Electronic Supplementary Material (ESI) for New Journal of Chemistry.


**Electronic Supplementary Information**

# Gold nanoparticles-sensitized wide and narrow band gap $TiO_2$ for visible light applications: A comparative study

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**Schematic diagram of the photoelectrochemical measurement**

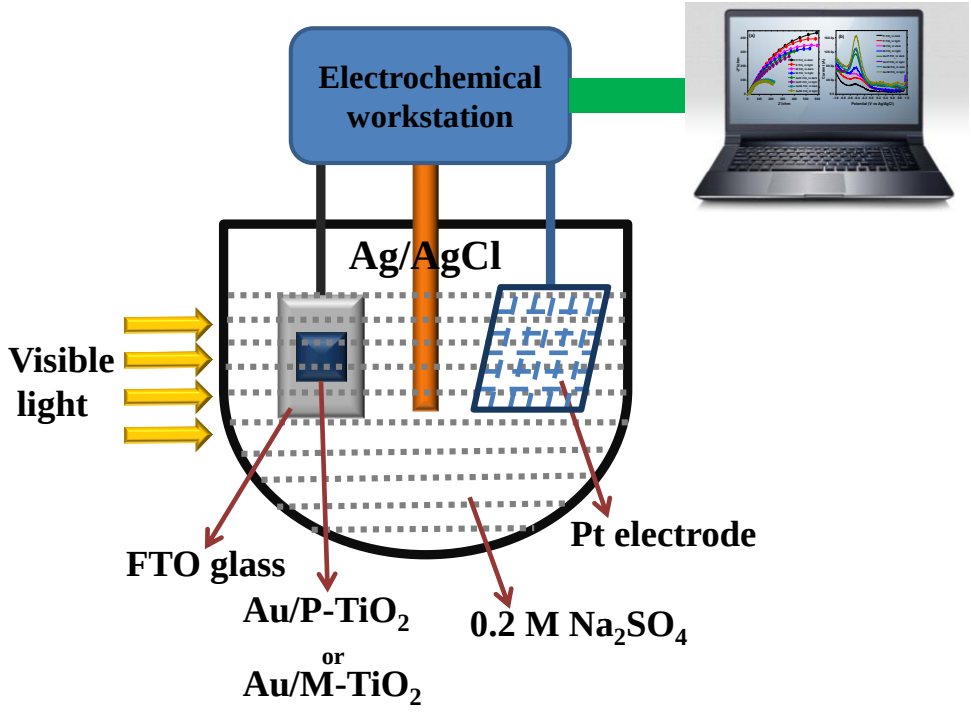


**Fig. S1** Schematic diagram of the photoelectrochemical measurements.

**Characterization and photodegradation results of P-$TiO_2$ and M-$TiO_2$**

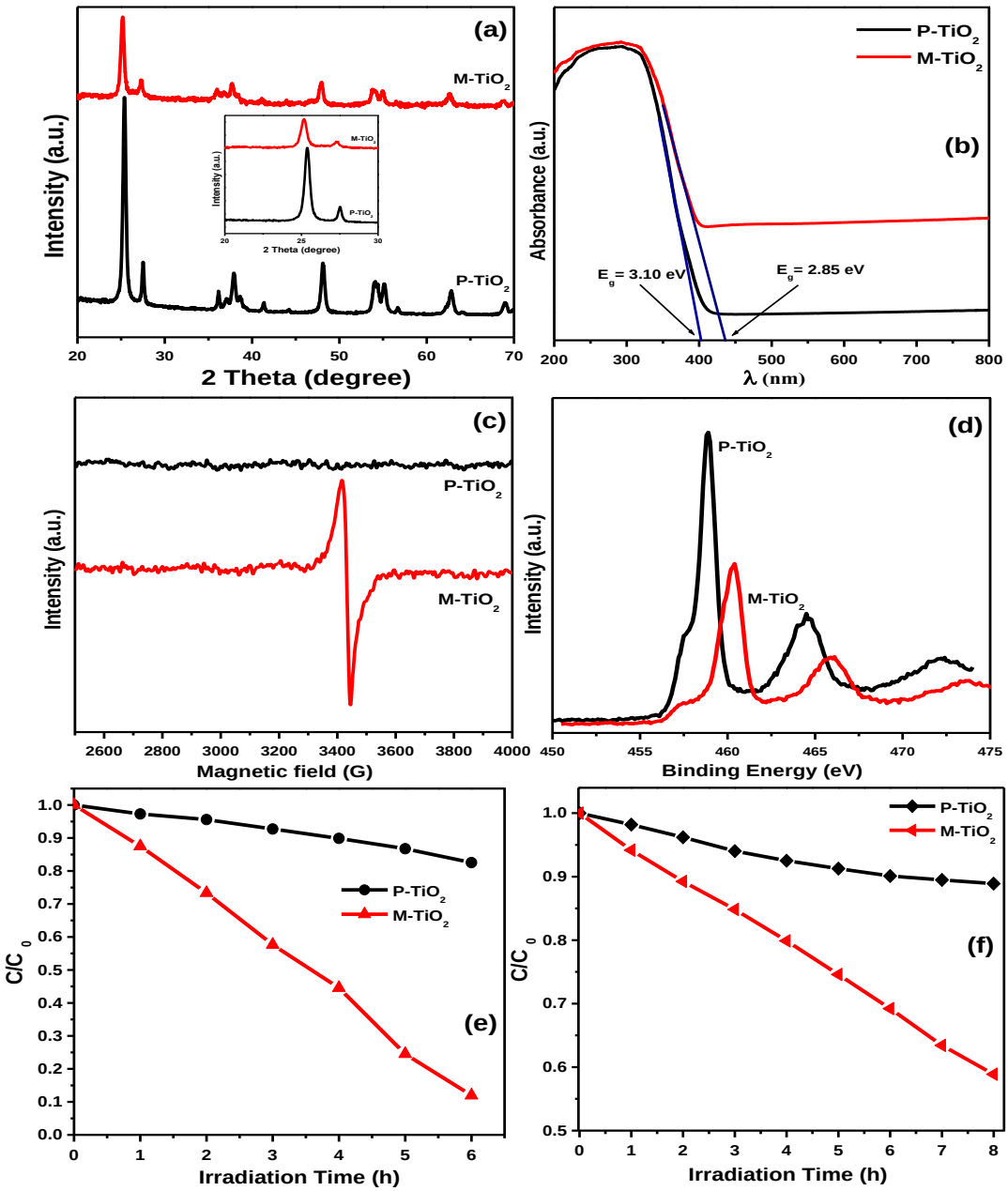


**Fig. S2** (**a**) XRD pattern, (**b**) UV-visible absorption spectra, (**c**) EPR spectra, (**d**) Ti 2p XPS spectra of P-$TiO_2$ and M-$TiO_2$, (**e**) $C/C_0$ versus irradiation time plot for the photodegradation of MB by P-$TiO_2$ and M-$TiO_2$, and (**f**) $C/C_0$ versus irradiation time plot for the photodegradation of MO by P-$TiO_2$ and M-$TiO_2$.

**UV-vis diffuse reflectance spectra of the Au/P-$TiO_2$ and Au/M-$TiO_2$ nanocomposites**

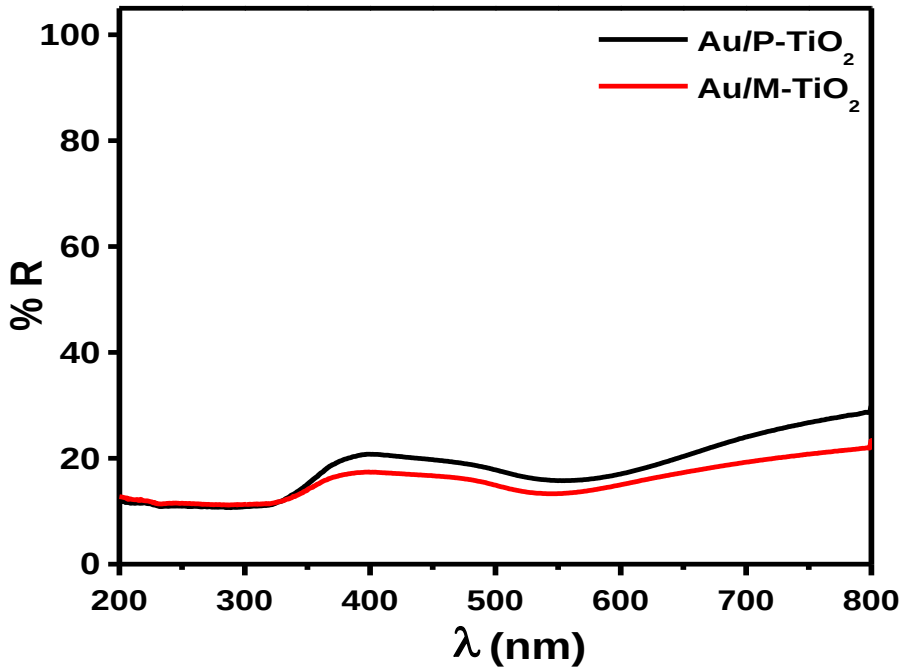


**Fig. S3** UV-vis diffuse reflectance spectra of the Au/P-$TiO_2$ and Au/M-$TiO_2$ nanocomposites.

**SAED patterns of the Au/P-$TiO_2$ nanocomposite**

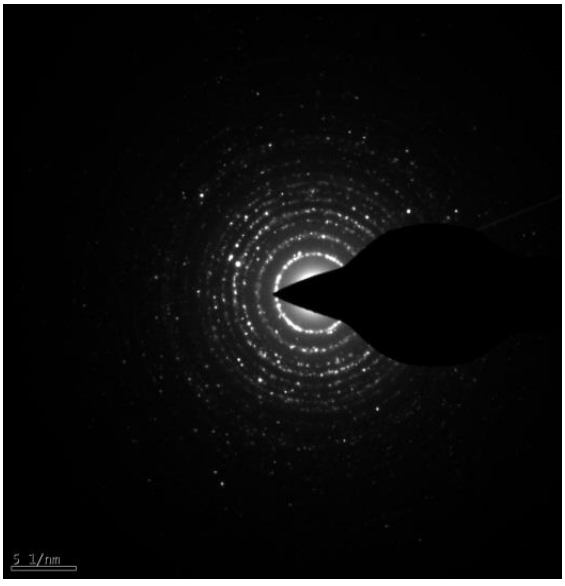

**Fig. S4** SAED patterns of the Au/P-$TiO_2$ nanocomposite.

**SAED patterns of the Au/M-$TiO_2$ nanocomposite**

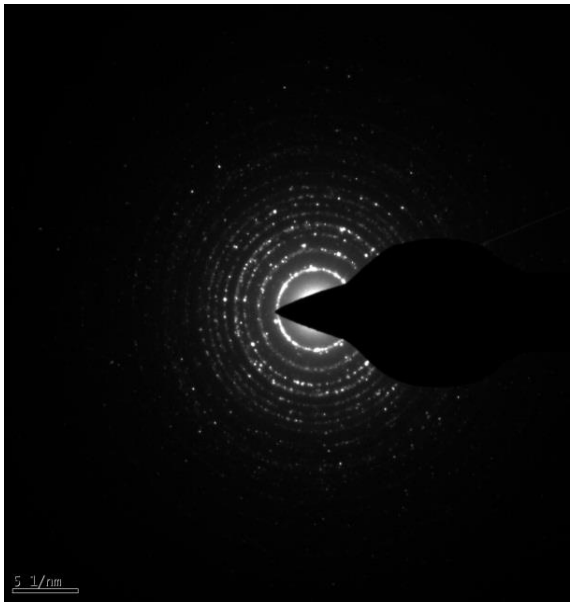


**Fig. S5** SAED patterns of the Au/M-$TiO_2$ nanocomposite.

**Acquire HAADF FE-TEM image of the Au/P-$TiO_2$ nanocomposite**

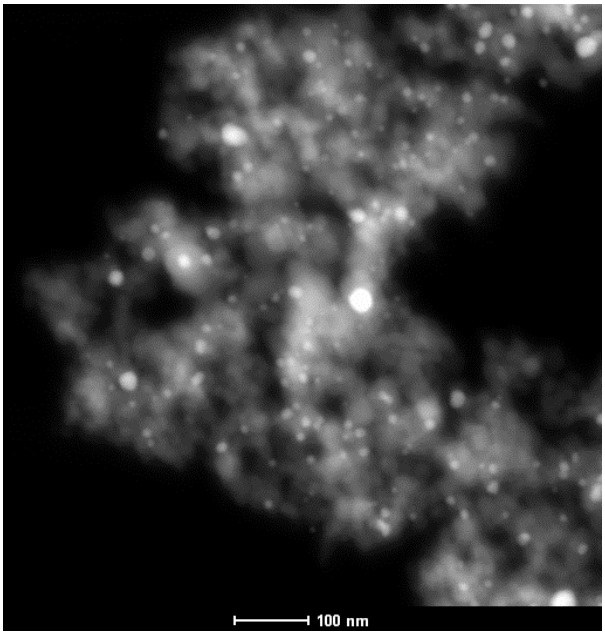


**Fig. S6** Representative HAADF FE-TEM image of the Au/P-$TiO_2$ nanocomposite.

**Acquire HAADF FE-TEM image of the Au/M-$TiO_2$ nanocomposite**

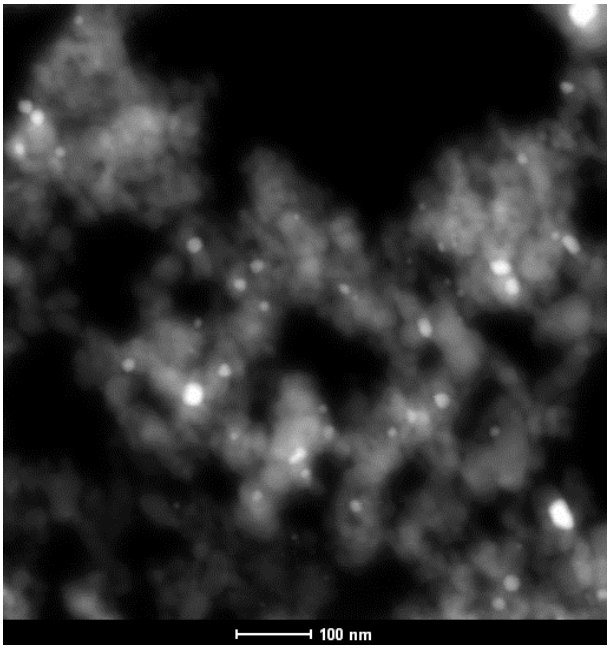


**Fig. S7** Representative HAADF FE-TEM image of the Au/M-$TiO_2$ nanocomposite.

**EDS of the Au/P-$TiO_2$ nanocomposite**

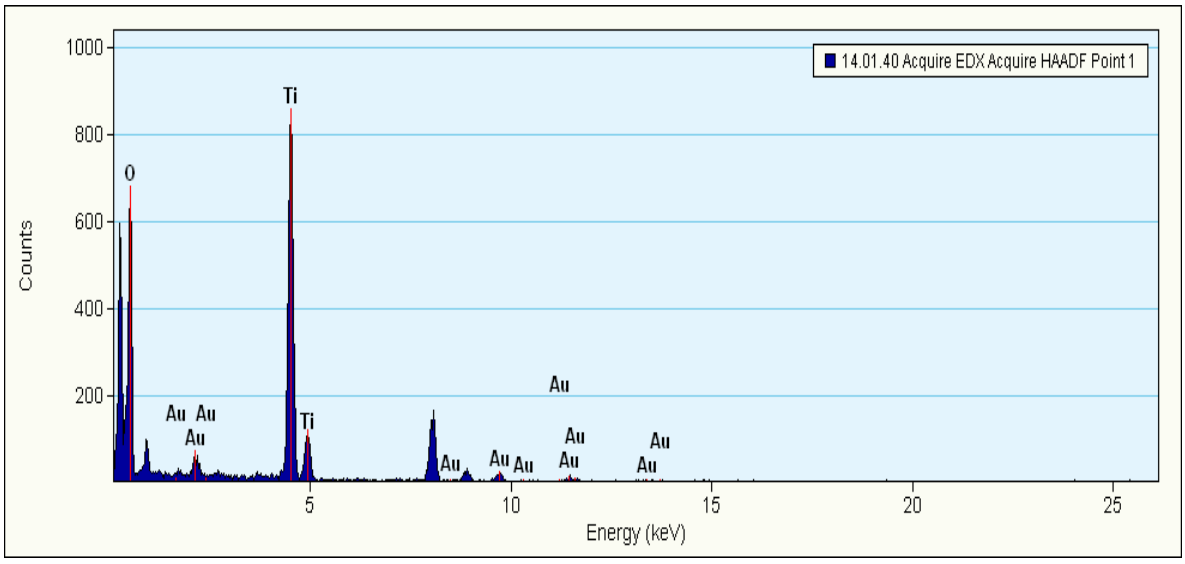


**Fig. S8** EDS of the Au/P-$TiO_2$ nanocomposite.

**EDS of the Au/M-$TiO_2$ nanocomposite**

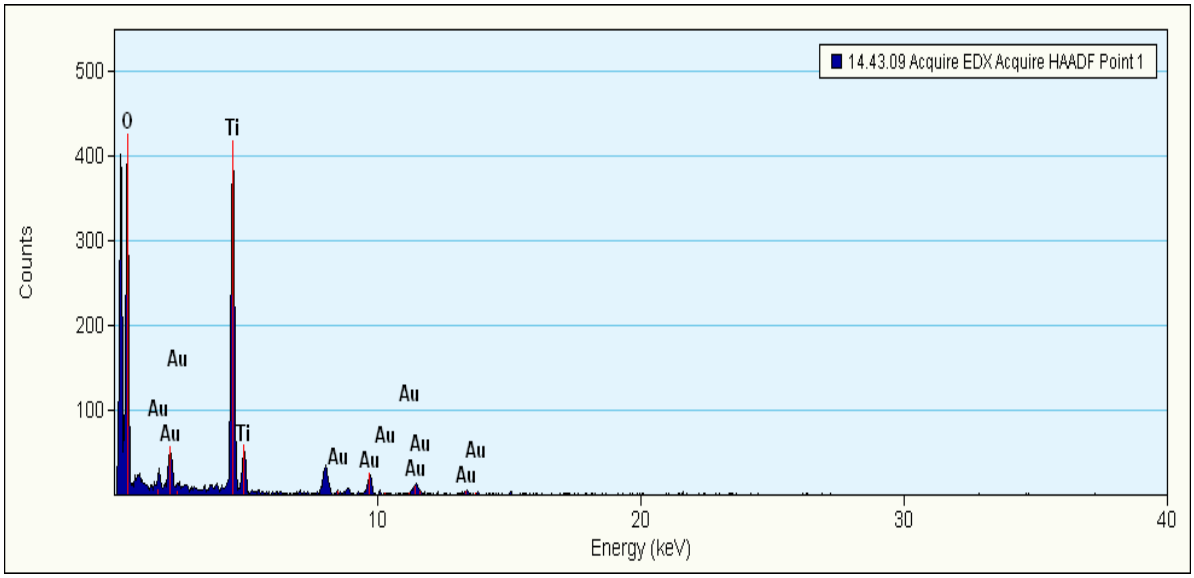


**Fig. S9** EDS of the Au/M-$TiO_2$ nanocomposite.

**C 1s photoelectron peaks of the Au/P-$TiO_2$ and Au/M-$TiO_2$ nanocomposites**

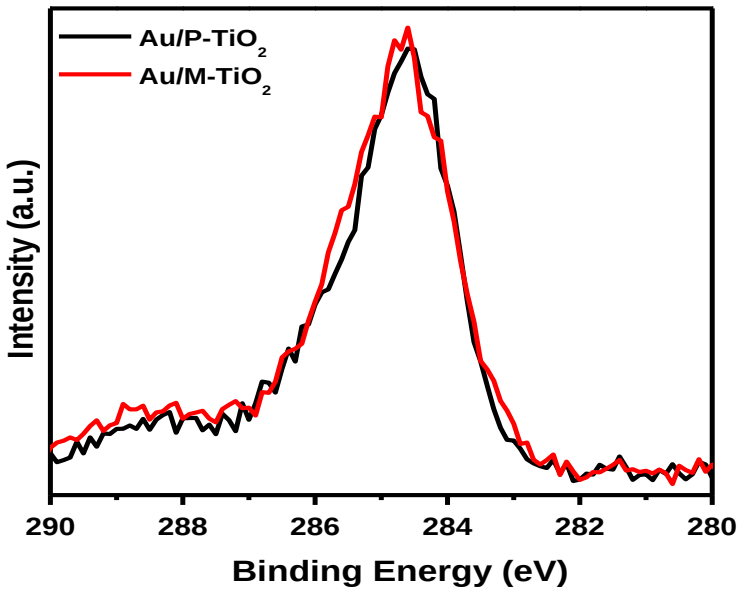


**Fig. S10** C 1s photoelectron peaks of the Au/P-$TiO_2$ and Au/M-$TiO_2$ nanocomposites.

**Photocatalytic degradation plots of MB, MO and 2-CP by Au/P-$TiO_2$ and Au/M-$TiO_2$ nanocomposites under visible light irradiation**

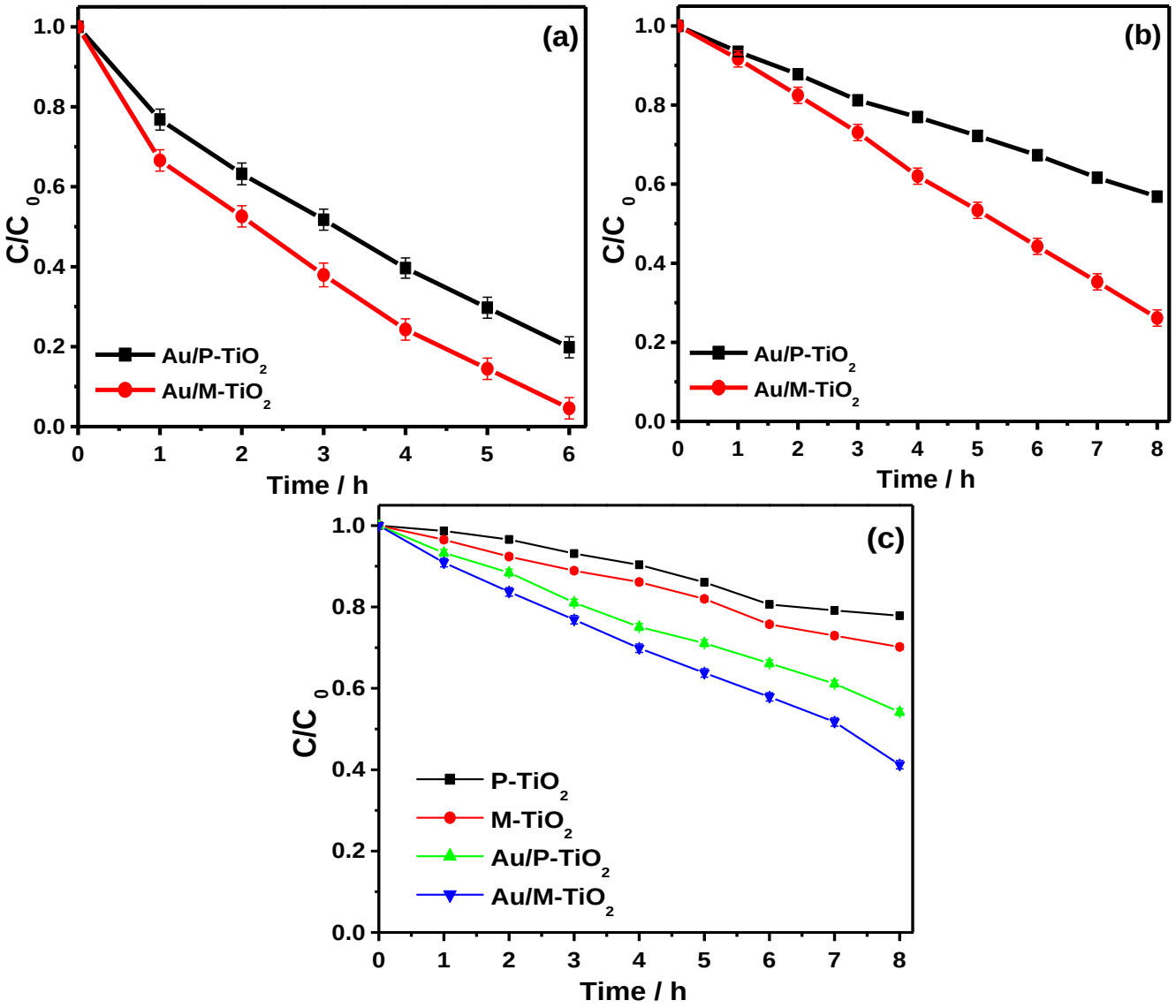


**Fig. S11** Photocatalytic degradation plots ($C/C_0$ versus time) of (**a**) MB, (**b**) MO, and (**c**) 2-CP by Au/P-$TiO_2$ and Au/M-$TiO_2$ nanocomposites under visible light irradiation.

**Stability test of the Au/P-$TiO_2$ and Au/M-$TiO_2$ nanocomposites**

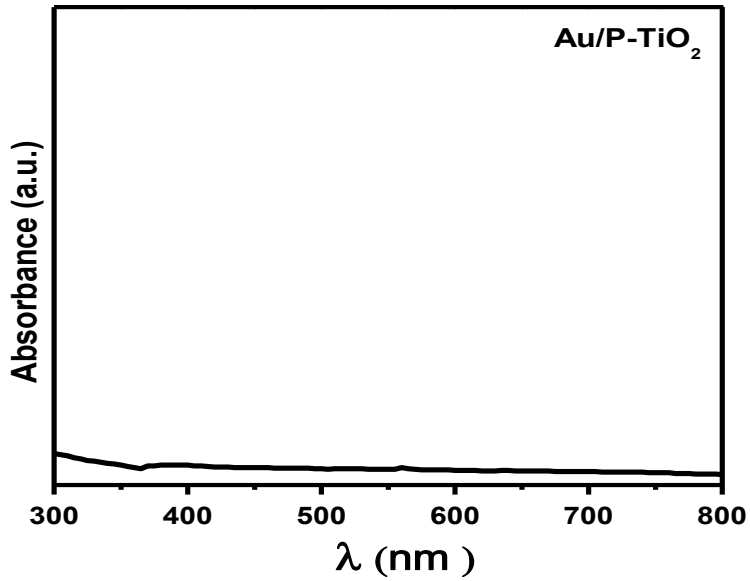


**Fig. S12** Stability of the Au/P-$TiO_2$ nanocomposite after 1 hour sonication.

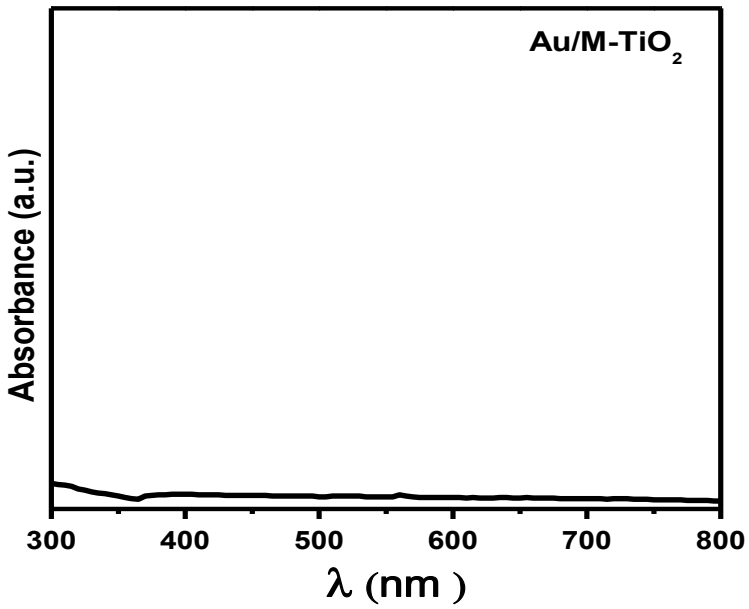


**Fig. S13** Stability of the Au/M-$TiO_2$ nanocomposite after 1 hour sonication.