## MS20-P03 | Raman and Surface Analysis Studies of $(CuGaSe_2)_{0.8}(CuAlSe_2)_{0.2}$ Single Crystals

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Chalcopyrite ternary compounds - Copper Gallium Selenide ($CuGaSe_2$) and Copper Aluminum Selenide ($CuAlSe_2$), belong to the I-III-$VI_2$ group of semiconductors that exhibit a wide band gap and are extensively studied as active elements in optical filters and as absorbing materials in solar cells. To optimize their properties, it is necessary to control their surface characteristics. To this end, the structure and chemical modification of the surfaces of single crystals of the $(CuGaSe_2)_{1-x}$ $(CuAlSe_2)_x$ system, with x = 0.20, grown by chemical vapor transport (CVT), were studied using confocal Raman spectroscopy (CRS), scanning electron microscopy (SEM), energy dispersive spectroscopy(EDS) and X-ray photon electron spectroscopy (XPS). The surface of the crystal was characterized at room temperature, before and after alkali etching, and after $Ar^+$ sputtering. After scanning with a 532 nm laser and a 20x objective lens, Raman maps showed that areas corresponding to iodide related compounds at 123 $cm^{-1}$ and at 141 $cm^{-1}$ were concentrated in the crevices and uneven surfaces of the crystal. Additional bands such as the split of the $A_1$ mode at 184 $cm^{-1}$ was also observed. These bands were no longer visible after chemical etching and Ar+ sputtering, and a more uniform surface was obtained. This data was confirmed with SEM-EDS and XPS studies. CRS combined with additional surface studies are proving to be useful tools for the surface characterization of these compounds.