Supporting Information

Pt Nanocluster Co-Catalysts for Photocatalytic Water Splitting

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Figure S1. Attenuated total reflection Fourier transform infrared (ATR-FTIR) spectra showing absorbance of H2O (navy series) and D2O (purple series) placed onto the ATR crystal which shows that the D2O is pure.
Figure S2. ATR-FTIR spectra of glass microfibre discs loading with increasing mass/area P25-Ptnc photocatalyst showing bare (0 mg/cm), low (~1.5 mg/cm), medium (~3 mg/cm) and high (~5 mg/cm) loading. From the disappearance of the Si-O stretch at 1000 cm\(^{-1}\), the surface is coated for the medium and high loadings and the low loading has a very small fraction of uncoated surface.

Figure S3. Repeated photocatalysis experiments for a Pt-nc sample (1 wt%) showing the production of D\(_2\) (purple, m/z = 4), O\(_2\) (grey, m/z = 32) and CO\(_2\) (brown, m/z = 44) for repeated experiments. In the first experiment, CO\(_2\) is produced and O\(_2\) is consumed. In subsequent experiments CO\(_2\) and O\(_2\) are not produced or consumed. Investigation is continuing to determine why O\(_2\) is not produced. Previous experiments have shown a delay of 10 h for O\(_2\) production in gas phase D\(_2\)O splitting which was attributed to O\(_2\) capture by the semiconductor.\(^1\)
Figure S4. Pt mass loading % for each sample determined by EDS. >10 individual areas were investigated by EDS for each sample.

Figure S5. Comparison of D₂ production rates with photocatalyst (P25-Ptnc-2wt%) loading. The data are presented with (upper figure) and without (lower figure) dividing by photocatalyst mass.
Figure S6. Digital photographs of P25-Pt-nc-1wt% photocatalytic disc (a) before and (b) after 3 repeated UV photocatalytic D$_2$ production experiments.

References


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