**Supporting Information**

**Magneticallyrecyclable TiO2/MXene/MnFe2O4 photocatalyst for enhanced peroxymonosulphate-assisted photocatalytic degradation of carbamazepine   
and ibuprofen under simulated solar light**

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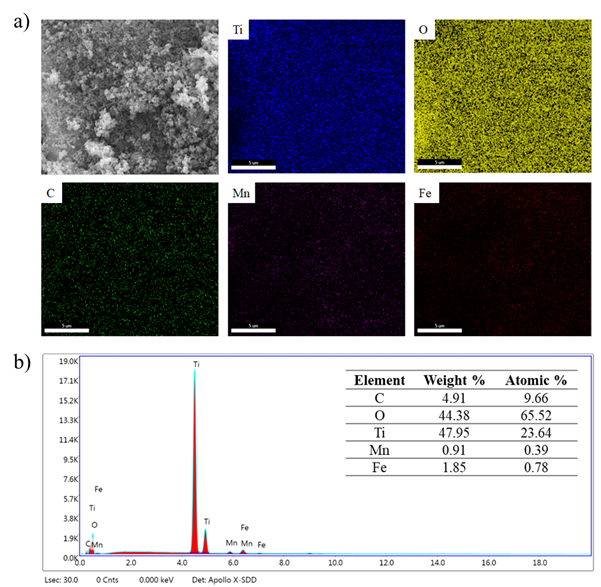
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1. **Results and discussion**

*3.1 Characterization of MnFe2O4, TiO2/Ti3C2 and TiO2/Ti3C2/MnFe2O4 photocatalysts*

**Table S1**. ICP-OES measurements for the TiO2/Ti3C2/5%MnFe2O4.

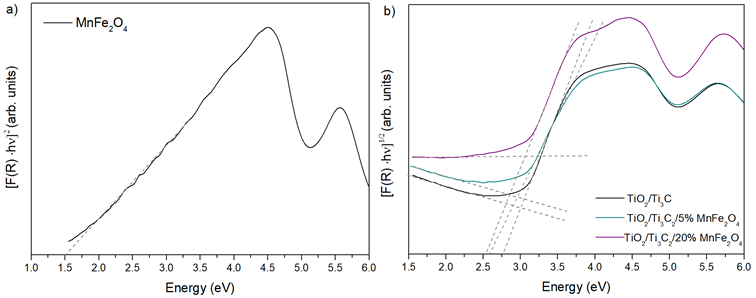
|  |  |
| --- | --- |
| Element | Content (wt%) |
| Ti | 33.9930*±*2.0554 |
| Mn | 0.9436*±*0.0632 |
| Fe | 2.0062*±*0.1147 |



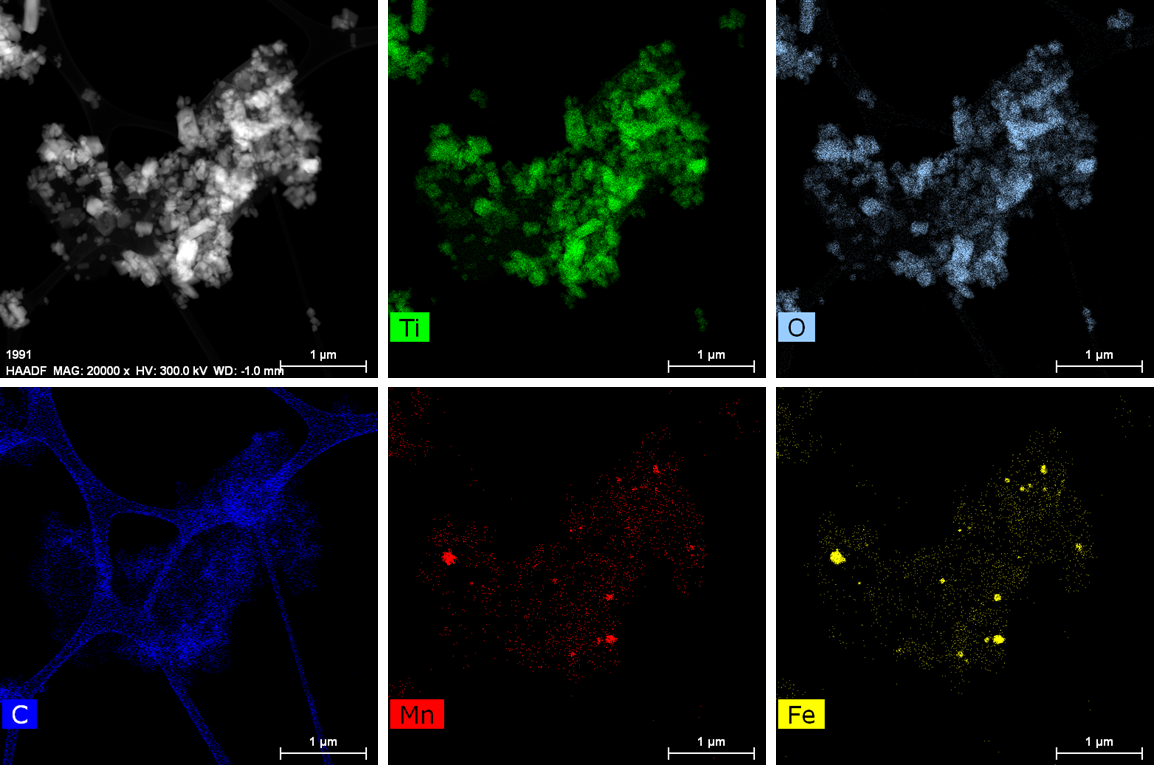
**Figure S1.** SEM area EDS spectrum with atomic and weight percentage of elements.



**Figure S2.** Survey XPS spectra for TiO2/Ti3C2 composite.



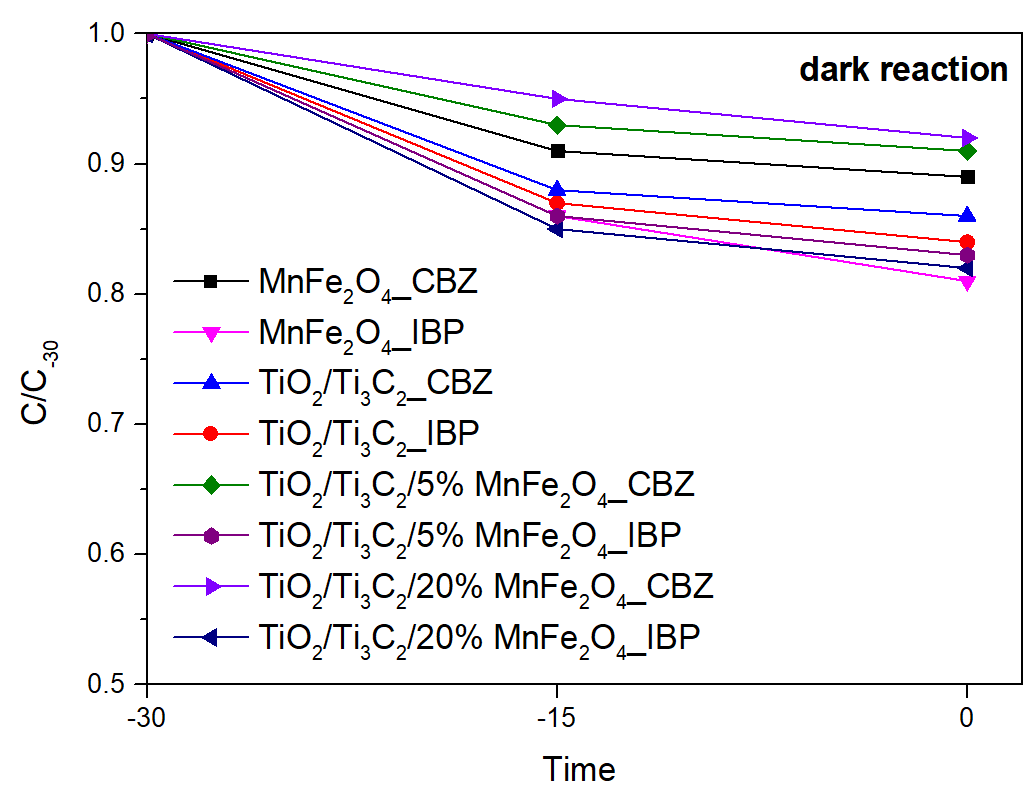
**Figure S3.** The band gap determination from Kubelka Munk function for various photocatalysts.



**Figure S4.** HAADF-STEM image and STEM-EDS elemental mapping of TiO2/Ti3C2/5%MnFe2O4.



**Figure S5.** The Gaussian fitting and deconvolution of PL spectra of the TiO2/Ti3C2 (a), MnFe2O4 (b), and TiO2/Ti3C2/20%MnFe2O4 (c)



**Figure S6.** CBZ and IBP adsorption (dark reaction) for prepared materials.

**Table S2.** The rate constant of CBZ and IBP degradation in the CBZ/IBU mixture for selected processes.

|  |  |  |
| --- | --- | --- |
| **Sample** | **CBZ degradation rate constant**  **(min-1‧ 10-2)** | **IBP degradation rate constant**  **(min-1‧ 10-2)** |
| Photolysis | 0.5±0.02 | 1.2±0.05 |
| Photolysis/PMS | 4.8±0.14 | 5.2±0.23 |
| TiO2/Ti3C2 | 6.9±0.19 | 6.2±0.24 |
| TiO2/Ti3C2/5% MnFe2O4 | 8.9±0.27 | 7.0±0.18 |
| TiO2/Ti3C2/5% MnFe2O4 /PMS (0.25 mM) | 28.6±0.98 | 53.0±1.4 |

**Table S3.** The TOC removal (%) in the CBZ/IBU mixture for selected processes.

|  |  |
| --- | --- |
| **Sample** | **TOC removal (%)** |
| TiO2/Ti3C2/5% MnFe2O4 /PMS (0.25 mM) Amount of photocatalyts - 2g/dm3 | 54±1.7% |
| TiO2/Ti3C2/5% MnFe2O4 /PMS (0.25 mM) Amount of photocatalyts - 1g/dm3 | 51±0.6% |
| TiO2/Ti3C2/5% MnFe2O4 /PMS (0.25 mM) Amount of photocatalyts - 0.5 g/dm3 | 47±1.3% |
| TiO2/Ti3C2/5% MnFe2O4 /PMS (0.25 mM) pH 4.5 | 57±0.8% |
| TiO2/Ti3C2/5% MnFe2O4 /PMS (0.25 mM) pH 9.5 | 43.1±1.1% |
| TiO2/Ti3C2/5% MnFe2O4 /PMS (0.25 mM) Seawater | 60.3±2.1% |

**Table S4.** The metal lixiviation results for a post-process solution using TiO2/Ti3C2/5% MnFe2O4/PMS (0.25 mM) and amount of photocatalyst – 2 g/dm3.

|  |  |  |
| --- | --- | --- |
| Element | ICP-OES  (mg/dm3) | Iron Photometric Test  (mg/dm3) |
| Ti | <LOD | - |
| Mn | 0.423***±***0.032 | - |
| Fe | 0.089***±***0.010 | 0.08 |