Electronic Supplementary Material (ESI) for Sustainable Energy & Fuels.


# Supporting Information

# Enhanced Photoelectrochemical Water Splitting using Oxidized Mass-Selected Ti Nanoclusters on Metal Oxide Photoelectrodes

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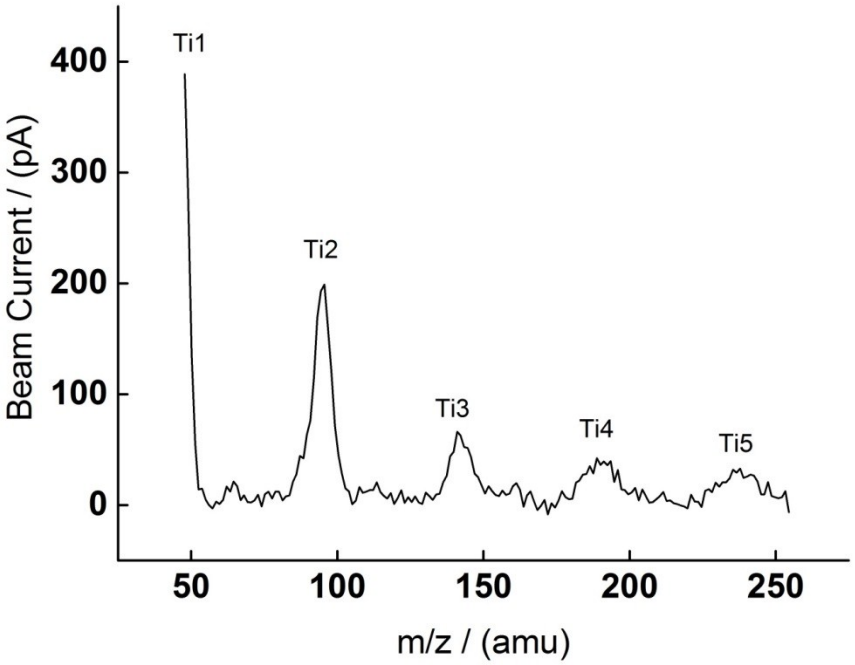


Figure S1: Mass spectrum after a short period of sputtering, with the clear absence of the target oxidation peak for $TiO_2$ (at 80 amu), confirming this is removed with time.

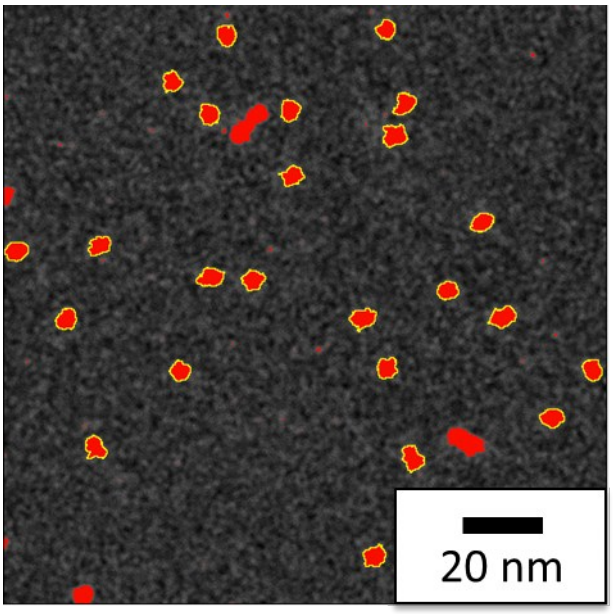


Figure S2: STEM image of $Ti_{2000}$ clusters after image processing via thresholding, allowing more accurate determination of the edge of the clusters.

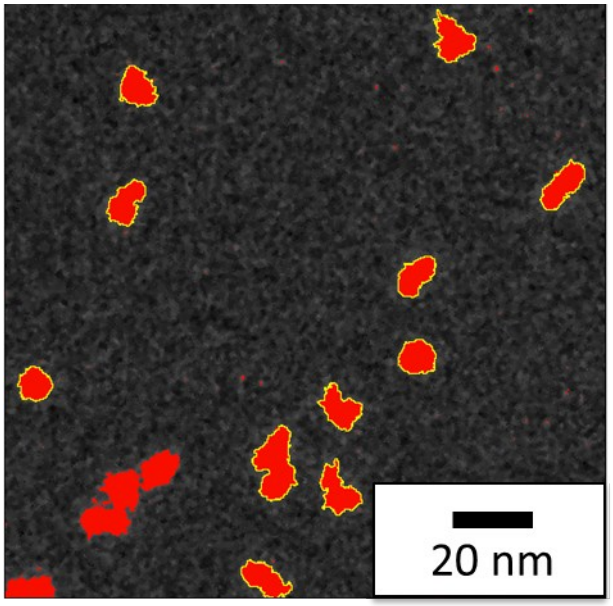


Figure S3: STEM image of $Ti_{8000}$ clusters after image processing via thresholding, allowing more accurate determination of the edge of the clusters.

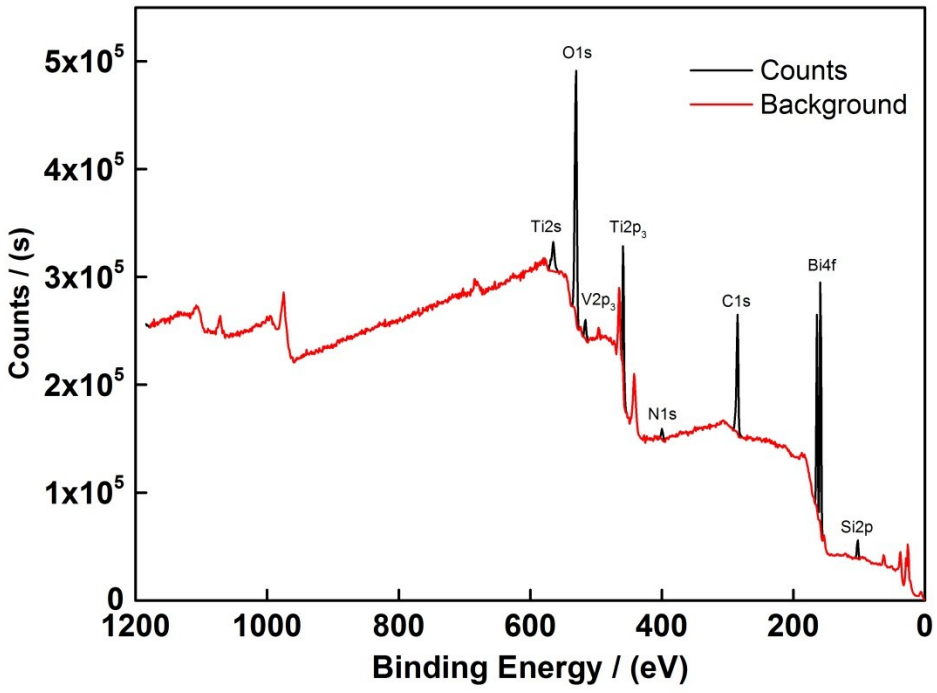


Figure S4: XPS survey spectrum showing all detected peaks (Black) and the background (red)

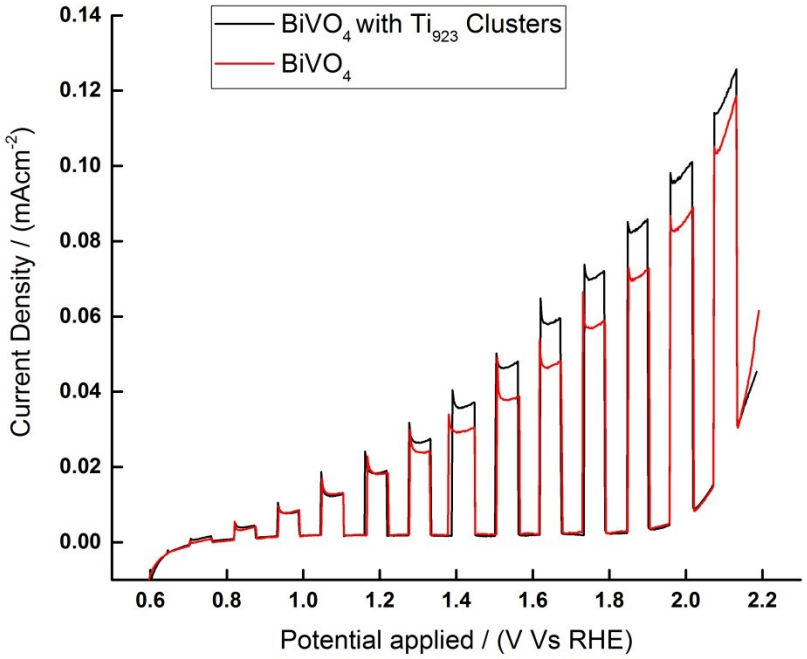


Figure S5: Chopped J-V curve showing $BiVO_4$ with (Black) and without (Red) $Ti_{923\pm25}$ clusters. An enhancement of 16% at 1.23V vs RHE can be seen.

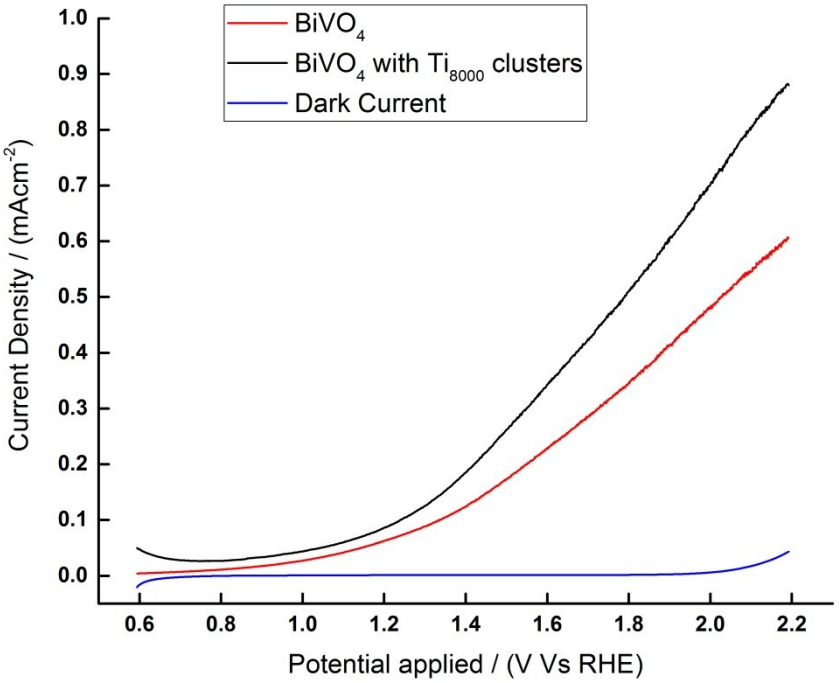


Figure S6: J-V curve showing $BiVO_4$ with (Black) and without (Red) $Ti_{8000\pm216}$ clusters. The dark current is shown in blue. An enhancement of 38% at 1.23V vs RHE is seen.

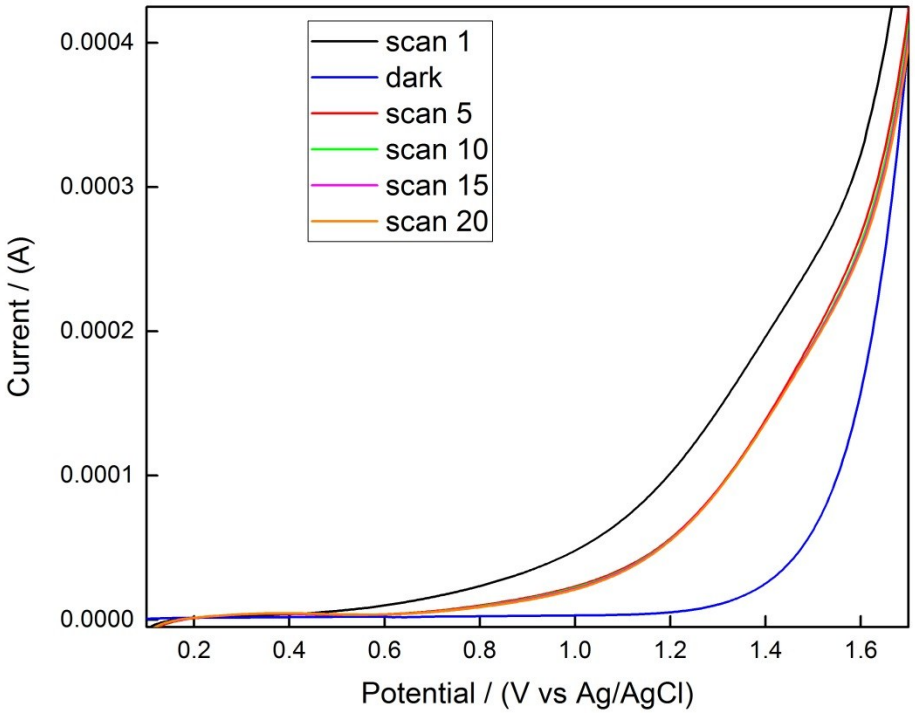


Figure S7: Multiple LSV showing the relative stability of $BiVO_4$ photoelectrodes under blue light illumination. After an initial drop from the first scan, the subsequent scans appear to overlap and no further degradation was seen.

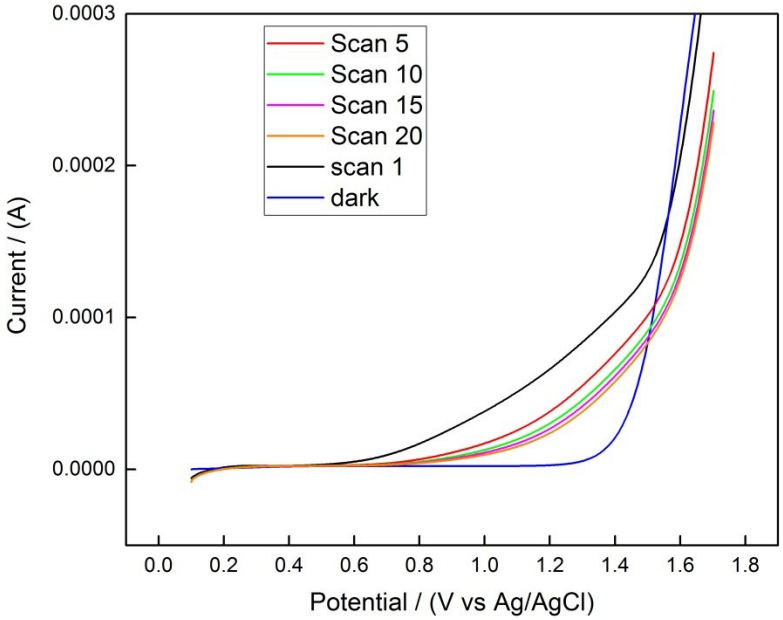


Figure S8: Multiple LSV showing the relative stability of $BiVO_4$ photoelectrodes under white light illumination. After a significant initial drop, the photocurrent curves are seen to continually degrade with increasing number of scans.

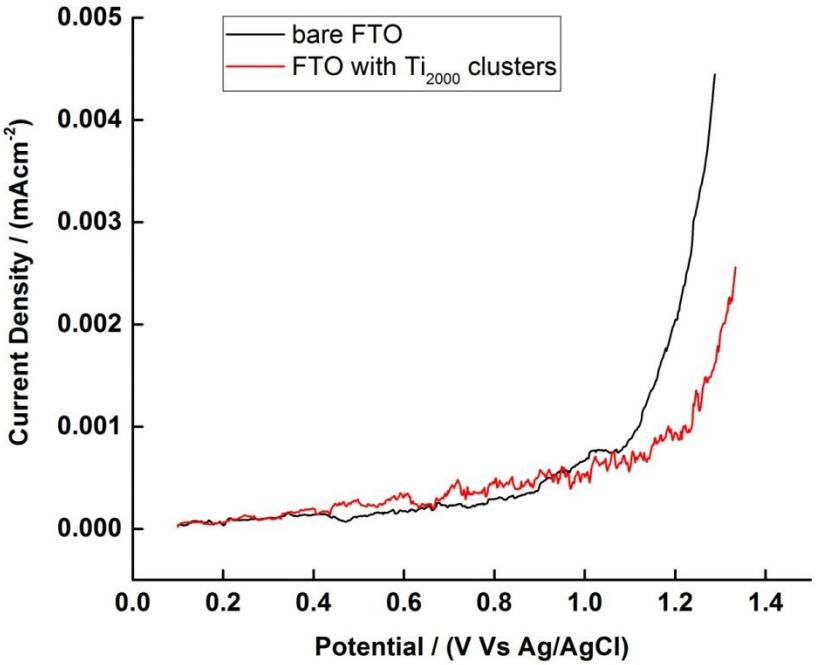


Figure S9: J-V curve of bare FTO with (Red) and without (Black) $Ti_{2000\pm54}$ clusters. It can be seen that there is no photoactivity from the clusters and only noise is detected.