Sustainable synthesis of titanium based photocatalysts *via* surfactant templating: From kerosene to sunflower oil- Supporting Information

*Reece M. D. Bristow[1], Peter J. S. Foot[1], James D. McGettrick[2], Joseph C. Bear[1] and Ayomi S. Perera[1]**

[1] Kingston University London, Department of Chemical and Pharmaceutical Sciences, Faculty of Health, Science, Social Care and Education, Kingston Upon Thames, KT1 2EE, UK.

[2] SPECIFIC IKC, Materials Research Centre, College of Engineering, Swansea University, Bay Campus, Fabian Way, Swansea, SA1 8EN, UK.

*a.perera@kingston.ac.uk

Table of Contents

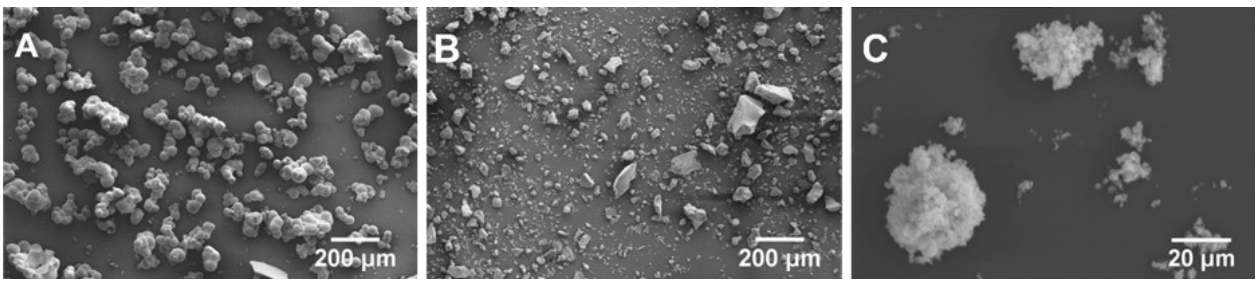

Figure S1: SEM images for samples V (vegetable oil) and VT80 (vegetable oil and Tween® 80) indicating A- V microbeads, B- VT80 debris and C- Aeroxide P25 TiO_2 clusters.

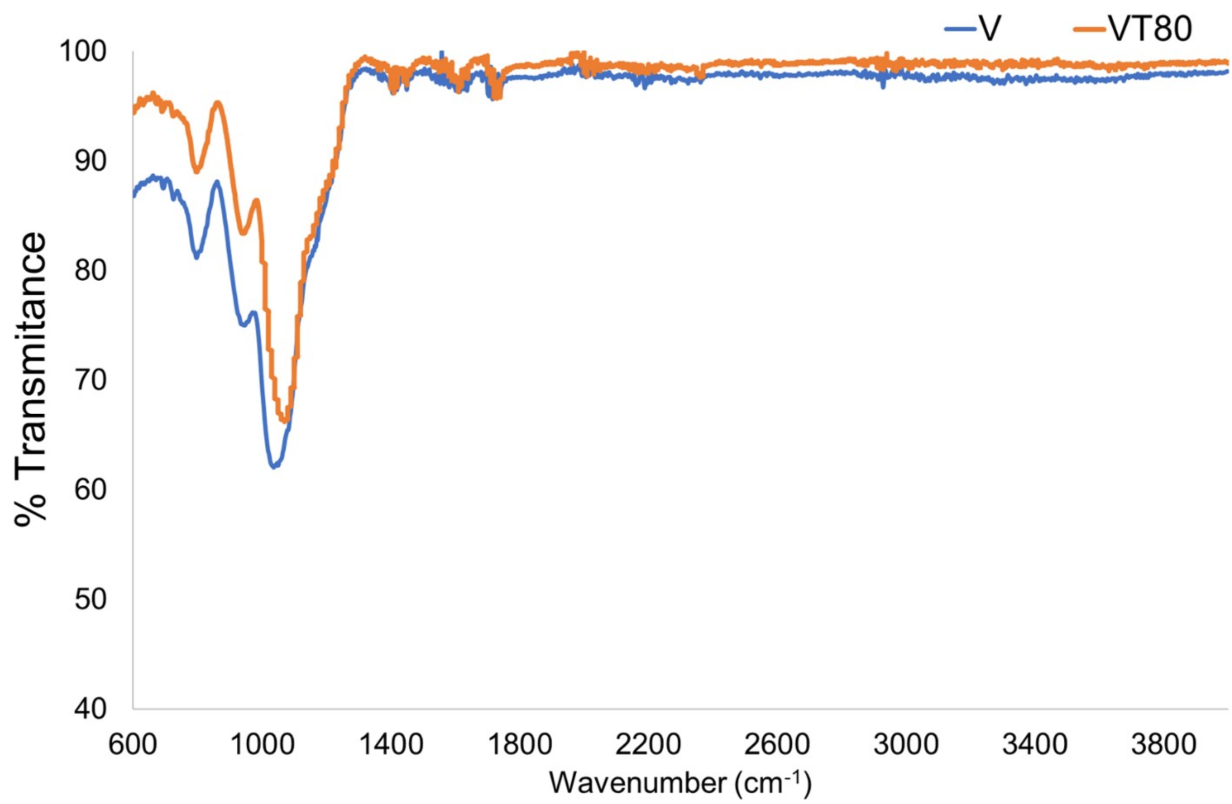

Figure S2: FTIR data for samples V and VT80, showing key Ti-O-Si peak at ~950 cm^{-1}.

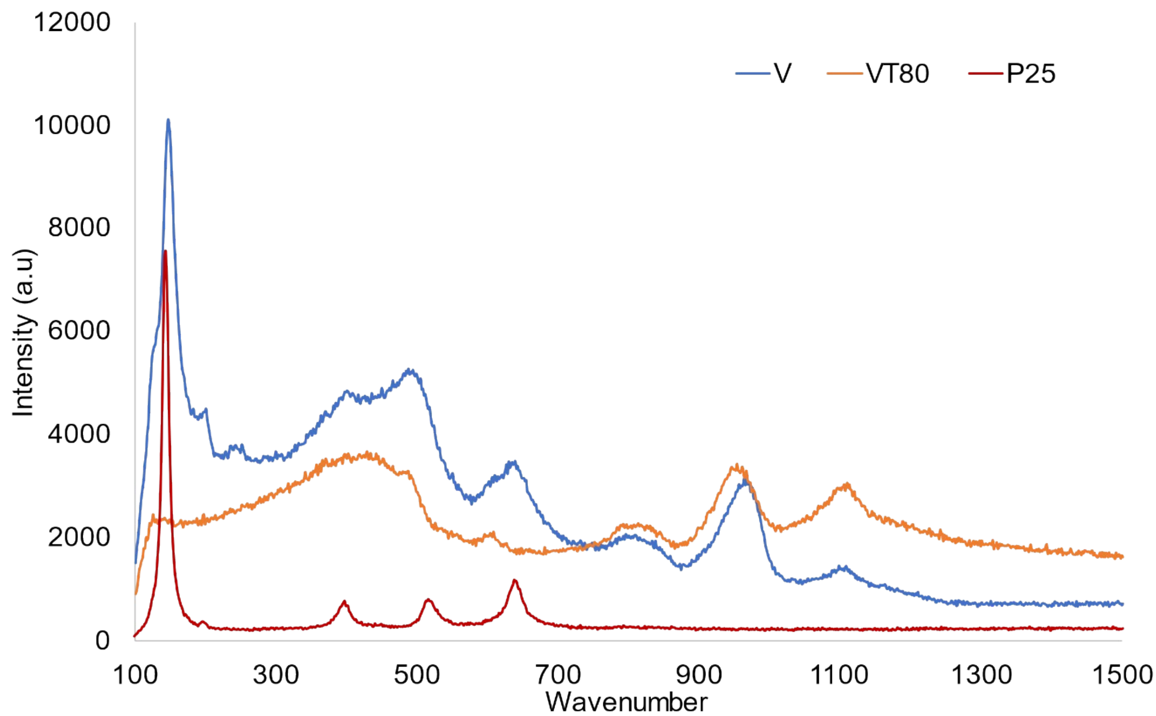

Figure S3: Raman results for samples V and VT80, as well as reference P25 indicating typical titanosilicate and TiO_2 peaks.

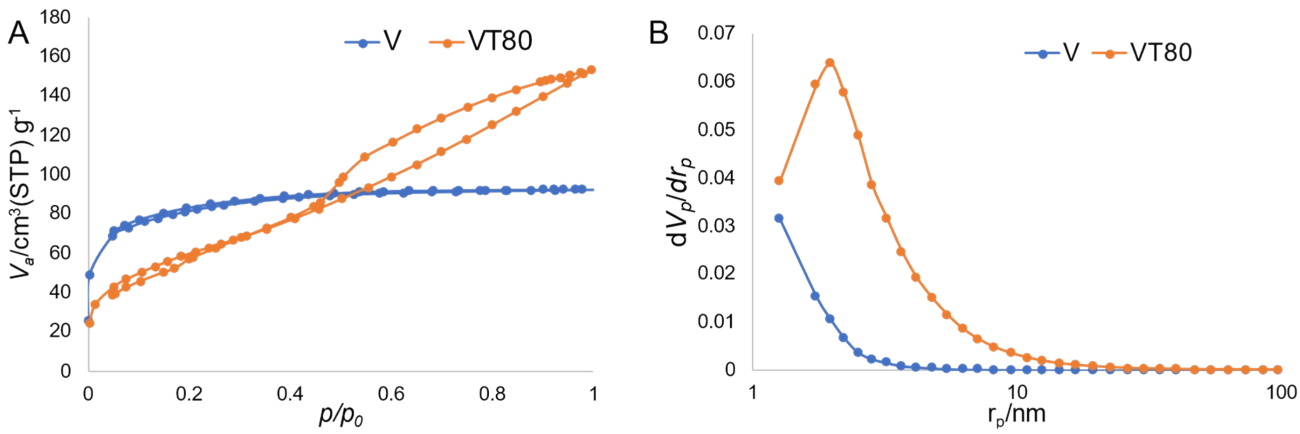

Figure S4: Results of N_2-based porosity experiments for V and VT80 showing A-Adsorption-desorption isotherms and B- BJH plots.

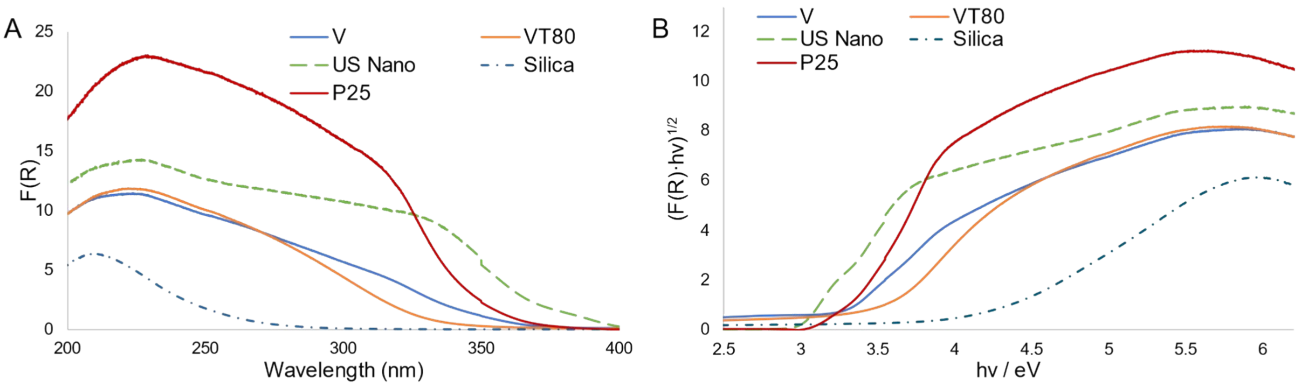

Figure S5: A-Kubelka-Munk results and B- Associated tauc plots for samples V, VT80, US Nano TiO_2, Aeroxide P25 TiO_2 and Silica.

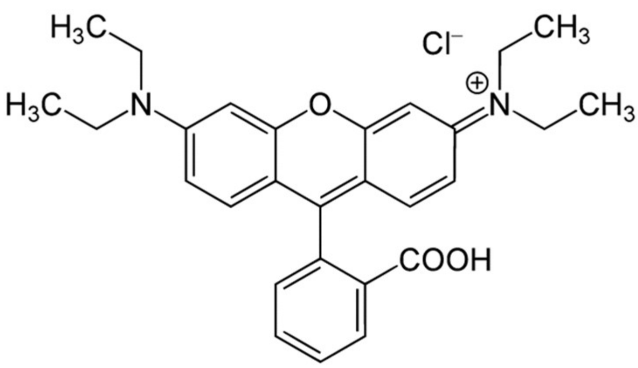

Figure S6: Chemical structure of Rhodamine B, the selected model pollutant.

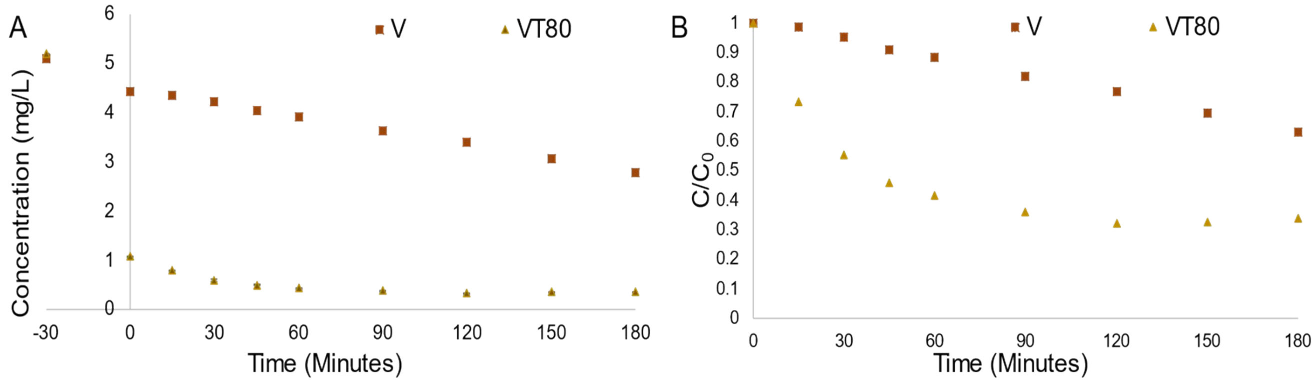

Figure S7: Adsorption-photocatalysis results for VT80 showing A- Concentration *vs.* time and B – The associated C/C_0 graphs.

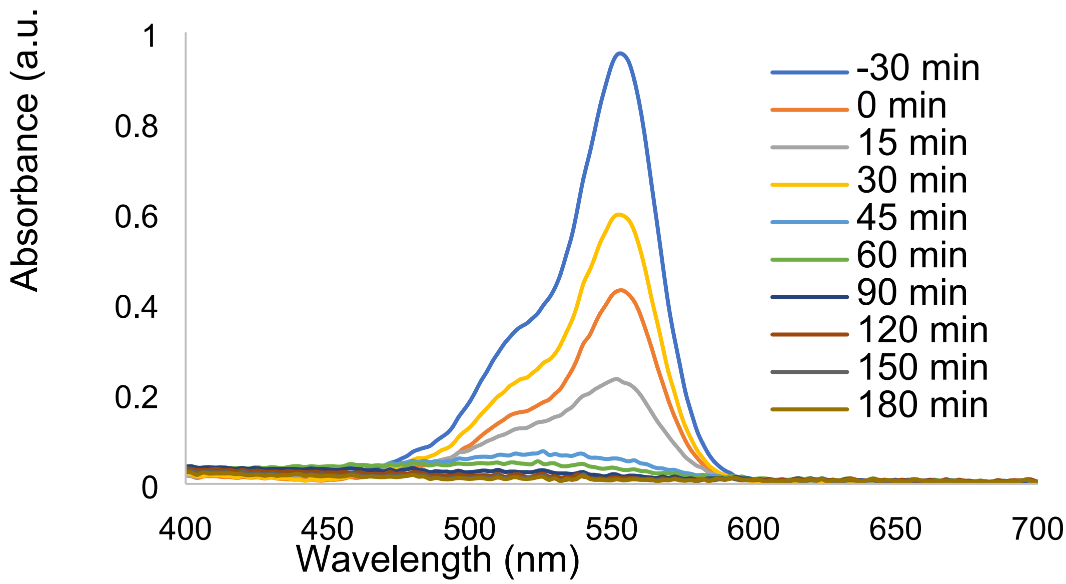

Figure S8: Full UV-Vis spectrum of Rhodamine B under photocatalysis using sample S (sunflower oil) as catalyst. This demonstrates the degradation of Rhodamine B over time.

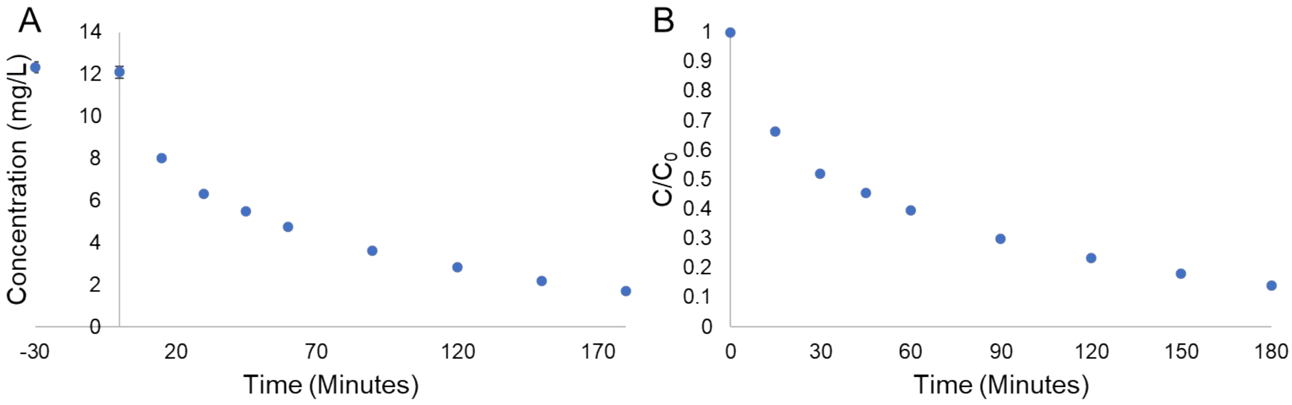

Figure S9: Photocatalysis results for Aeroxide P25 TiO_2, showing A- Concentration against time and B- The associated C/C_0 graph. Note that the solution concentration was 5 mg/L.

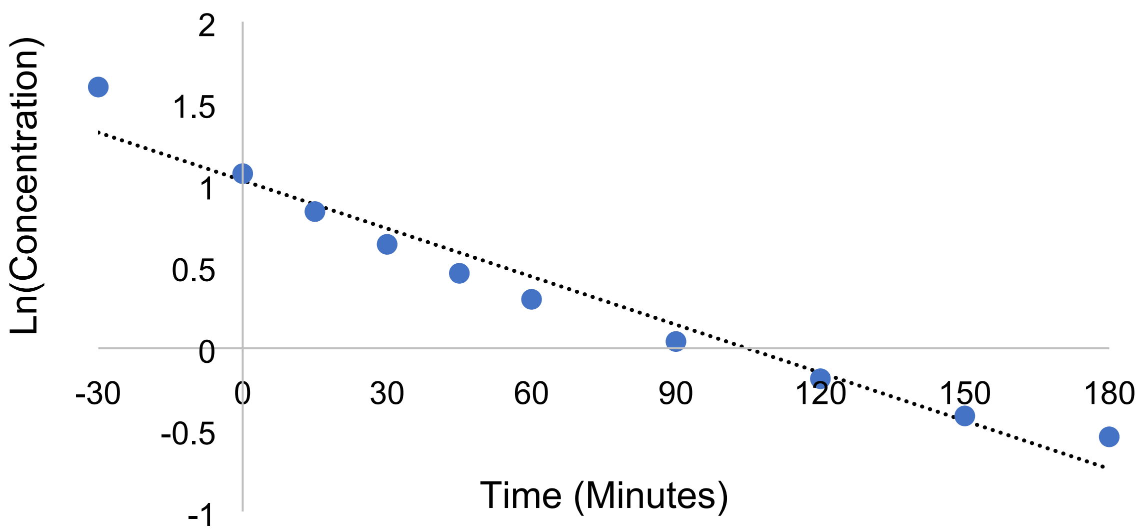

Figure S10: Natural log of concentration *vs.* time for the KS80 experiment, used to calculate the rate of reaction. A straight line here suggests pseudo first order kinetics.

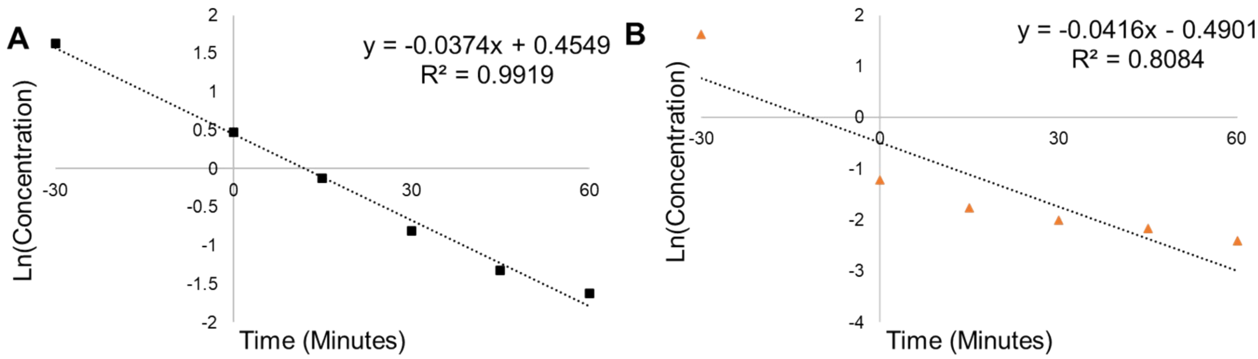

Figure S11: Natural logs *vs.* time for -30- 60 mins for A- Sample S and B- Sample ST80. These were used to calculate rates of reaction between specific times.

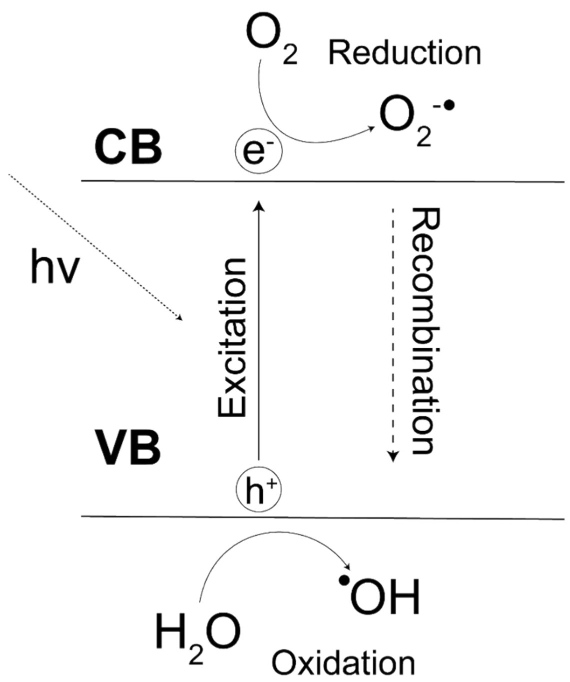

Figure S12: The proposed photocatalytic mechanism for the generation of OH$^{\bullet}$ and$O_2^{-\bullet}$ radicals.

Table S1: Complete viscometry data for all templating solutions (after mixing at 1000 rpm at 80 °C).

Sample	KS80	V	VT80	S	ST80
Viscosity (cP)	3.12	12.2	23.2	7.92	18.1
Torque (%)	5.2	20.4	38	13.2	30.1