Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supplementary Information to:

Light driven growth of silver nanoplatelets on 2D MoS_2 nanosheet templates

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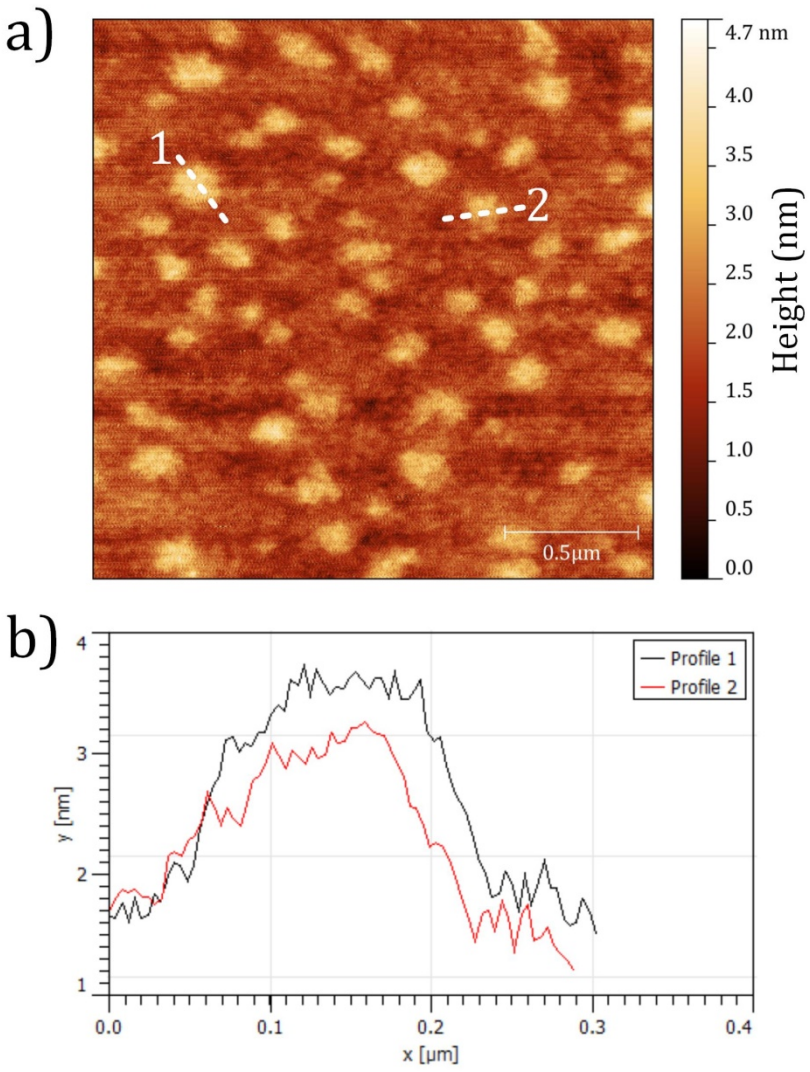

Figure S1: a) Atomic force microscopy (AFM) image of the MoS_2 nanosheet templates, the white lines indicate the location of the measured height profiles displayed in **b)**

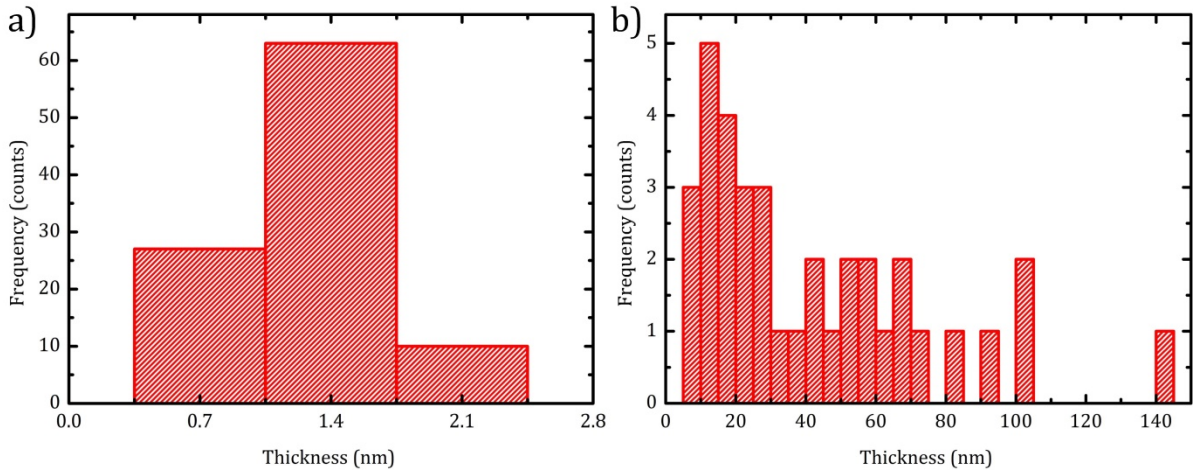

Figure S2: Frequency counts of the flake thickness determined by AFM for **a)** the MoS_2 nanosheet templates and **b)** the silver nanoplatelets

Table S1: Size evolution and particle to particle separation of the silver nanoparticles grown on the MoS_2 templates for different illumination times based on TEM images.

Illumination time (min)	Nanoparticle size (nm)	Nanoparticle separation (nm)
0	4.1 ± 1.5	8.3 ± 4
5	7.3 ± 6.3	6.5 ± 2.6
10	18.7 ± 14.0	joined[1]
20	23.1± 17.5	joined[1]
90+45	N/A[2]	N/A[2]

Sizes were measured for at least 100 particles, providing the average value and the standard deviation. [1] For 10 and 20 min most particles are joined to at least one neighbour; [2] for 90+45 min the original particles have fully enveloped the template and formed a flat silver surface leaving no discernible silver particles.

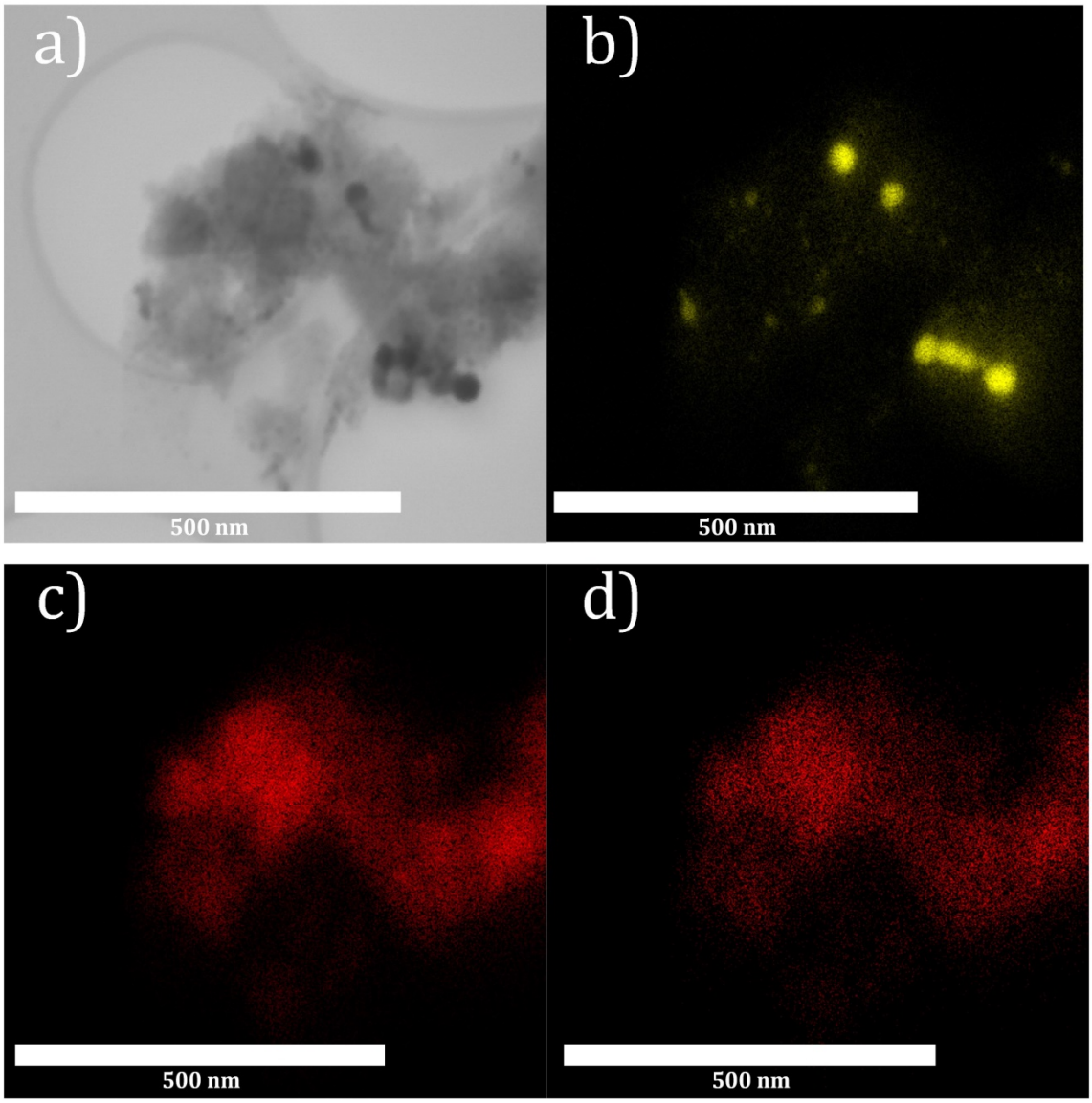

Figure S3: Transmission electron microscope (TEM) image and electron dispersive x-ray (EDX) maps of the MoS_2 nanosheet templates after 5 min of illumination in the presence of $AgNO_3$. **a)** TEM image of the investigated area; **b)** EDX silver map; **c)** EDX sulphur map; and **d)** EDX molybdenum map

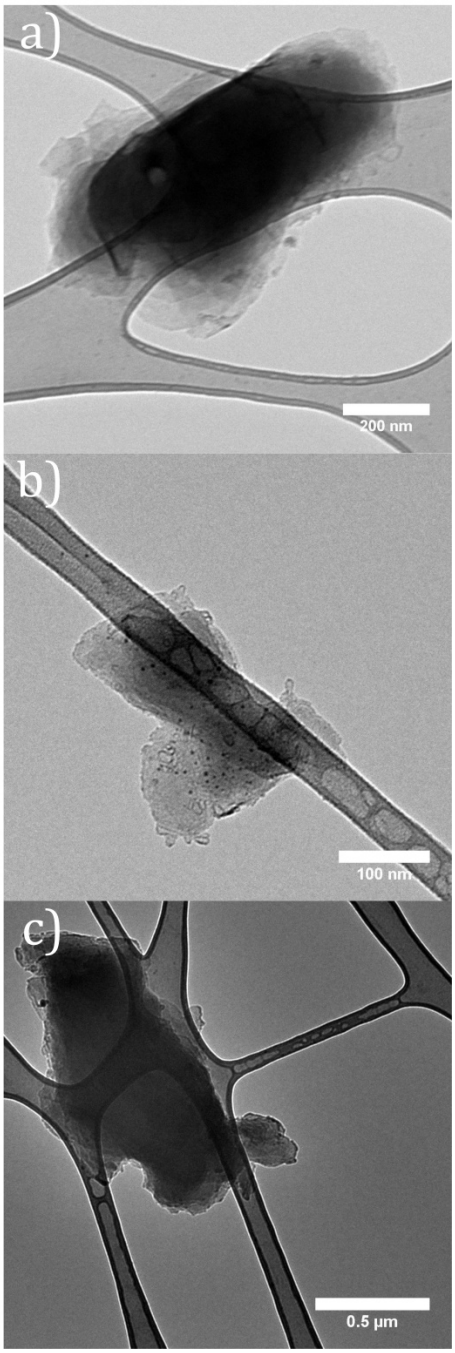

Figure S4: TEM images of bulk flakes found in the reaction mixture after: **a)** 5 min of light exposure; **b)** 10 min of light exposure; and **c)** 90+45 min of light exposure

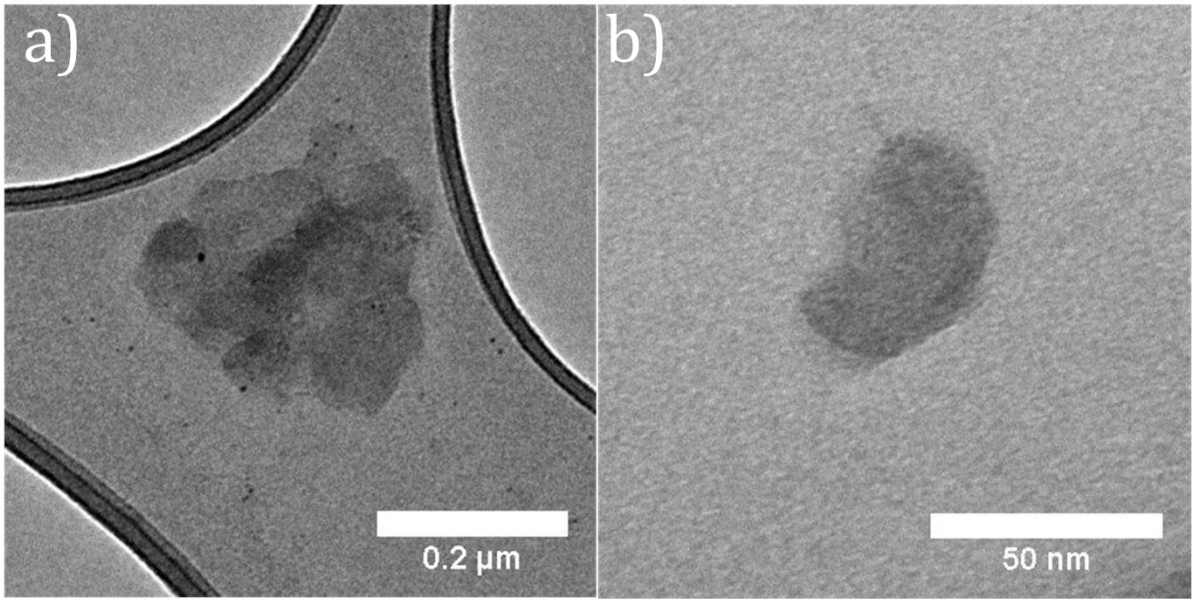

Figure S5: TEM images of thin MoS_2 flakes found in the reaction mixture after 90+45 min of light exposure using **a)** a 700 nm cut off filter, **b)** using a 825 nm cut off filter

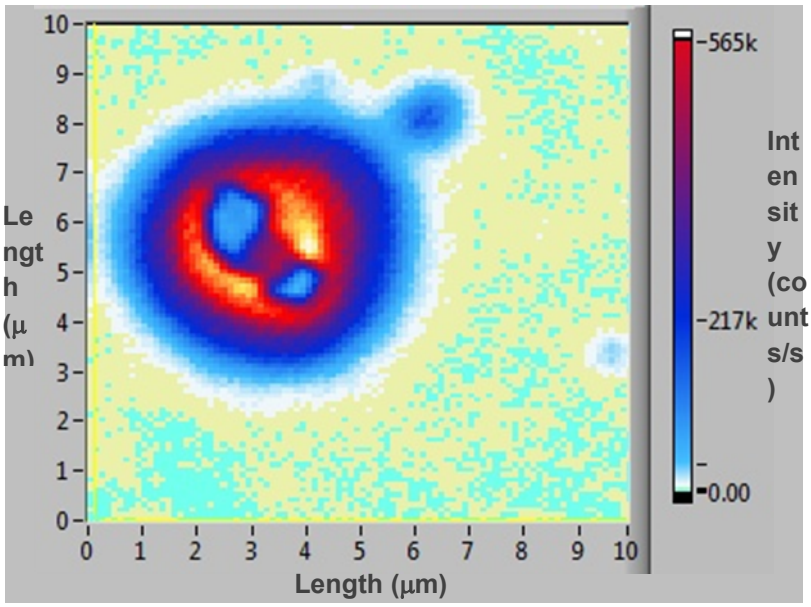

Figure S6: Photoluminescence (PL) map of the MoS_2 nanosheet templates. The size of the feature is a result of aggregation during the drop casting process

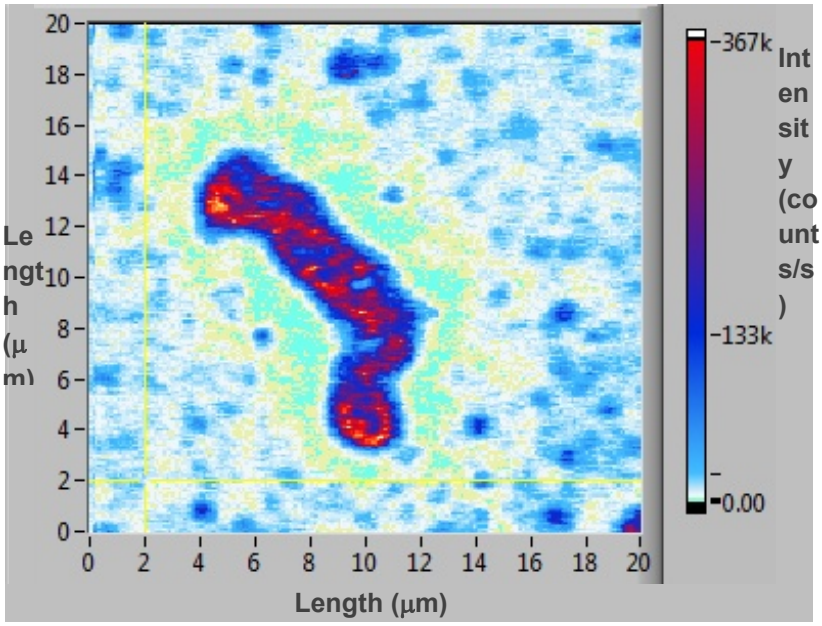

Figure S7: PL map of the silver nanobranches

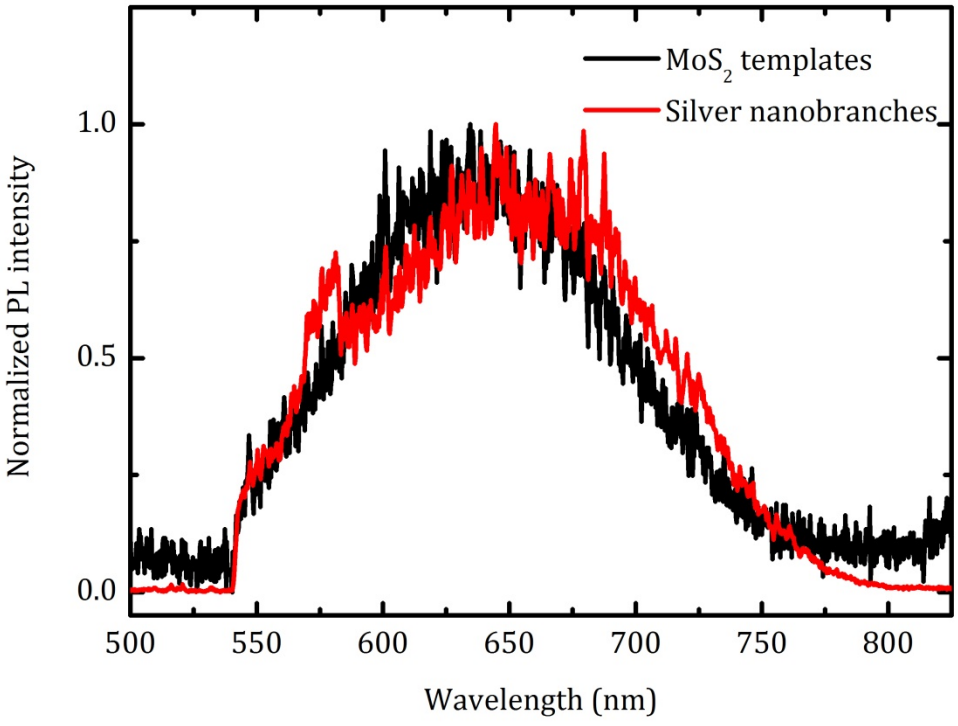

Figure S8: Normalized PL spectra of the features shown in the PL maps in Figures S5 and S6

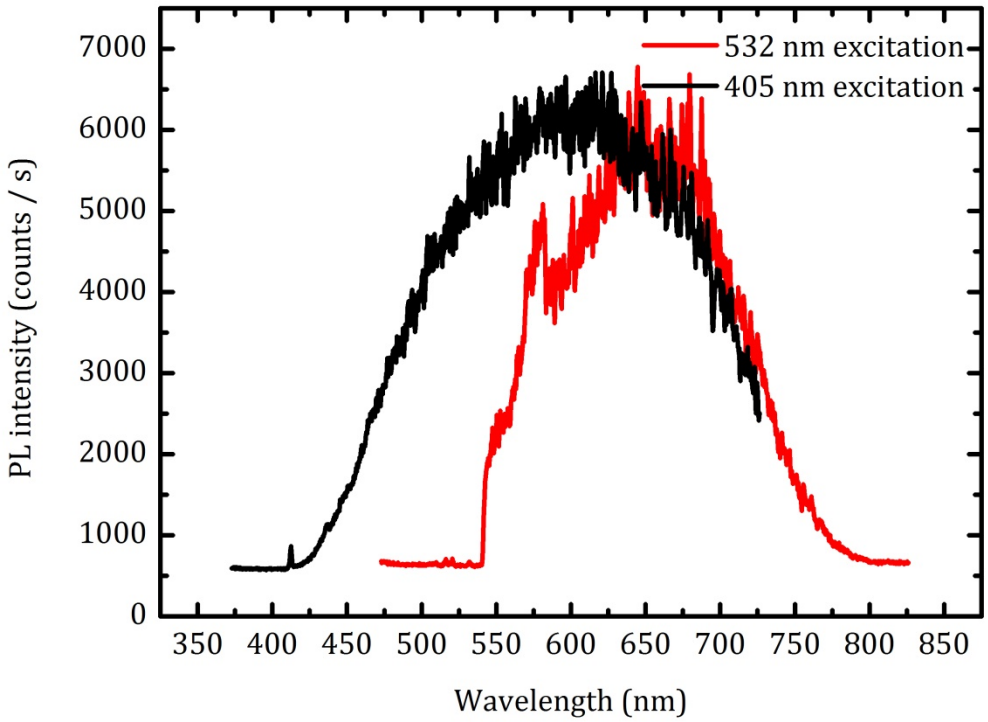

Figure S9: PL spectra of the silver nanobranches measured at 532 and 405 nm laser excitation.

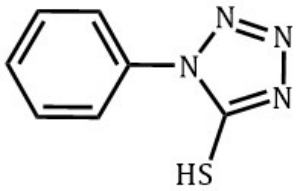

Figure S10: Chemical structure of 1-phenyl-5-mercaptotetrazole (PMT)

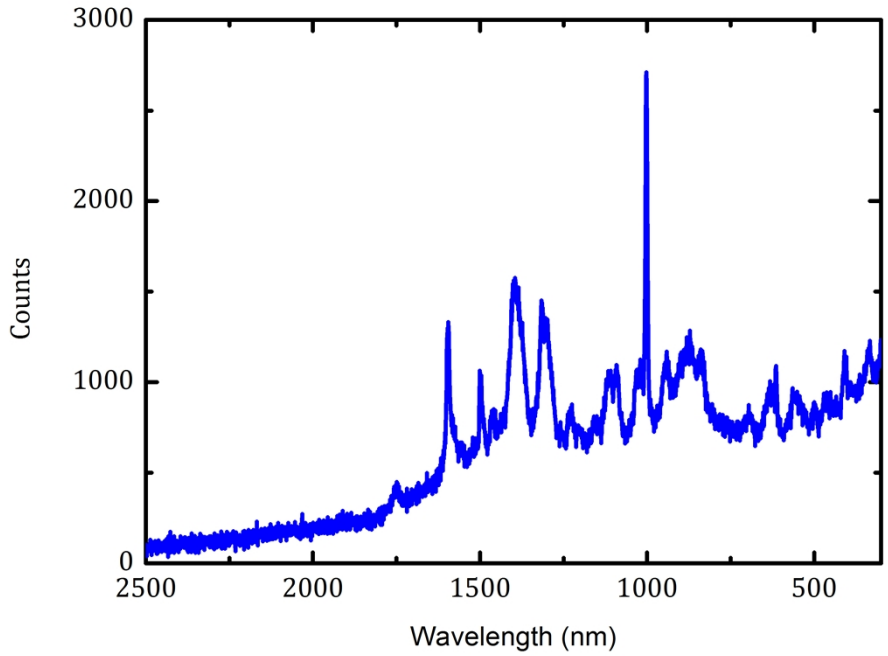

Figure S11: Raman spectrum of PMT adsorbed onto silver nanobranches measured using a 785 nm excitation source with an integration time of 10s, 0.0001% laser power, 1200 grating and a 100x lens

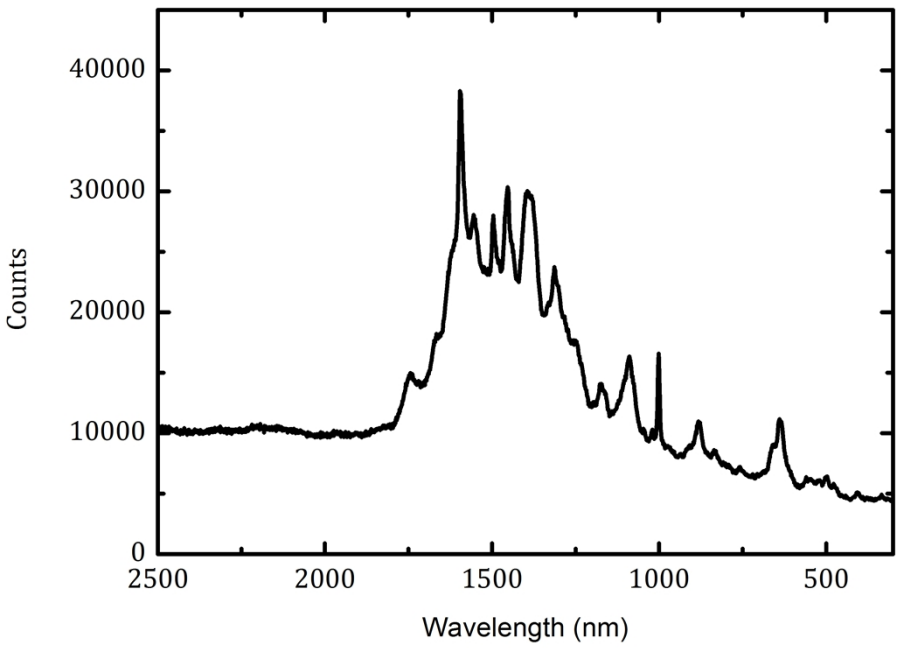

Figure S12: Raman spectrum of PMT adsorbed onto silver nanobranches measured using a 488 nm excitation source with an integration time of 10s, 1% laser power, 2400 grating and a 100x lens

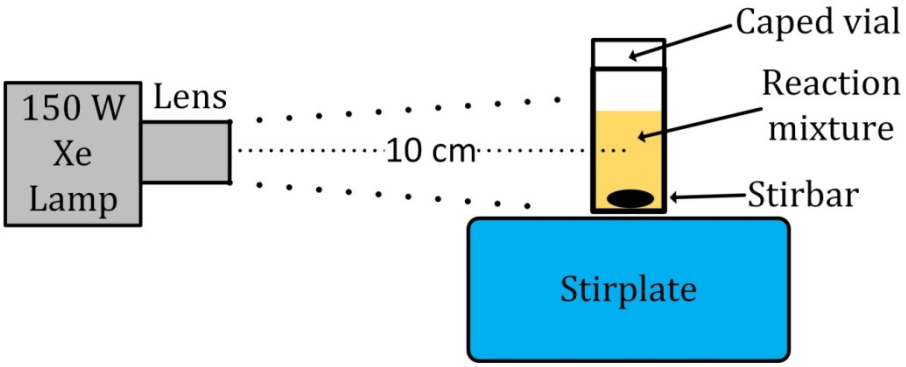

Figure S13: Experimental setup for the photoreaction