

Supplementary Information

The unexpected photoelectrochemical activity of MAX phases: the role of oxide impurities

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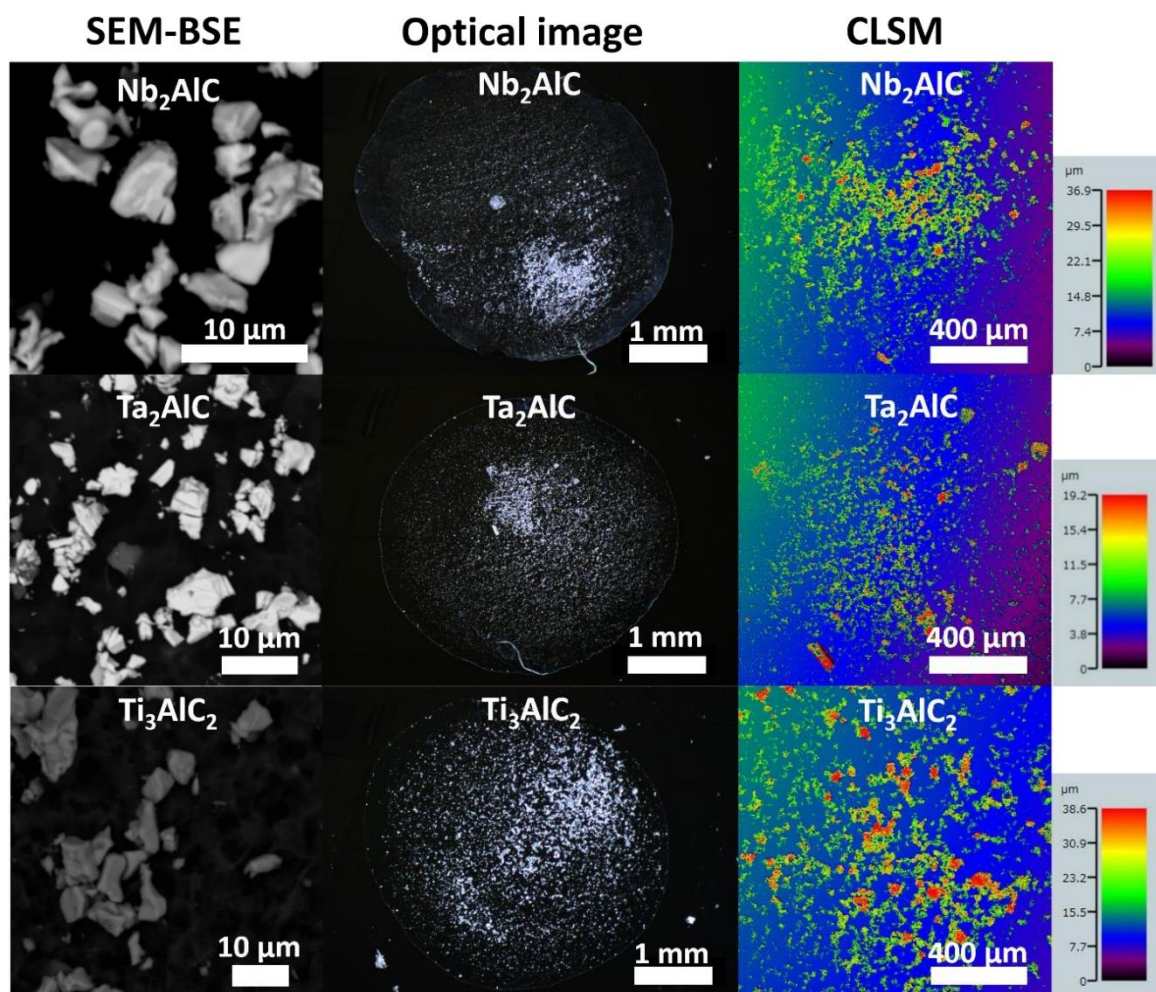


Figure S1. Analysis of the drop-casted Nb_2AlC , Ta_2AlC , and Ti_3AlC_2 , showing (from left to right column) back-scattered electrons micrographs (SEM-BSE), optical images, and coloured confocal laser scanning micrographs (CLSM).

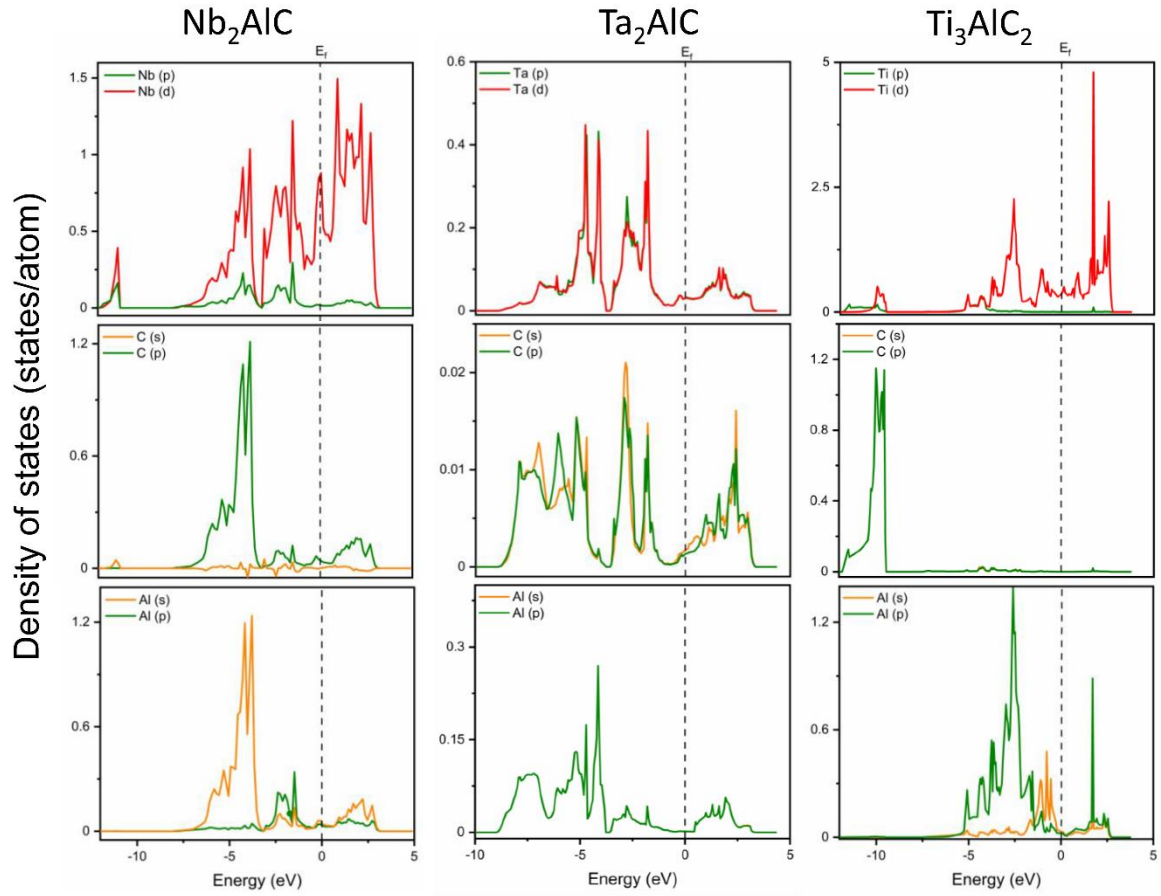


Figure S2. Element and orbital resolved density of states for Nb_2AlC , Ta_2AlC and Ti_3AlC_2 MAX phases. The Fermi level is shown by the black dashed line.

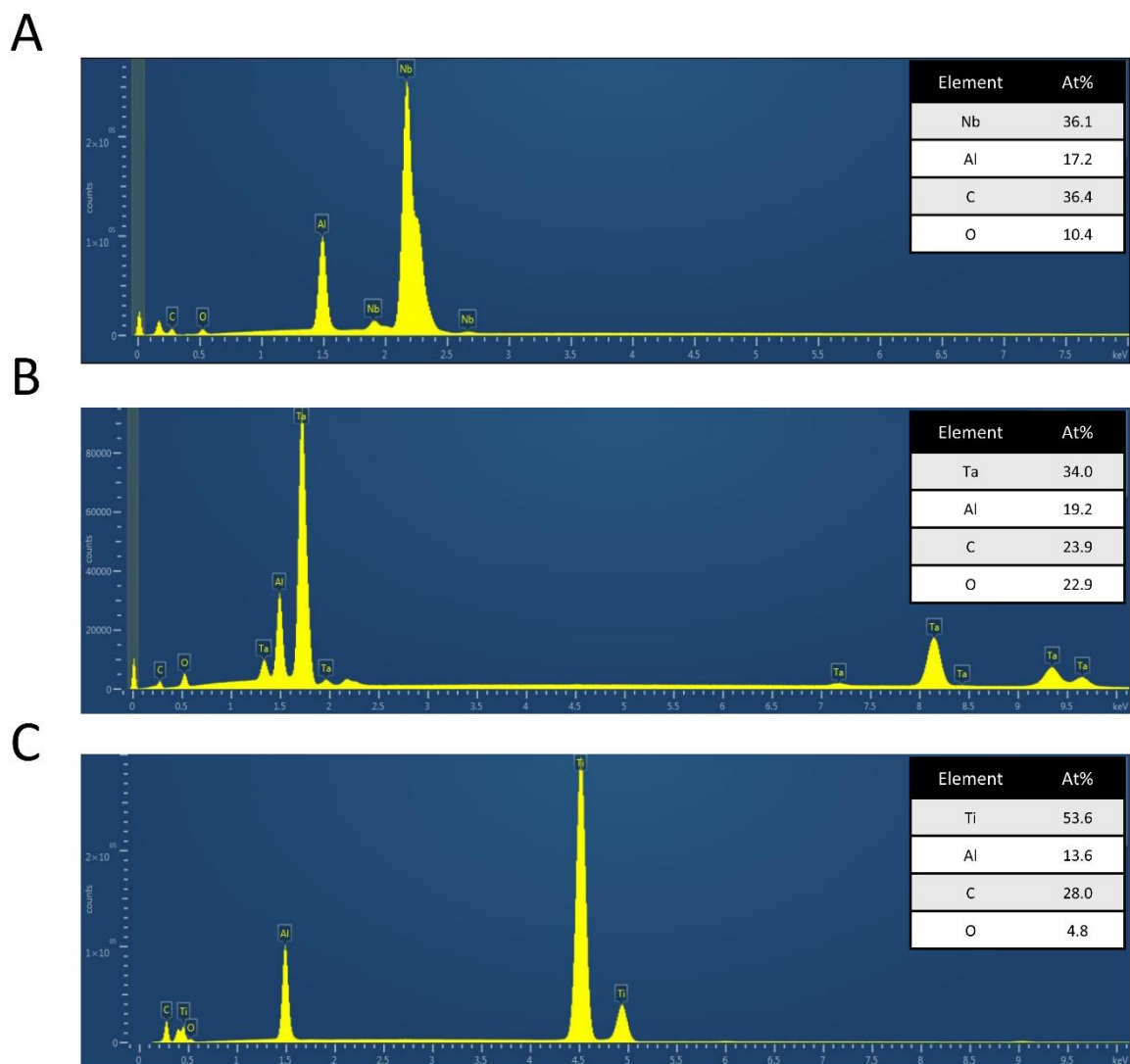


Figure S3. EDS spectra of MAX phases, Nb₂AlC (A), Ta₂AlC (B), and Ti₃AlC₂ (C). Inset shows the atomic percentage (At %) of the relevant elements.

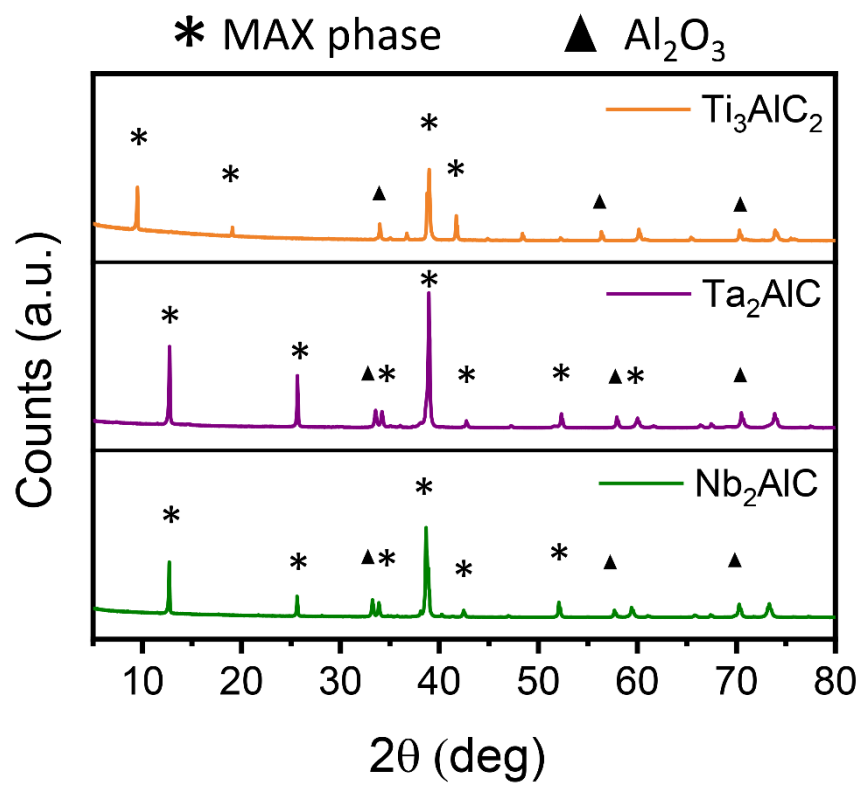


Figure S4. XRD patterns of Nb_2AlC , Ta_2AlC , and Ti_3AlC_2 .

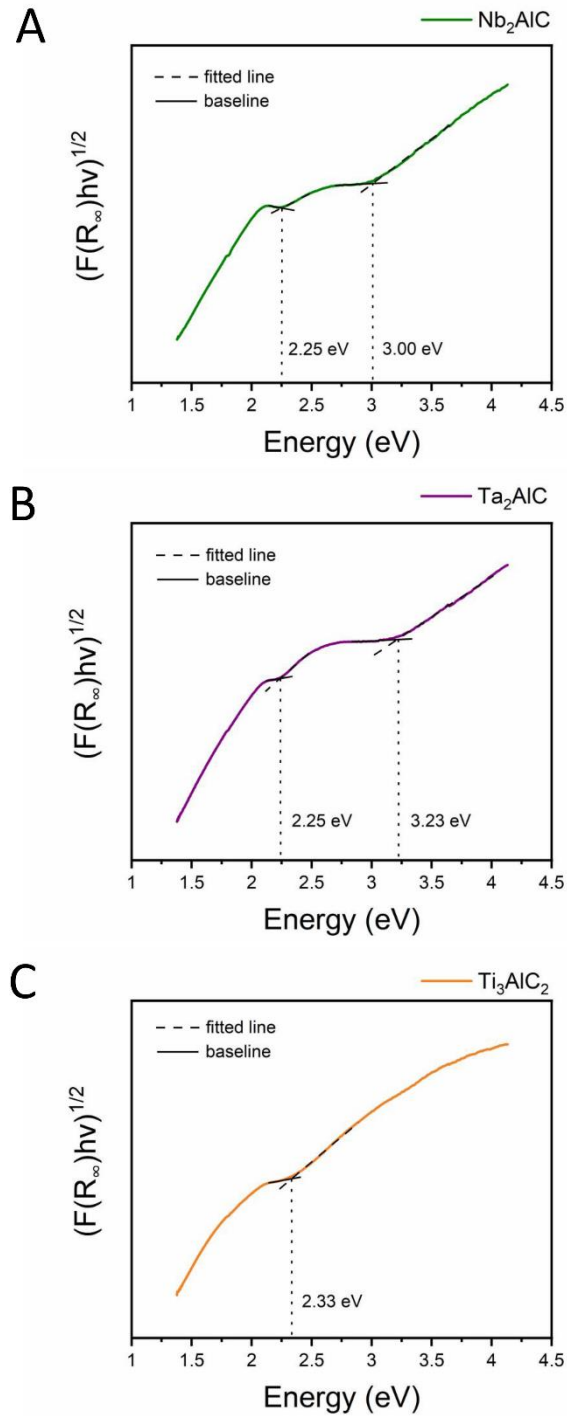


Figure S5. Tauc plots of the Kubelka-Munk function calculated from the reflectance spectrum of Nb₂AlC (A), Ta₂AlC (B), and Ti₃AlC₂ (C), assuming indirect transition. The dashed and solid black lines show the fitted line from the Tauc method and the baseline, respectively. The estimated band gap values are reported and correspond to the abscissa of the intersection of the two lines, as shown by the dotted vertical line.

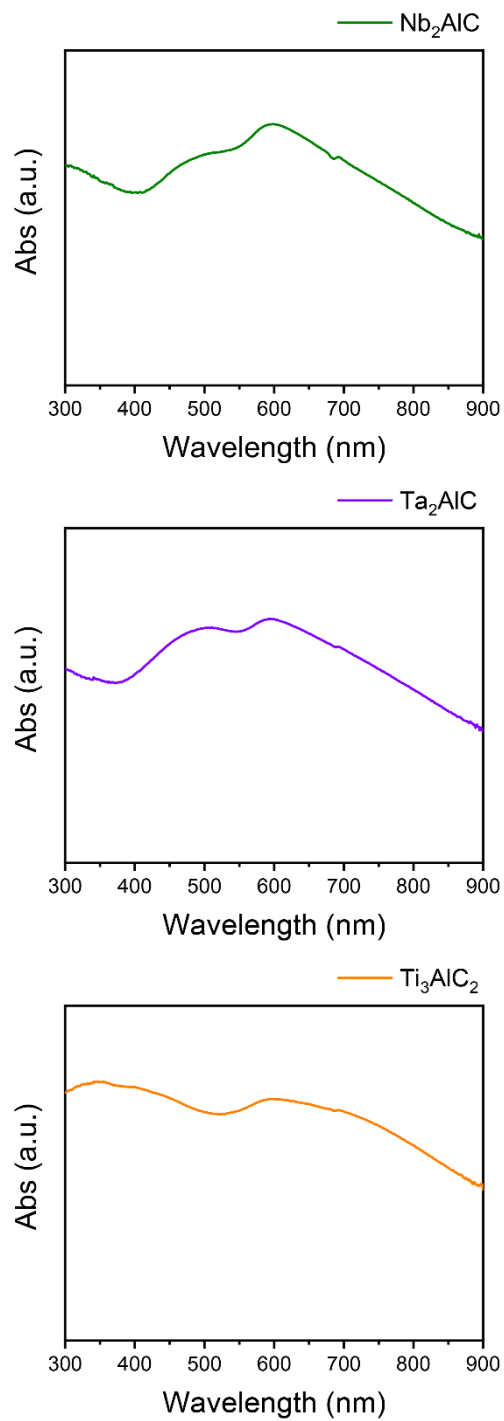


Figure S6. UV-Vis absorbance spectra of Nb₂AlC, Ta₂AlC, and Ti₃AlC₂.

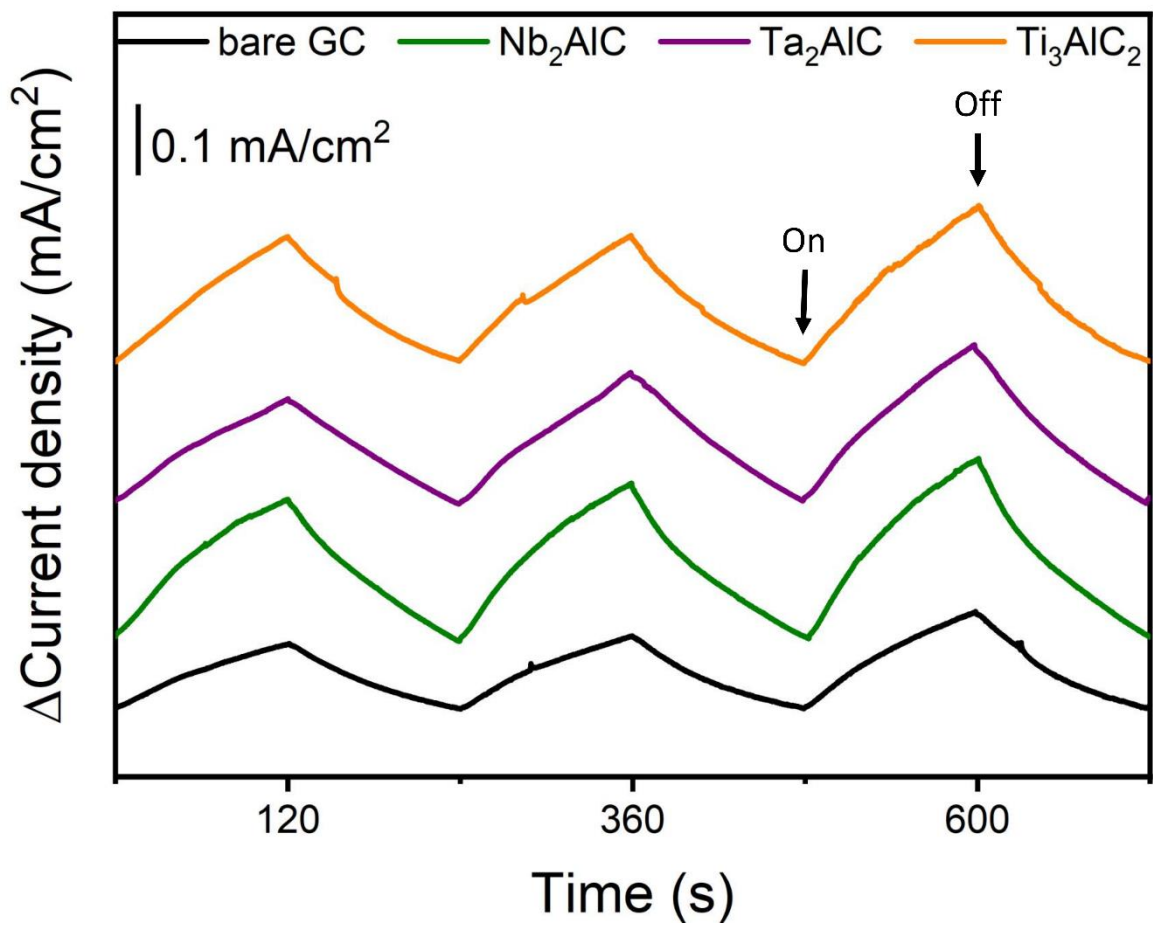


Figure S7. Chronoamperometry measurement for representation of the photoresponses of MAX on glassy carbon (GC) electrode at -0.56 V vs. RHE with regular on/off of the 660 nm LED irradiation.