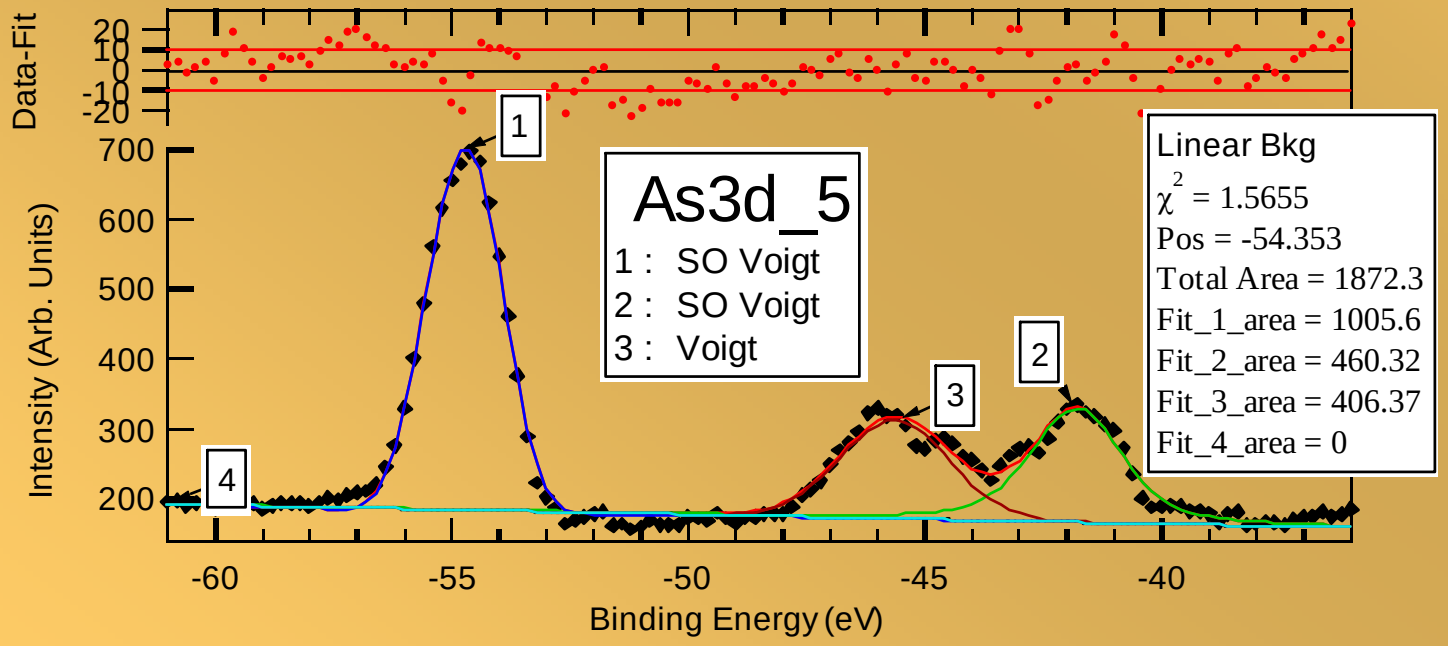


Towards Quantitative Analysis: Igor curve-fitting

Data are curve-fit in Igor Pro 5.0 to determine exact peak locations and areas.

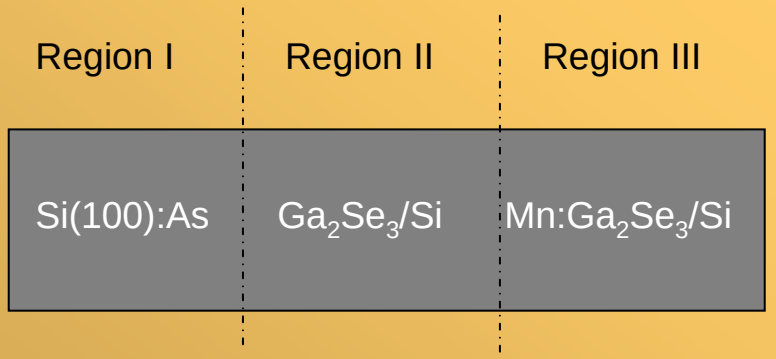
The user can set parameters such as background and peak type, spin-orbit splitting, etc.

Once this information is obtained, a more quantitative analysis can be performed.



Water-Exposed Sample

To explore the resilience of the films, the surface of a 3-sectioned sample was covered in deionized water for ~1min

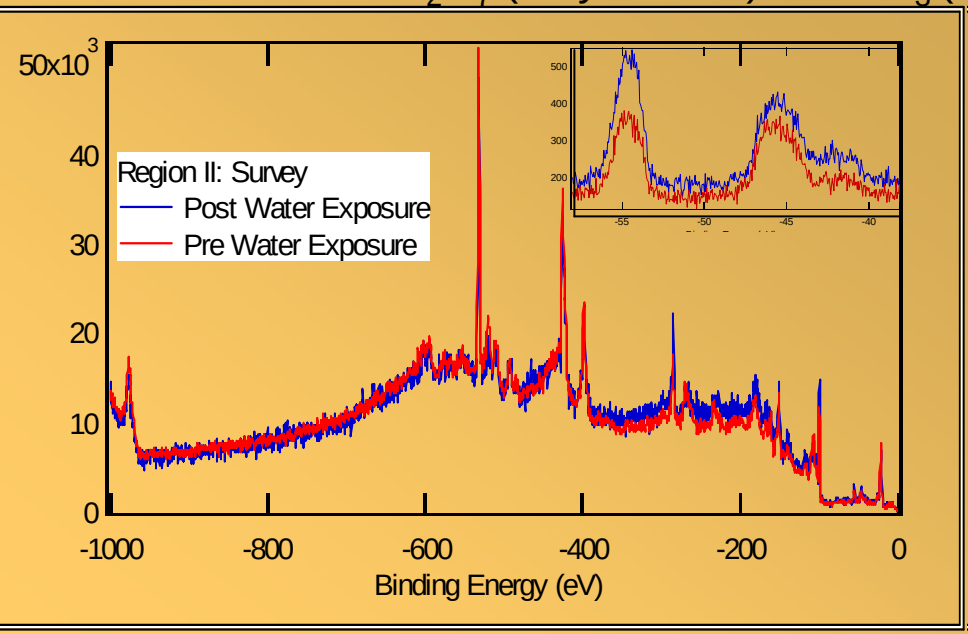


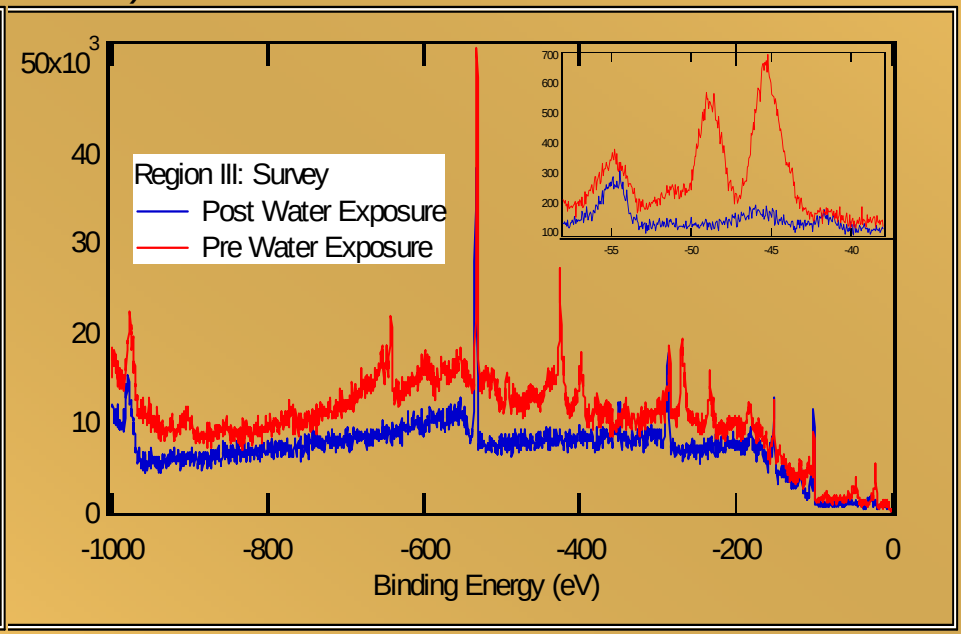
Region II

Essentially unchanged by exposure. Also showed little change when exposed to acetone.

Region III

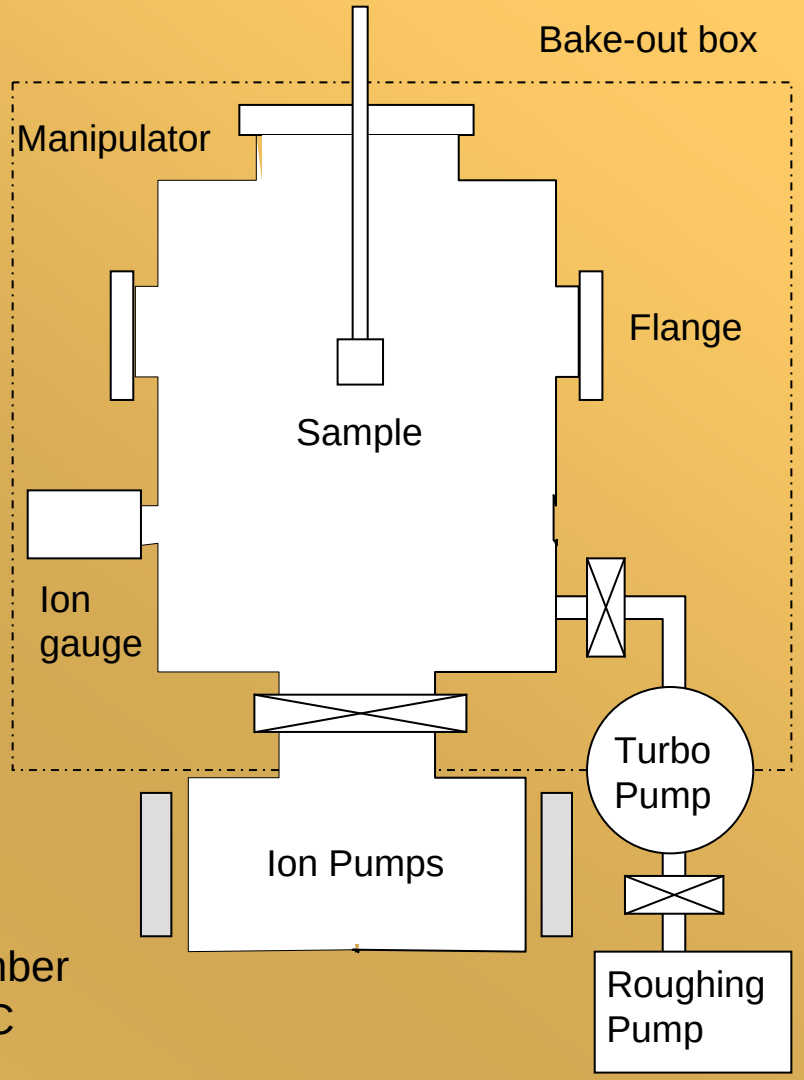
Film mostly gone. Suggests that a particularly soluble Mn compound forms on the surface. Either Mn_2O_7 (very soluble) or MnO_3 (soluble)





Surface science and UHV

Surface sensitive techniques, such as XPS must be performed under Ultra-High Vacuum (UHV) conditions, as the slightest contamination will alter the results. Ambient pressures of $<10^{-9}$ Torr are considered in the UHV range.



Pumping

Each type of pump operates over a limited range, so a combination is needed to reach UHV

Baking

When exposed to air, a water film sticks to chamber walls. Baking the chamber for ~10hrs at 150-180C accelerates the evaporation of the film. The now gaseous contaminants are pumped out.