

## Supplementary

### **Ti<sub>2</sub>C MXene modified with ceramic oxide and noble metal nanoparticles: synthesis, morpho-structural properties and high photocatalytic activity**

Tomasz Wojciechowski<sup>†</sup>, Anita Rozmysłowska-Wojciechowska<sup>‡</sup>, Grzegorz Matyszczyk<sup>†</sup>, Michał Wrzecionek<sup>†</sup>, Andrzej Olszyna<sup>‡</sup>, Anca Peter<sup>§</sup>, Anca Mihaly-Cozmuta<sup>§</sup>, Camelia Nicula<sup>§</sup>, Leonard Mihaly-Cozmuta<sup>§</sup>, Sławomir Podsiadło<sup>†</sup>, Dariusz Basiak<sup>†</sup>, Wanda Ziemkowska<sup>†\*</sup>, Agnieszka Jastrzębska<sup>‡</sup>

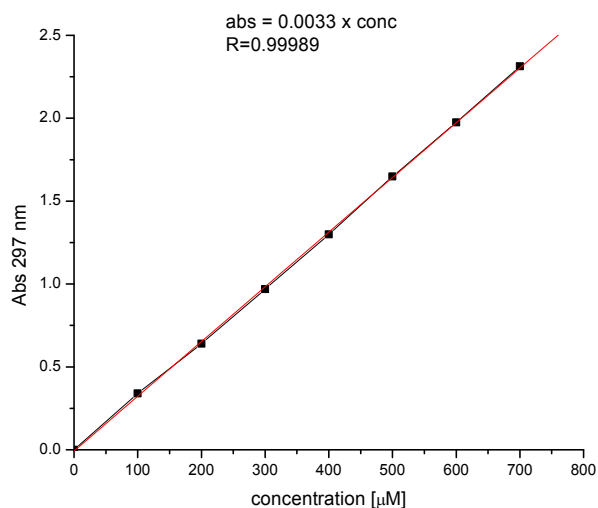
<sup>†</sup> Warsaw University of Technology, Faculty of Chemistry, Noakowskiego 3, 00-664 Warsaw, Poland

<sup>§</sup> Technical University Cluj Napoca, Department of Chemistry and Biology, Victor Babes 76, 0040744790308, Baia Mare, Romania

<sup>‡</sup> Warsaw University of Technology, Faculty of Materials Science and Engineering, Wołoska st. 141, 02-507 Warsaw, Poland



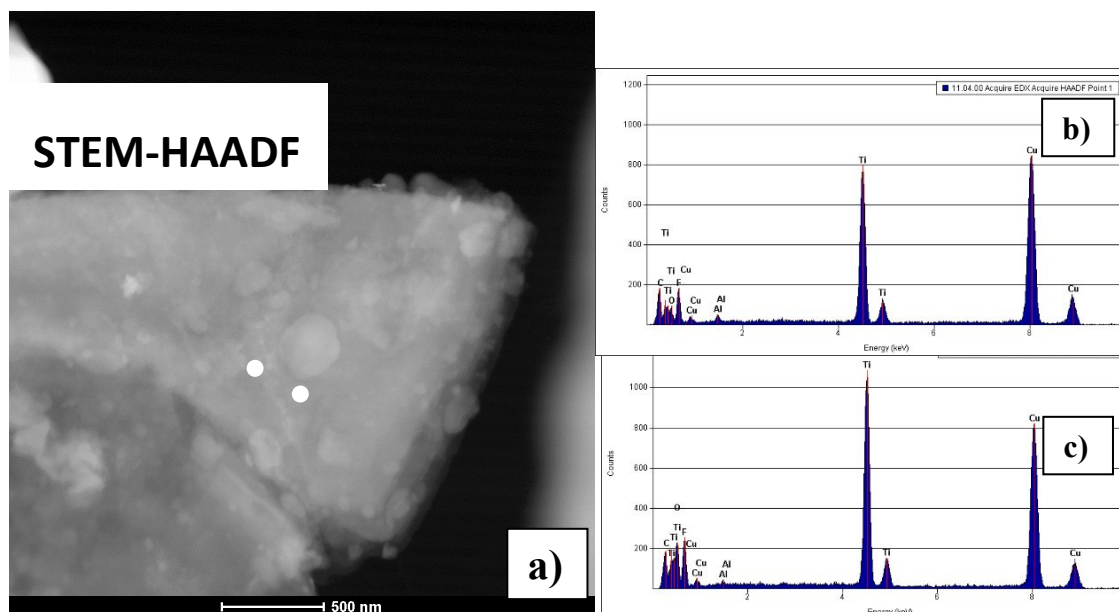
**Figure S1.** UV-reactor system



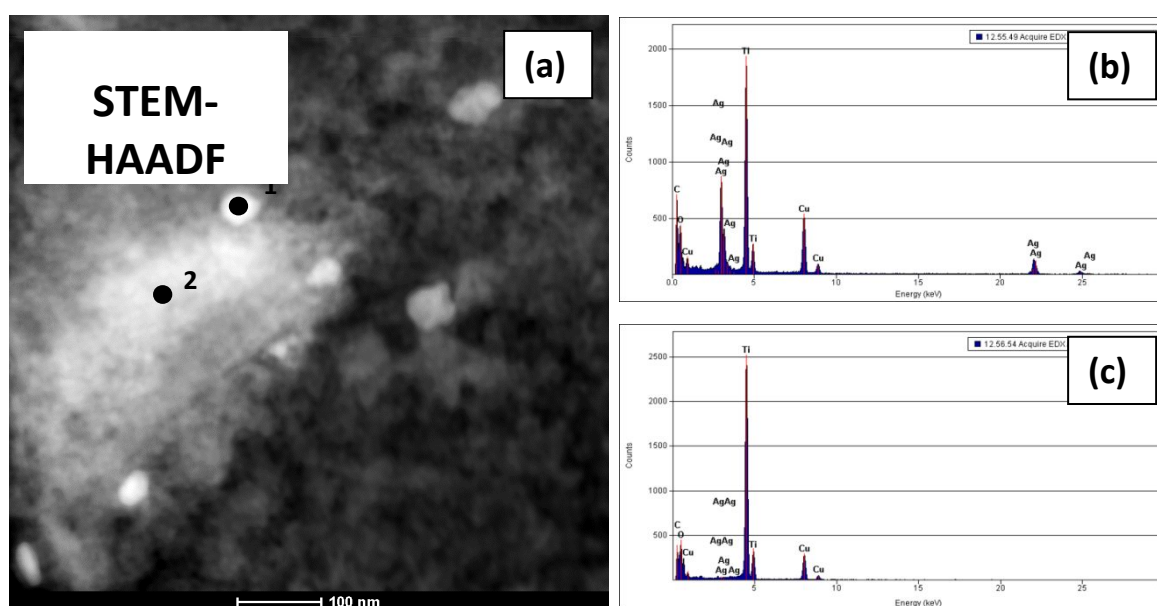
**Figure S2.** Reference curve for salicylic acid

**Table S1.** Values of apparent rate constant and square correlation coefficient

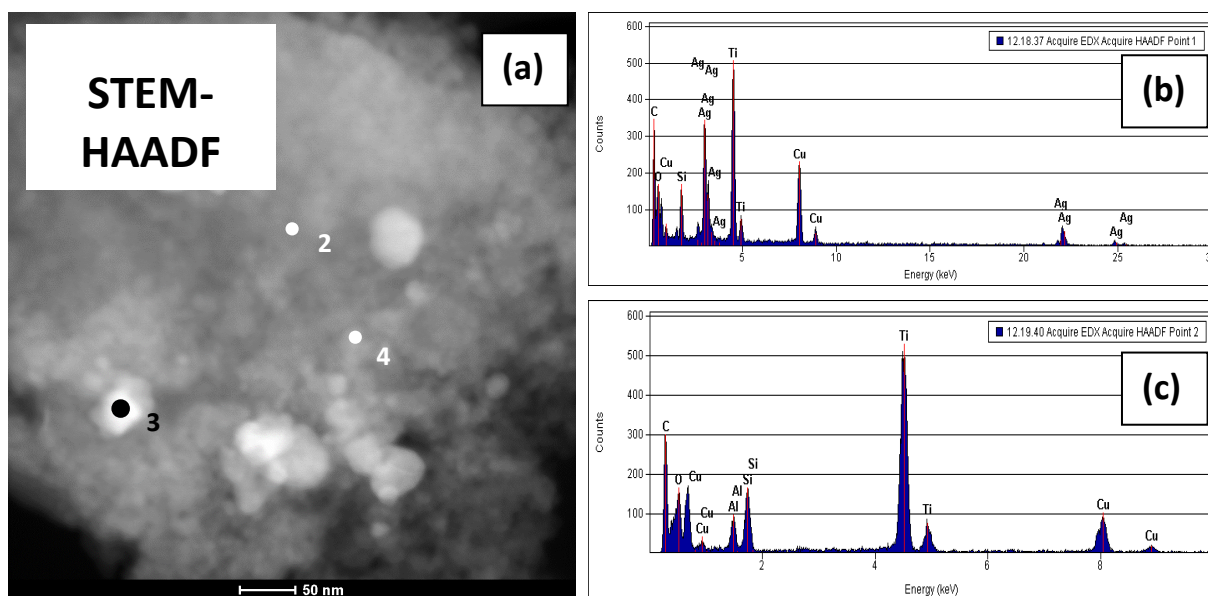
Run	Samples	Composition	$k_{app}$ (min <sup>-1</sup> )	R <sup>2</sup>
1	<b>1</b>	Ti <sub>2</sub> C	0.01331	0.9815
2	<b>2</b>	Ti <sub>2</sub> C/3%TiO <sub>2</sub>	0.01431	0.9923
3	<b>3</b>	Ti <sub>2</sub> C/3%TiO <sub>2</sub> /1%Ag <sub>2</sub> O	0.01710	0.9896
4	<b>4</b>	Ti <sub>2</sub> C/3%TiO <sub>2</sub> /1%Ag	0.01796	0.9633
5	<b>5</b>	Ti <sub>2</sub> C/3%TiO <sub>2</sub> /1%PdO	0.01078	0.9973
6	<b>6</b>	Ti <sub>2</sub> C/3%TiO <sub>2</sub> /1%Pd	0.01284	0.9873
7	<b>7</b>	Ti <sub>2</sub> C/3%TiO <sub>2</sub> /1%Au	0.01460	0.9883



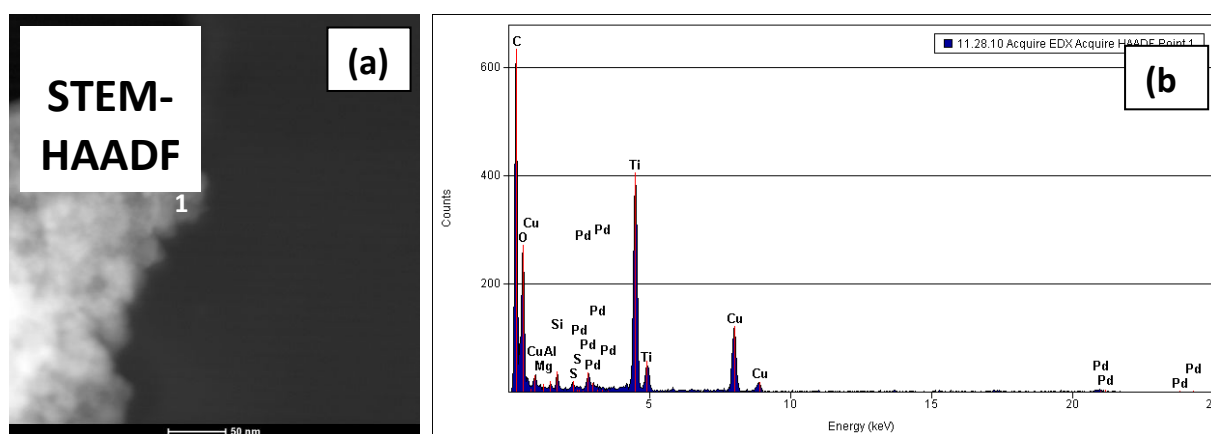
**Figure S3.** Ti<sub>2</sub>C MXene (sample 1) (a) its STEM-HAADF micrograph. (b, c) The EDX analyses in two points i.e. 1 and 2.



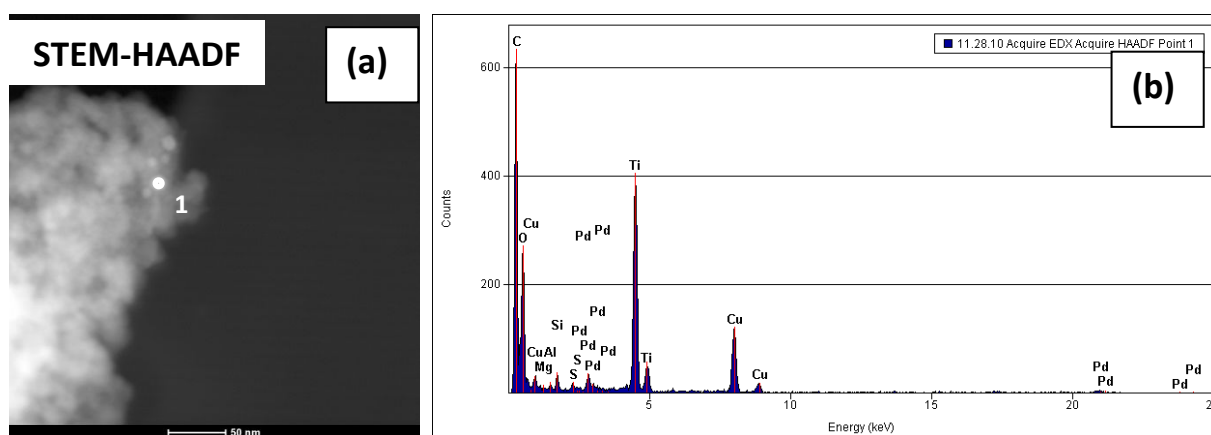
**Figure S4.** The STEM-HAADF image of the Ti<sub>2</sub>C/3%TiO<sub>2</sub>/1%Ag<sub>2</sub>O (3) nanocomposite clearly shows Ag nanoparticles as bright spots (a), which was additionally confirmed with (b, c) EDX analysis in two points.



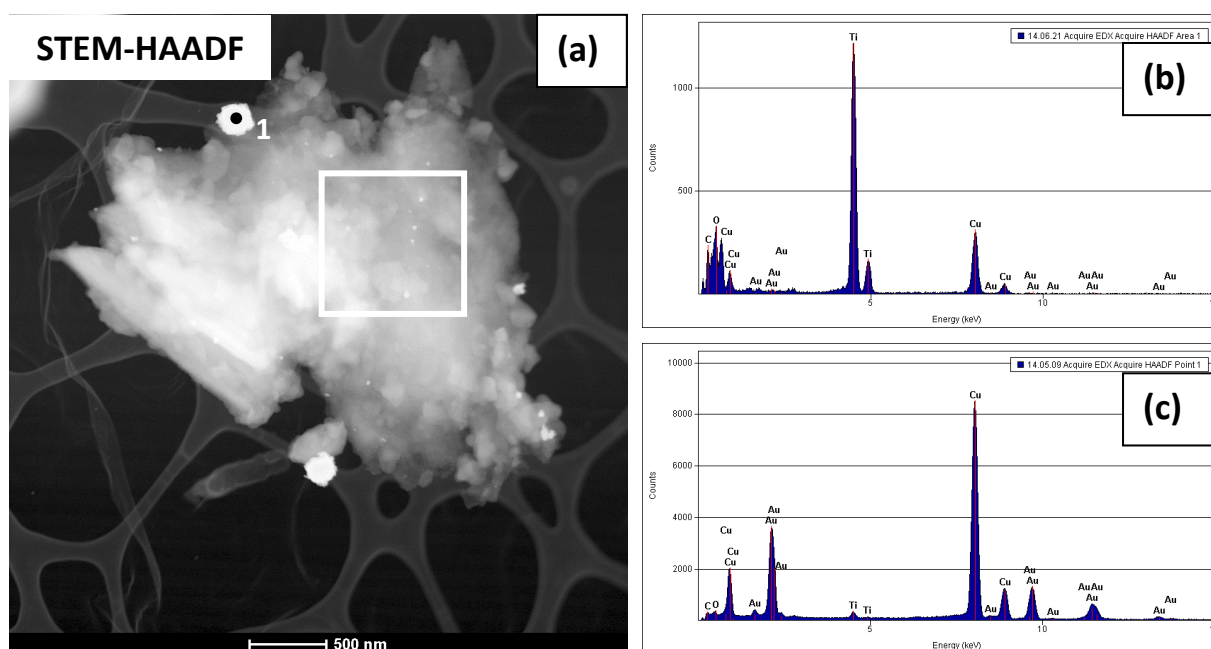
**Figure S5.** (a) The STEM-HAADF image of the sample (4) clearly shows Ag and  $\text{TiO}_2$  nanoparticles as bright spots; (b, c) EDX analysis in two points.



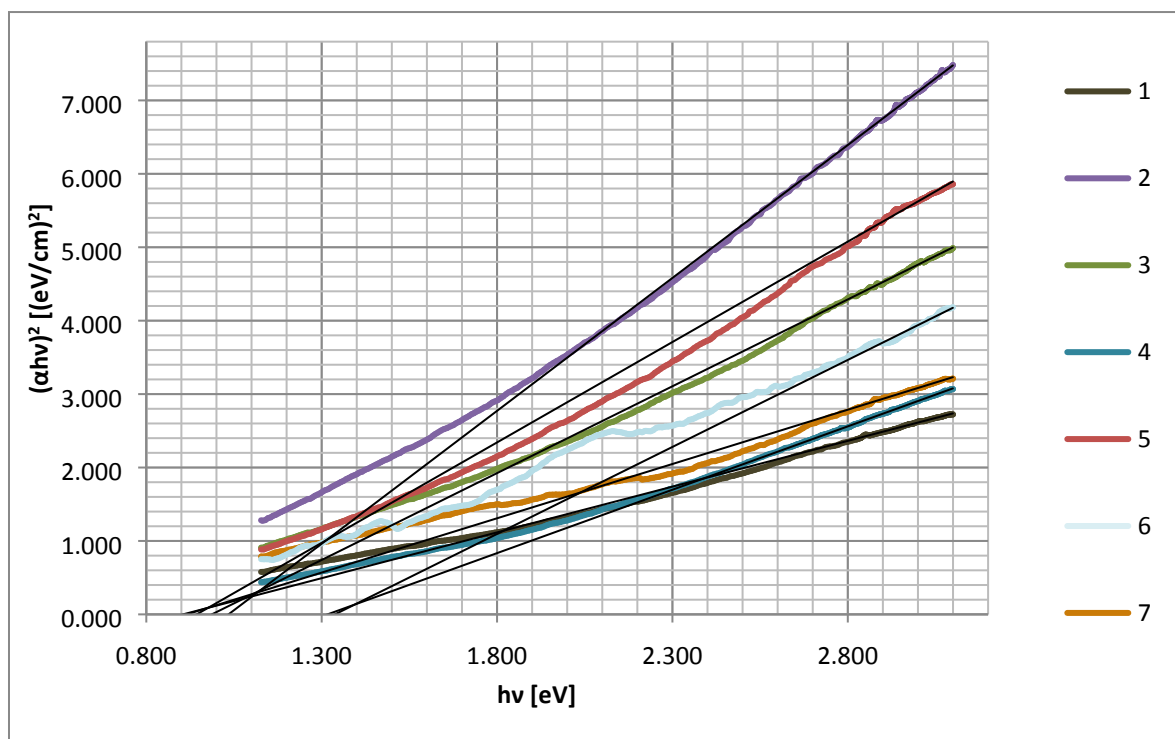
**Figure S6.** (a) The STEM-HAADF analysis of the sample (5) showing the occurrence of palladium on the surface of the  $\text{Ti}_2\text{C}$  flake in the shape of bright points, as confirmed by the EDX analysis (b).



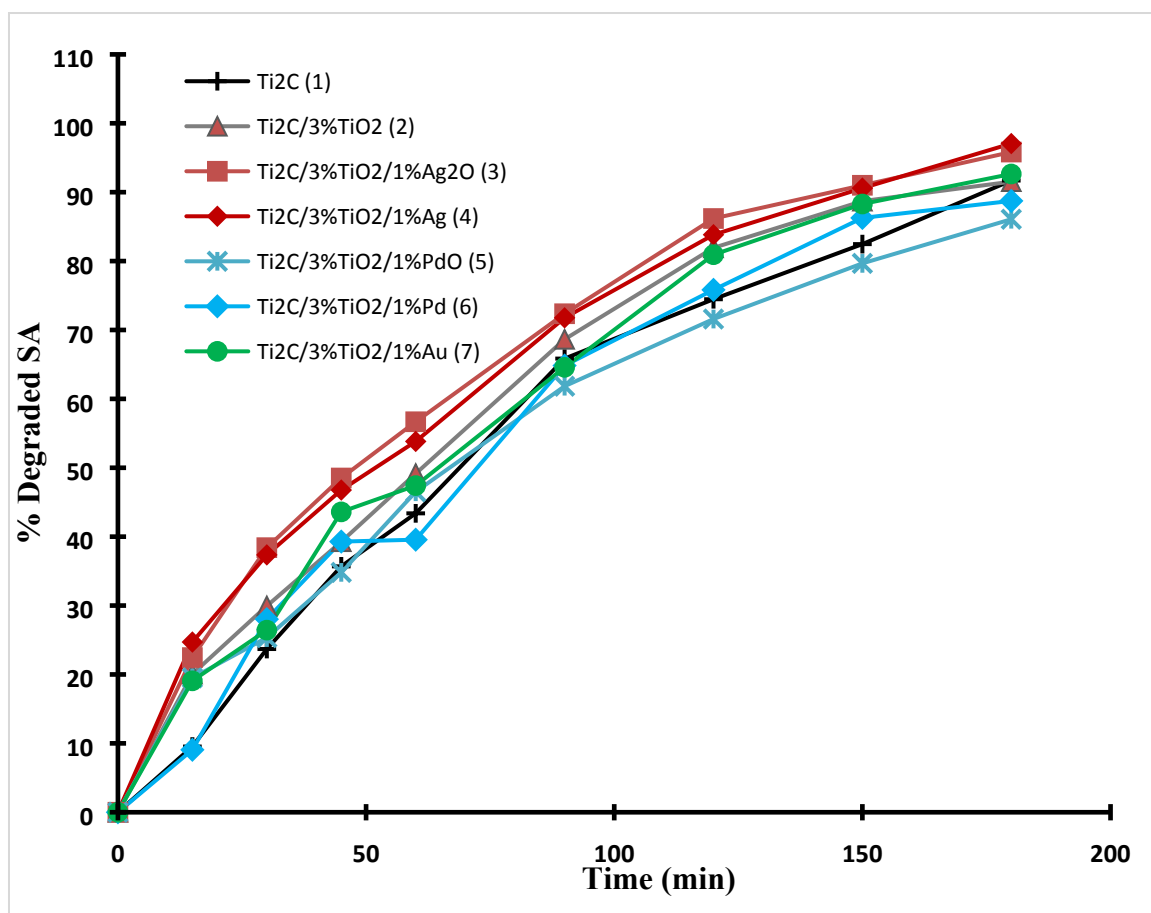
**Figure S7.** (a) The STEM-HAADF image of the sample (6) showing Pd nanoparticles as bright spots. (b) The EDX analysis confirming a presence of palladium;



**Figure S8.** (a) STEM-HAADF image showing Au nanoparticles as bright spots in the sample  $\text{Ti}_2\text{C}/3\%\text{TiO}_2/1\%\text{Au}$  (7). (b,c) EDX analysis performed in a selected point of the sample area confirming additionally the presence of gold.



**Figure S9.** Variation of  $(\alpha h\nu)^2$  as a function of photon energy ( $h\nu$ ) for investigated samples.



**Figure S10.** Profiles of photodegraded SA on 1-7 nanomaterials – percentage of degraded SA depending on time