

X-ray Photoelectron Studies of Removal of Sputter Damage from InGaP Surfaces Using Thermal Atomic Layer Etching

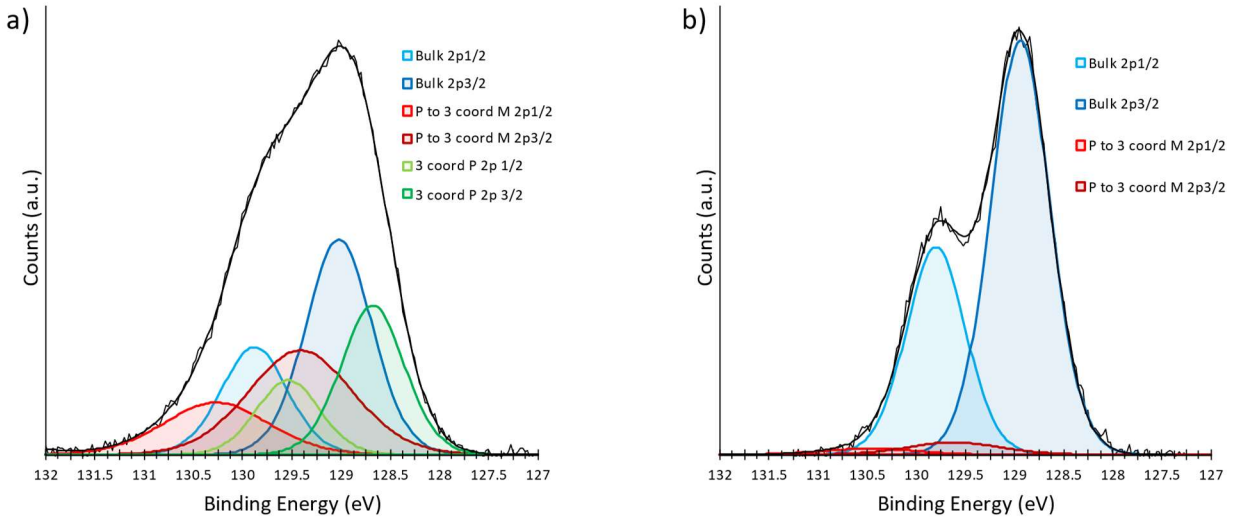


Figure 1: a) XPS spectra of the P 2p region of a sample after sputtering with 500 eV Ar ions for 30 minutes showing the bulk doublet as well as two shifted doublets that correspond to undercoordinated P and P bound to an undercoordinated In or Ga atom. b) XPS spectrum of the P 2p region after a total of 50 cycles of static atomic layer etching at 300 C. The bulk doublet is 96% of the total area vs 94% for an unsputtered control, showing that the damage from sputtering has been successfully removed.

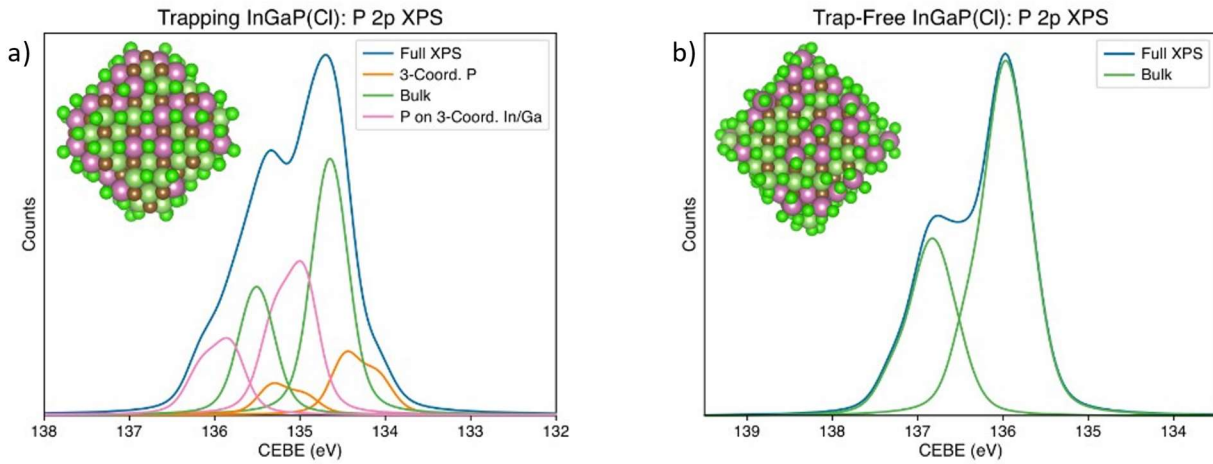


Figure 2: Simulated P 2p XPS spectra of InGaP nanocrystals a) with and b) without under-coordinated surface atoms. For each doublet the 2p_{1/2} contribution corresponds to the higher core electron binding energy (CEBE) peak and the 2p_{3/2} contribution corresponds to the lower CEBE peak. Space-filling models of the two nanocrystals are inset in their respective spectra, with pink atoms corresponding to indium, light green atoms corresponding to gallium, brown atoms corresponding to phosphorus, and bright green atoms corresponding to chlorine.