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(Supplementary Information)

Photo catalytic activities of Pt/ZIF-8 loaded highly ordered TiO$_2$ nanotubes

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ZIF-8 synthesis reaction:
**Fig. S1** Synthesis of ZIF-8 Nanocrystals Capped with Neutral 2-Methylimidazole 

\[
\text{Zn(NO}_3\text{)}_2 + 2 \text{Hmim} \rightarrow \text{[Zn(mim)\textsubscript{2-x}(Hmim)\textsubscript{x}]} + (2-x) \text{H}^+ + 2 \text{NO}_3^- 
\]

**Schematic illustration of catalytic setup:**

**Fig. S2:** Cross section of the set-up used for photocatalytic tests: (1) Solar simulator; (2) Black box; (3) Reactor; (4) Sample holder; (5) Stirrer bar; (6) Sample

**SEM micrographs of the TiO\textsubscript{2} NT samples:**
**Fig. S3** SEM micrographs of TiO$_2$ NT samples: (a) Cross-section of unloaded TiO$_2$ NTs, (b) top view of unloaded TiO$_2$ NTs at larger magnitude, (c) pore size and wall thickness of unloaded TiO$_2$ NTs, (d) Pt/ZIF-8 loaded TiO$_2$ NTs, (e) Pt loaded TiO$_2$ NTs

**Fig. S4** EDX results of Pt loaded TiO$_2$ NTs
Band gap calculation:

1) Wavelength ($\lambda$) was converted into Energy (E) according to equation (1)

$$E = \frac{h \nu}{\lambda} \quad (1)$$

Where, $h$ is Planck's constant ($6.626 \times 10^{-34}$ J.s), $C$ is speed of light ($3.0 \times 10^8$ m.s$^{-1}$) and $\lambda$ is wavelength of light.

2) F(R) vs $\lambda$ was measured by UV-vis

3) Band gap measurement curve was made by $\sqrt{F(R) \times E}$ vs. $E$

ZIF-8 loading calculation:

The chemical composition of ZIF-8 is Zn (mIm)$_2$ (i.e. Zn(2-methylimidazole)$_2$) with molecular mass of 227.6 g.mol$^{-1}$. Each molecular unit contains one Zn (65.4 g.mol$^{-1}$). According to EDX results, the Zn concentration was 5.2%, therefore the ZIF-8 loading can be calculated as following:

$$\text{ZIF-8\%} = \frac{227.6}{65.4} \times 5.2\% = 18.1\%$$

1) References