Electronic Supplementary Material (ESI) for Inorganic Chemistry Frontiers.


# $Cu_2O$ Clusters Grown on $TiO_2$ Nanoplates as Efficient Photocatalyst for Hydrogen Generation

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**Table S1** Experiment details for synthesis of varied $TMO_x/TiO_2$ samples.

| Sample | Precursor | Amount (g) |
|---|---|---|
| $Cu_2O/TiO_2$ | $Cu(Ac)_2 \cdot H_2O$ | 0.49 |
| $Co_3O_4/TiO_2$ | $Co(Ac)_2 \cdot 4H_2O$ | 0.61 |
| $MnO/TiO_2$ | $Mn(Ac)_2 \cdot H_2O$ | 0.61 |
| $NiO/TiO_2$ | $Ni(Ac)_2 \cdot 4H_2O$ | 0.61 |

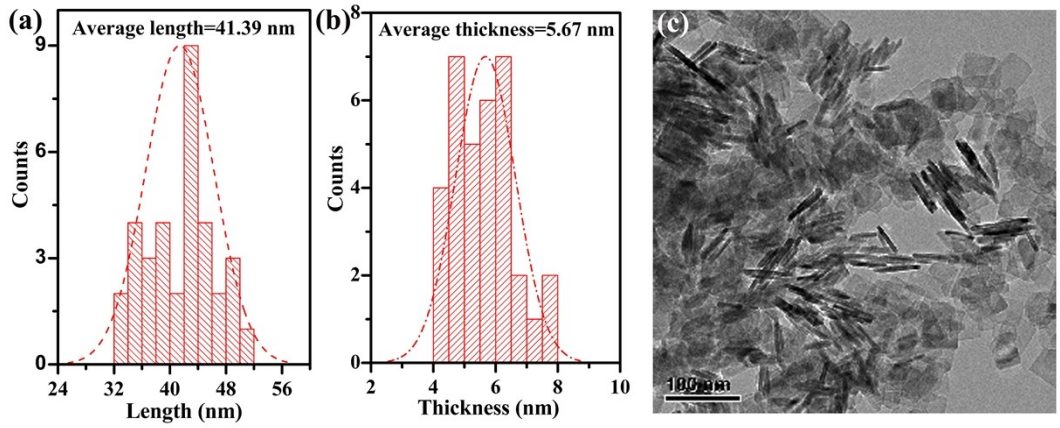


**Fig. S1** Statistic histogram of length (a) and thickness (b) of $TiO_2$ nanoplates, (c) the selected image for statistic.

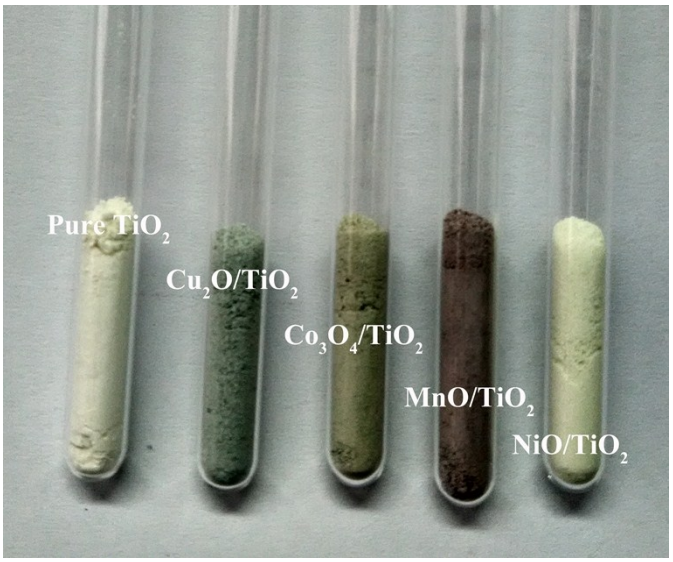


**Fig. S2** Colour of different photocatalysts.

**Table S2** Relative atomic ratios of various elements in pure $TiO_2$ nanoplate and $TMO_x/TiO_2$ measured by XPS.

| Samples | Ti (At. %) | O (At. %) | Metal (At. %) |
|---|---|---|---|
| $TiO_2$ | 26.02 | 73.98 | 0 |
| $Cu_2O/TiO_2$ | 17.75 | 80.73 | 1.53 |
| $Co_3O_4/TiO_2$ | 27.23 | 71.65 | 1.12 |
| $MnO/TiO_2$ | 20.30 | 68.00 | 1.70 |
| $NiO/TiO_2$ | 17.24 | 82.11 | 0.65 |

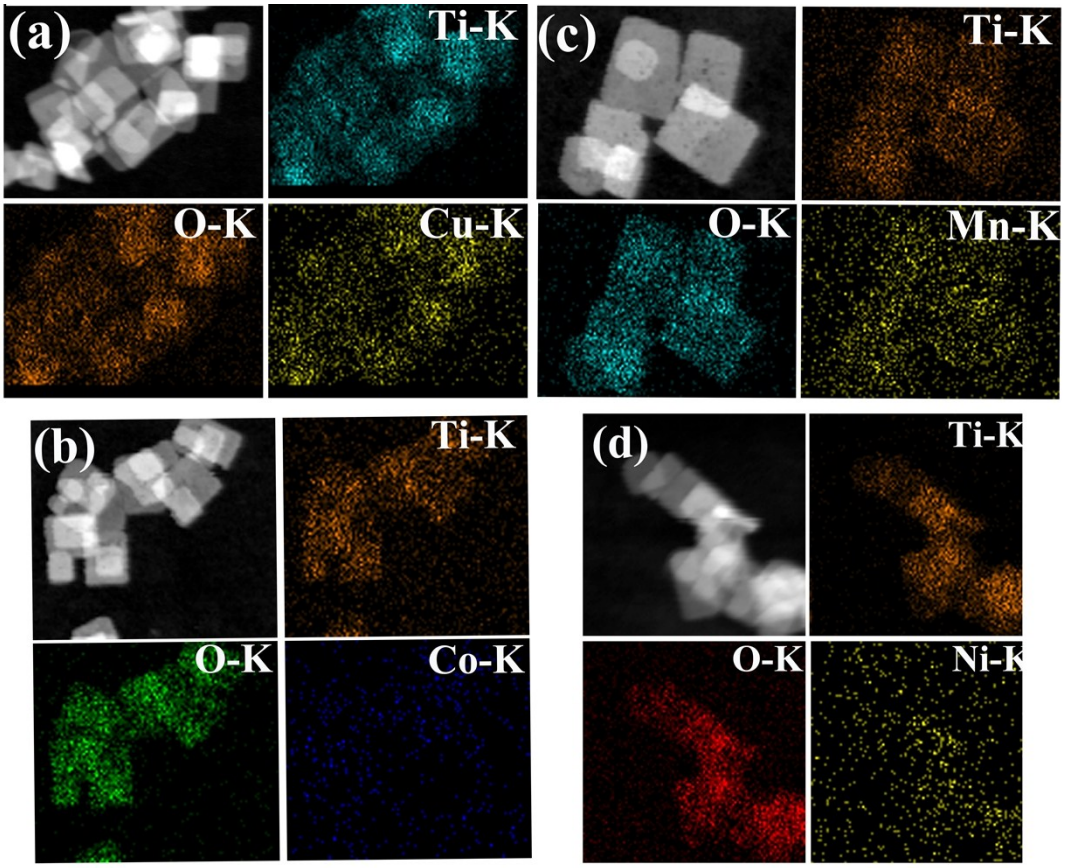


**Fig.S3** Element mapping images for different photocatalysts.

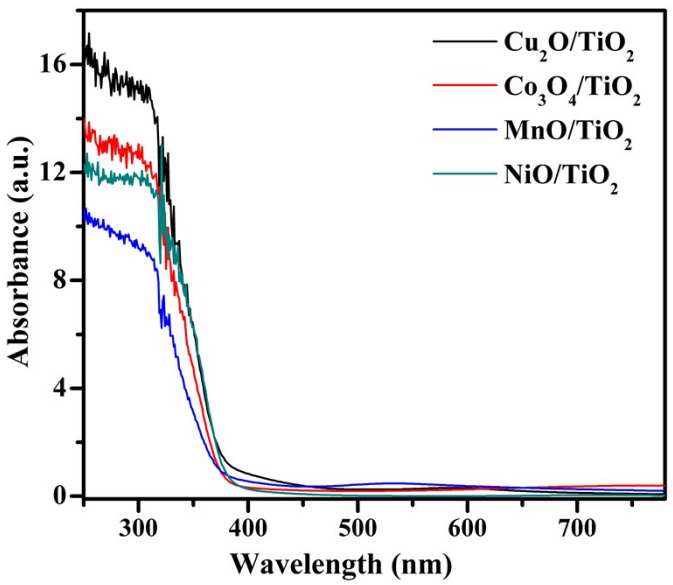


**Fig. S4** UV-light absorption spectra of different metal oxides loaded on $TiO_2$ nanoplates.

**Table 3** BET surface area, average pore diameter and total pore volume of $TMO_x/TiO_2$.

| Catalysts | BET surface area ($m^2\ g^{-1}$) | Average pore diameter (nm) | Total pore volume ($cm^3 g^{-1}$) |
|---|---|---|---|
| $TiO_2$ | 48.17 | 26.96 | 0.346 |
| $Cu_2O/TiO_2$ | 70.27 | 18.96 | 0.338 |
| $Co_3O_4/TiO_2$ | 72.29 | 16.51 | 0.258 |
| $MnO/TiO_2$ | 81.83 | 18.09 | 0.387 |
| $NiO/TiO_2$ | 94.66 | 16.24 | 0.314 |