Supporting Information

Efficient removal of methyl orange and ciprofloxacin by the reusable Eu-TiO$_2$/PVDF membranes with adsorption and photocatalysis methods

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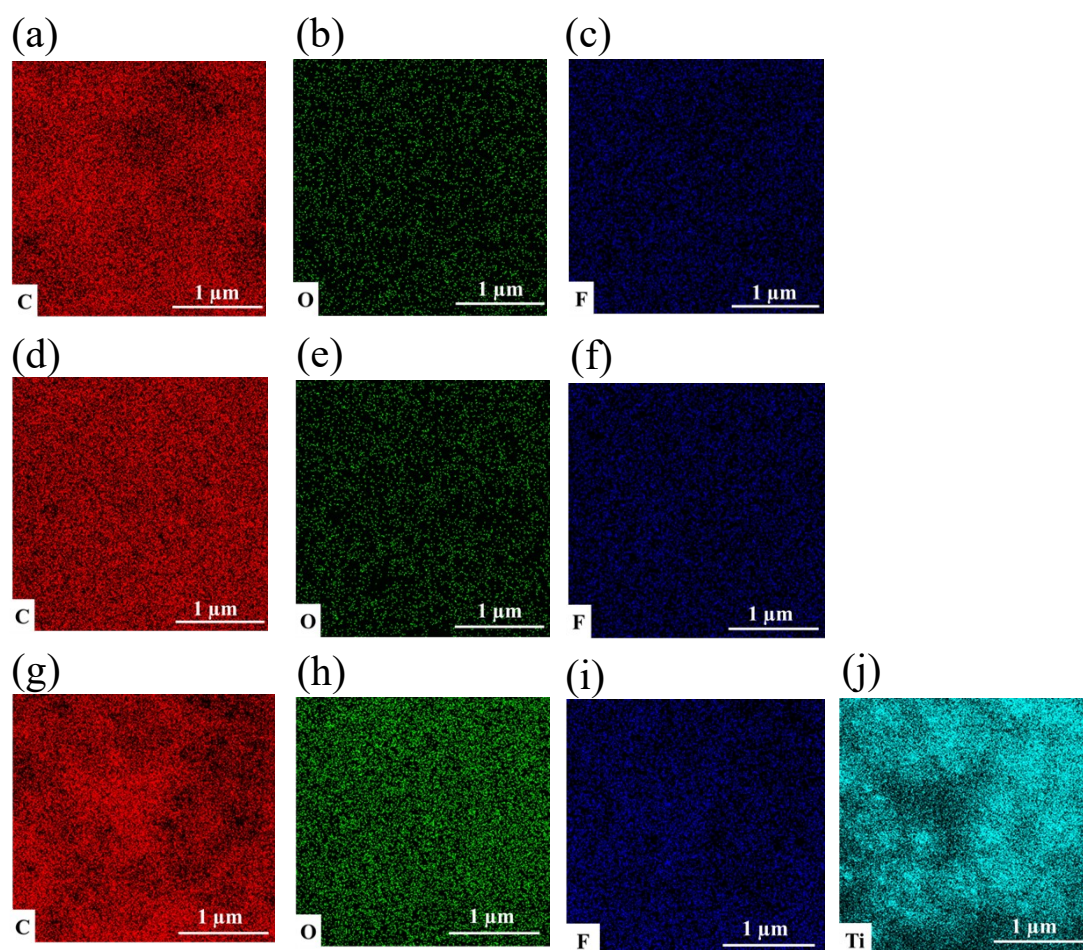
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Figure S1. (a-c) EDS maps of M1 with C, O and F atomic distribution; (d-f) EDS maps of M2 with C, O and F atomic distribution; (g-j) EDS maps of M3 with C, O, F and Ti atomic distribution.
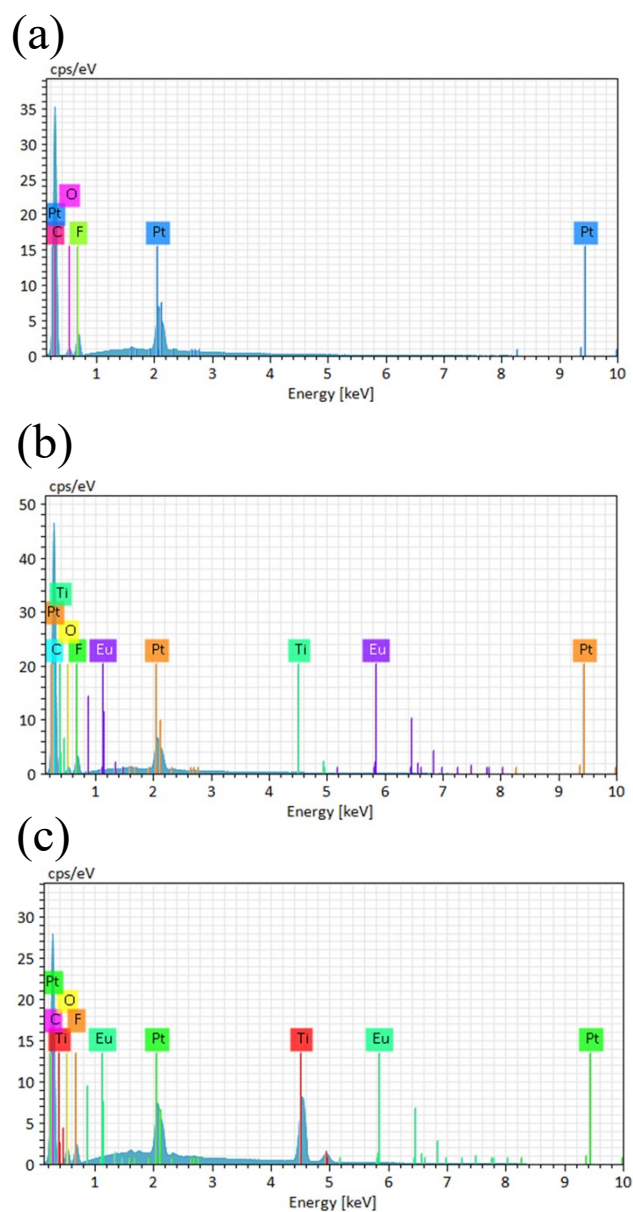
Figure S2. EDS analyses of (a) M1, (b) M2 and (c) M3.

Table S1. Element composition of Eu-TiO$_2$/PVDF membranes (M1, M2 and M3) determined by EDS.

Membranes	Elemental content (wt%)				
	C	**O**	**F**	**Pt**	**Ti**
M1	32.73	19.70	46.69	0.88	0
M2	36.61	18.86	43.78	0.74	0.03
M3	27.20	29.84	40.32	0.81	1.83

(a)

(b)
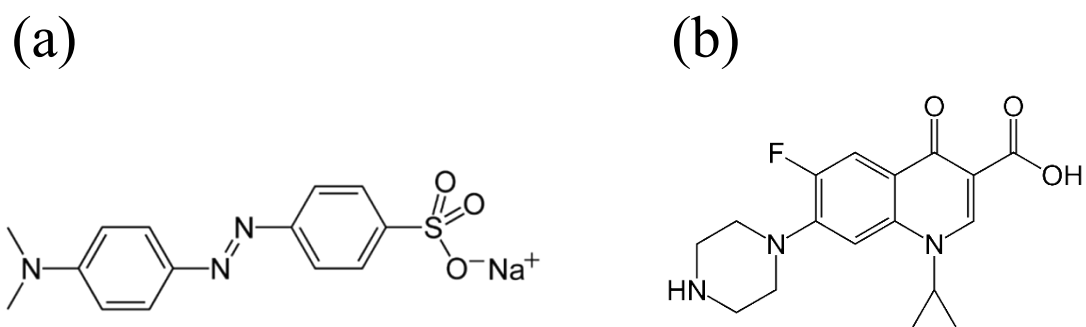
Figure S3. Chemical structure of (a) MO and (b) CIP.

(a)

$\ln (q_e-q_t)=0.50877-0.01527t$ $R^2=0.97811$

(b)

$\ln (q_e-q_t)=-0.18281-0.01203t$ $R^2=0.96375$

(c)

$\ln (q_e-q_t)=0.0198-0.01757t$ $R^2=0.85514$

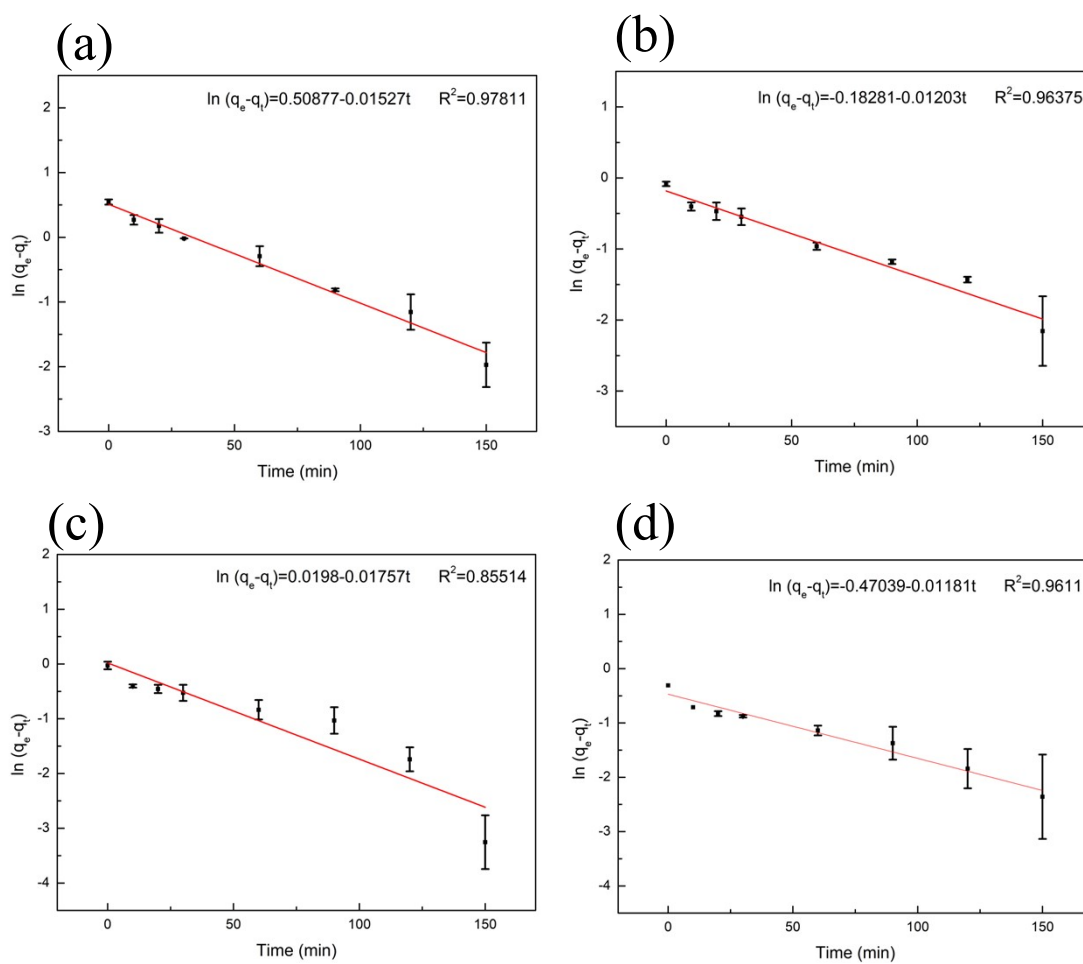(d)

$\ln (q_e-q_t)=-0.47039-0.01181t$ $R^2=0.9611$

Figure S4. Adsorption kinetics of MO by (a) M0, (b) M1, (c) M2 and (d) M3 fitted with pseudo-first-order.
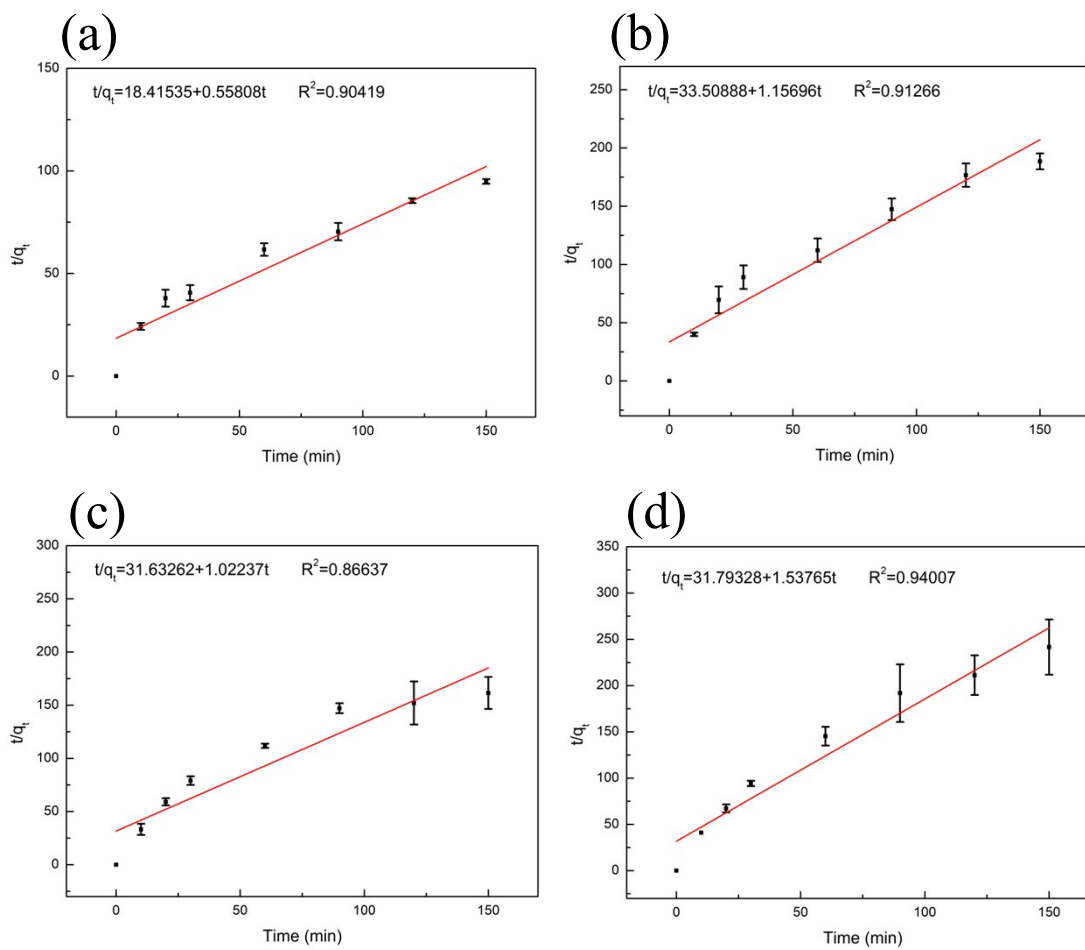
Figure S5. Adsorption kinetics of MO by (a) M0, (b) M1, (c) M2 and (d) M3 fitted with pseudo-second-order.
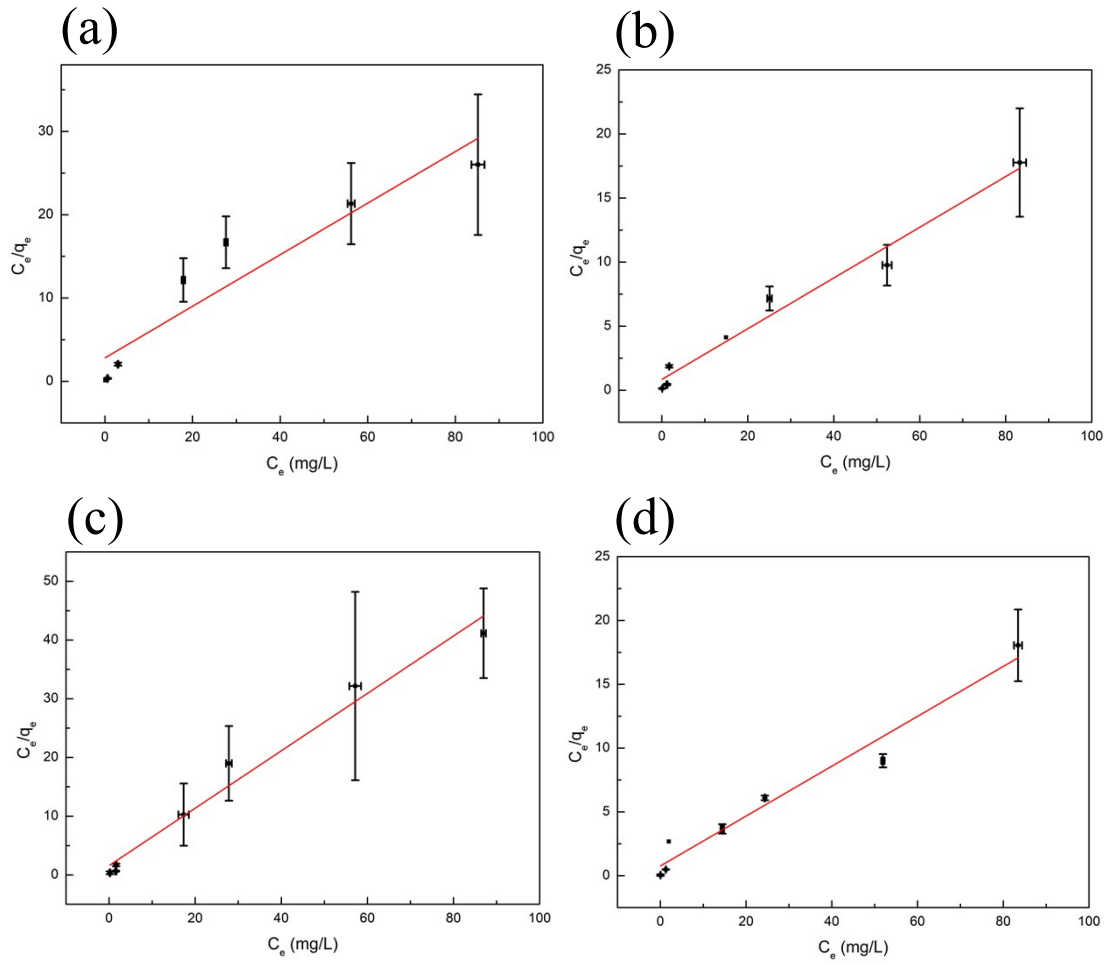
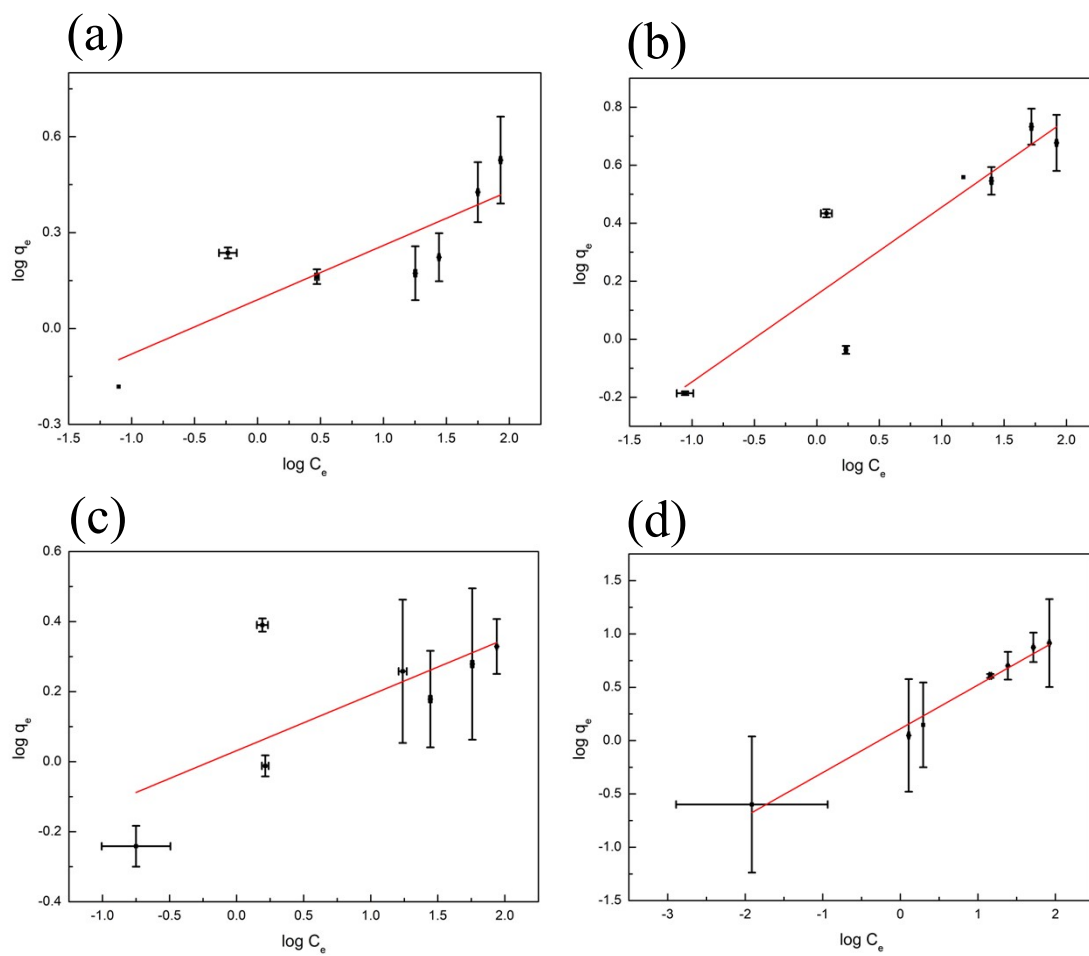**Figure S6.** Langmuir model for the adsorption of MO by (a) M0, (b) M1, (c) M2 and (d) M3.

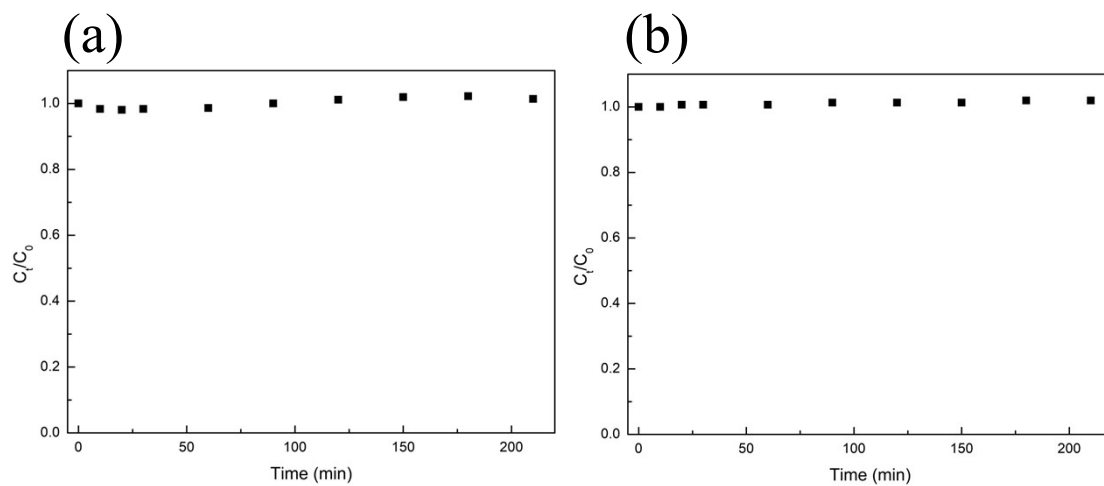**Figure S7.** Freundlich model for the adsorption of MO by (a) M0, (b) M1, (c) M2 and (d) M3.

Figure S8. Time-dependent variation of the concentration of (a) CIP solution (3 mg/L) and (b) MO solution (3 mg/L) under visible-light irradiation.
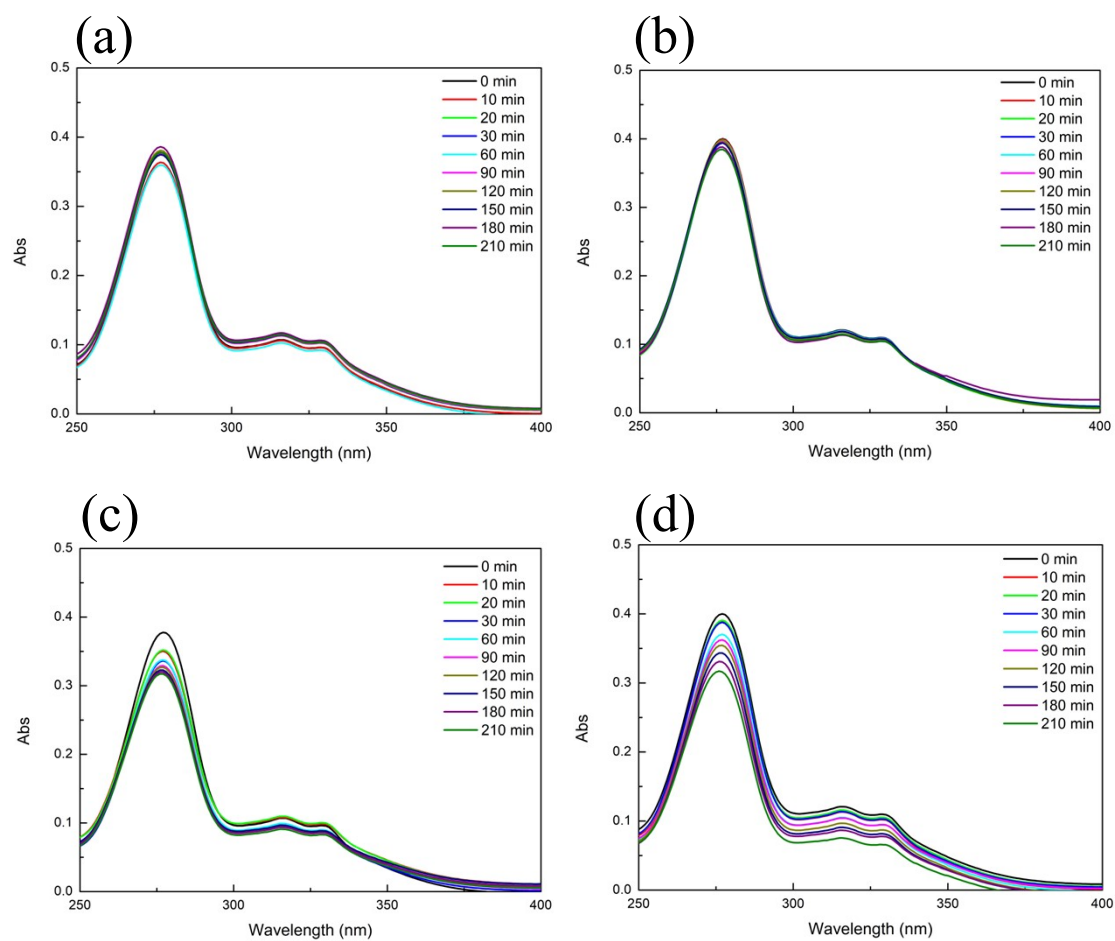
Figure S9. Representative variations of the absorption spectrum of CIP under visible-light irradiation in the presence of (a) M0, (b) M1, (c) M2 and (d) M3 (initial concentration of CIP: 3 mg/L).
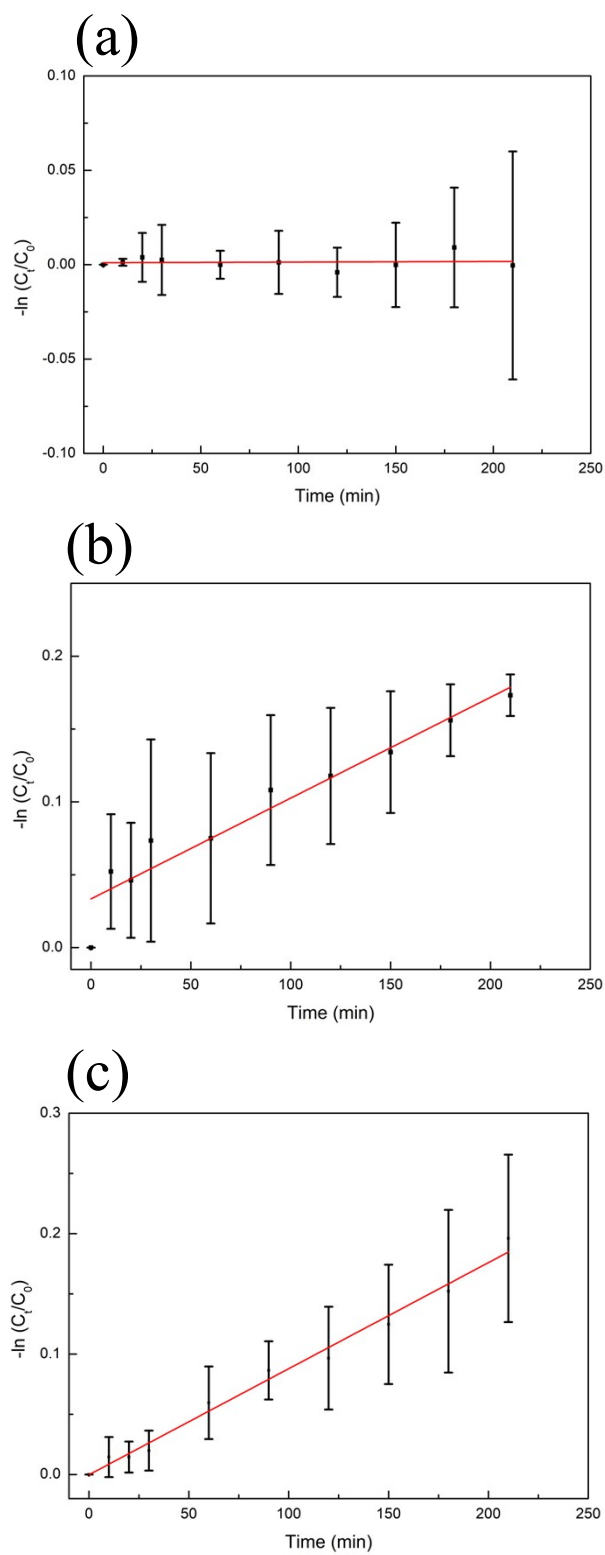
Figure S10. Pseudo-first-order kinetic fitting for CIP solution (3 mg/L) upon irradiation with visible light in the presence of (a) M1, (b) M2 and (c) M3.
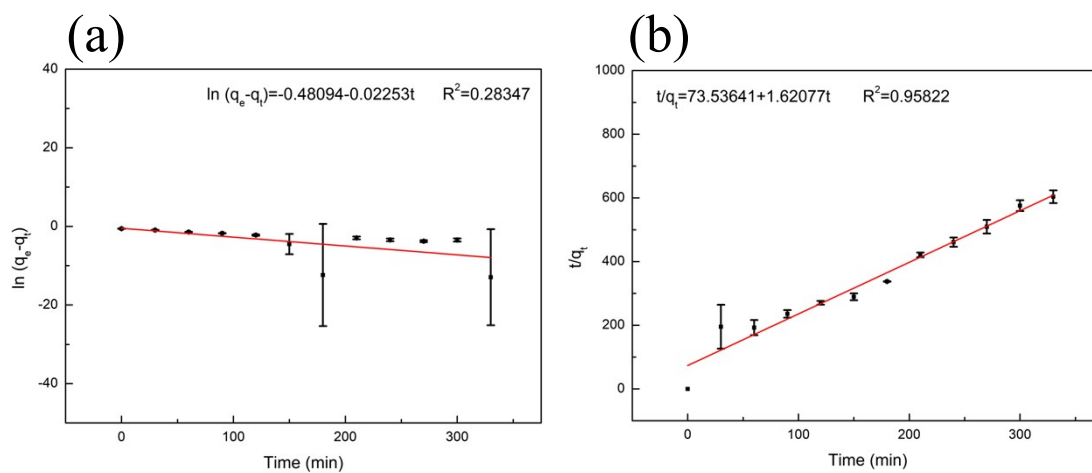
Figure S11. Adsorption-photocatalytic degradation kinetics fitting at 463 nm of MO in the presence of M2 for 360 min (the first 180 min in the dark and the second 180 min under visible-light irradiation): (a) pseudo-first-order fitting and (b) pseudo-second-order fitting.

Figure S12. Adsorption-photocatalytic degradation kinetics fitting at 277 nm of CIP in the presence of M2 for 360 min (the first 180 min in the dark and the second 180 min under visible-light irradiation): (a) pseudo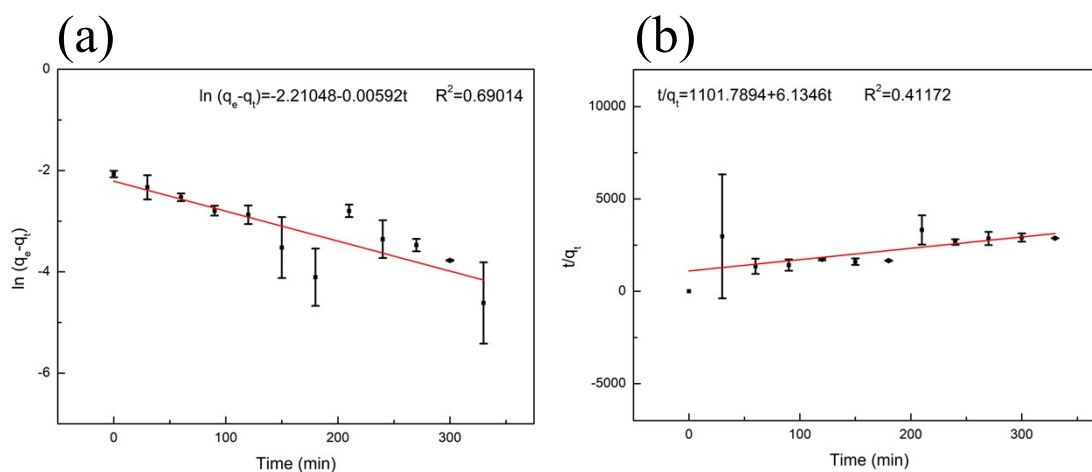-first-order fitting and (b) pseudo-second-order fitting.