Electronic Supplementary Material (ESI) for Photochemical & Photobiological Sciences.

Supplementary Information

Photocatalytic water disinfection by simple and low-cost monolithic and heterojunction ceramic wafers

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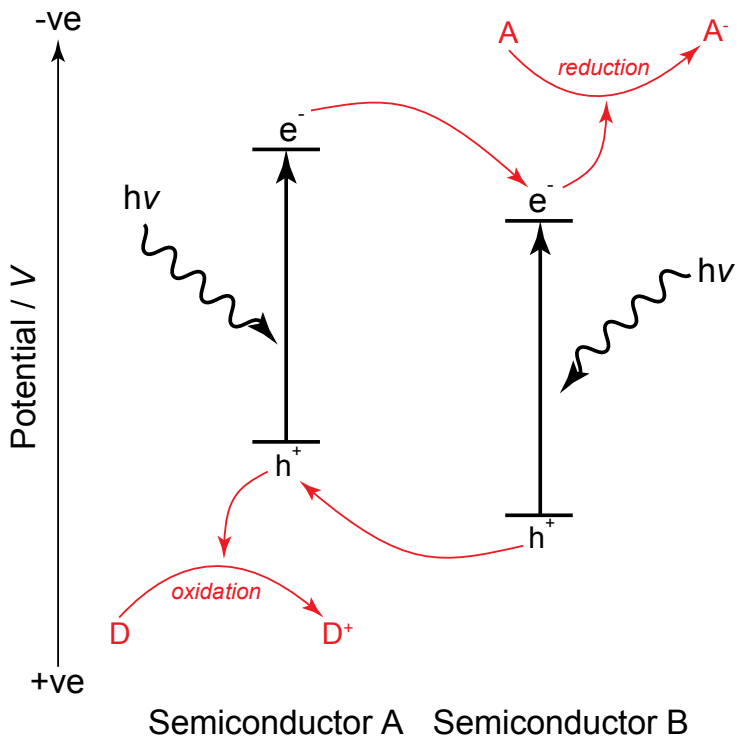

Fig. S1 Band energy diagram for a type II staggered bandgap heterostructure. Under photoirradiation, electrons can transfer across the heterojunction from the conduction band (CB) of semiconductor A to the CB of semiconductor B; conversely, holes can transfer from the valence band (VB) of semiconductor B to the VB of semiconductor A.

Material characterisation

X-ray diffraction (XRD) data was collected using a Stoe Stadi P diffractometer (Mo-Kα radiation, 0.70932 Å) in transmission geometry (2 - 40° 2θ range, 0.5° step size and 5 sec/step dwell). Field emission scanning electron microscopy (FE-SEM) images were obtained with a JEOL JSM-6700F microscope operating at 5 kV accelerating voltage. As-prepared ceramic wafers were cracked to expose the cross-sectional interface between the TiO_2 and WO_3 layers, and all samples were gold coated prior to imaging. Image analysis was performed using ImageJ software (version 1.48v).

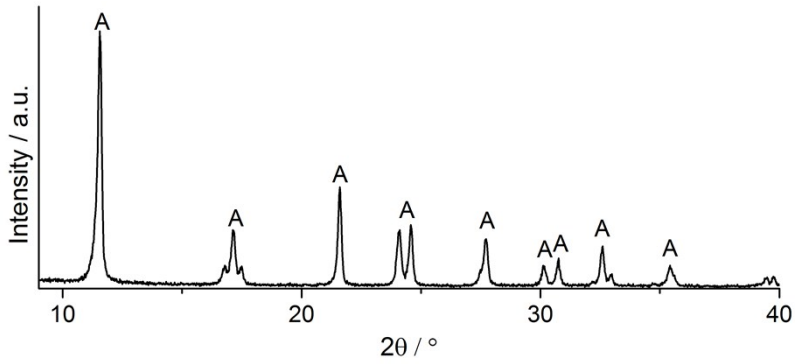

Fig. S2 X-ray diffraction (XRD) pattern of anatase TiO_2 phase of the TiO_2-WO_3 wafer following heat-treatment at 500 °C for 6 hours.

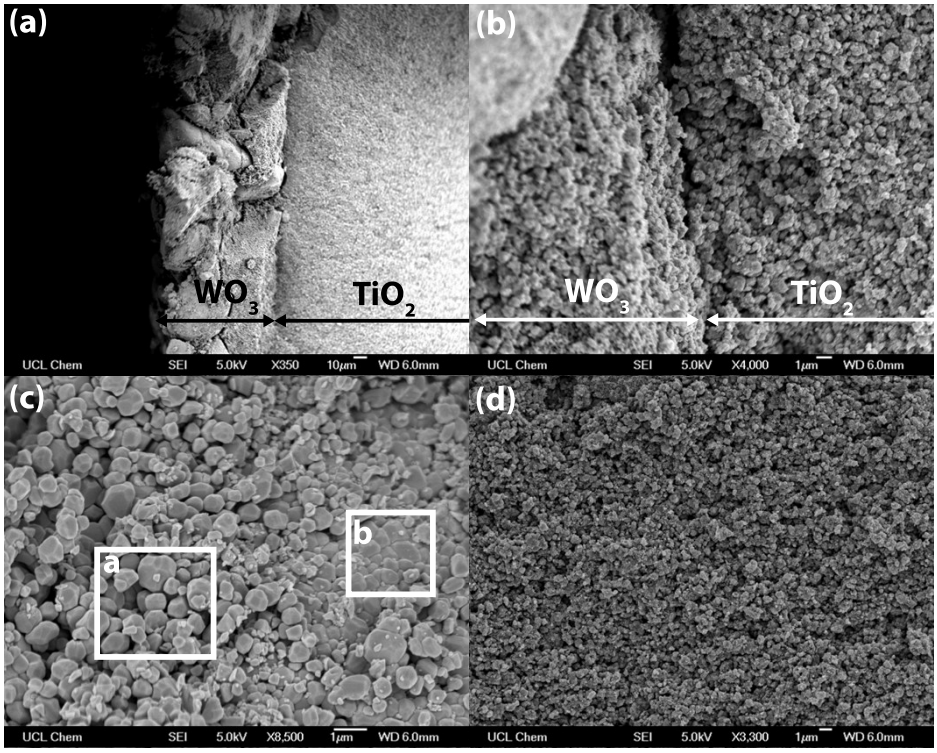

Fig. S3 Field emission scanning electron microscopy (FE-SEM) images of the TiO_2–WO_3 ceramic wafer heterojunction. Images (a) and (b) identify the TiO_2 and WO_3 layers and the physical interface between the two layers. Image (c) shows the WO_3 layer, with the area marked *a* showing loosely bound particles resulting from the disrupted physical interaction when the ceramic wafer was prepared for imaging. The area marked *b* shows particles in very close contact, as a result of the compaction (occurring in the horizontal plane) of the powder upon preparation of the ceramic wafer. Image (d) shows the TiO_2 layer.

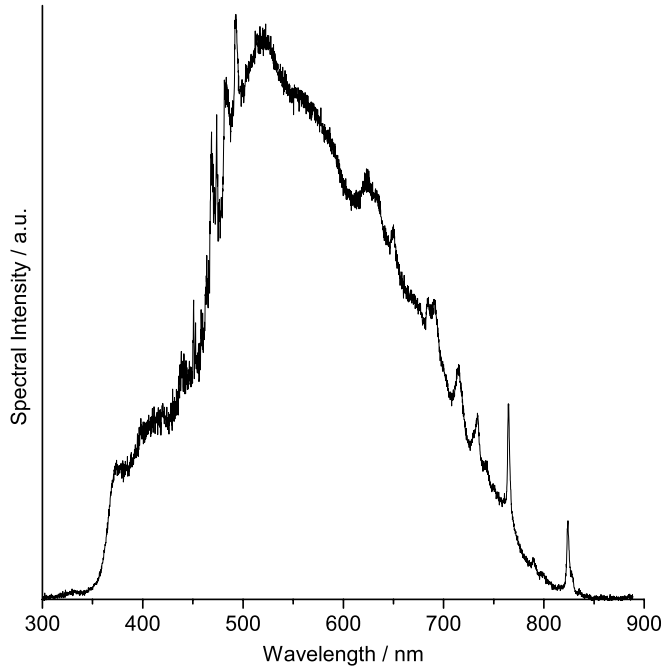

Fig. S4 Spectral output of 75 W Xenon lamp