Perovskite Zinc Titanate Photocatalysts Synthesized by Sol-gel Method and Its Application on Photocatalytic Degradation of Emerging Contaminants

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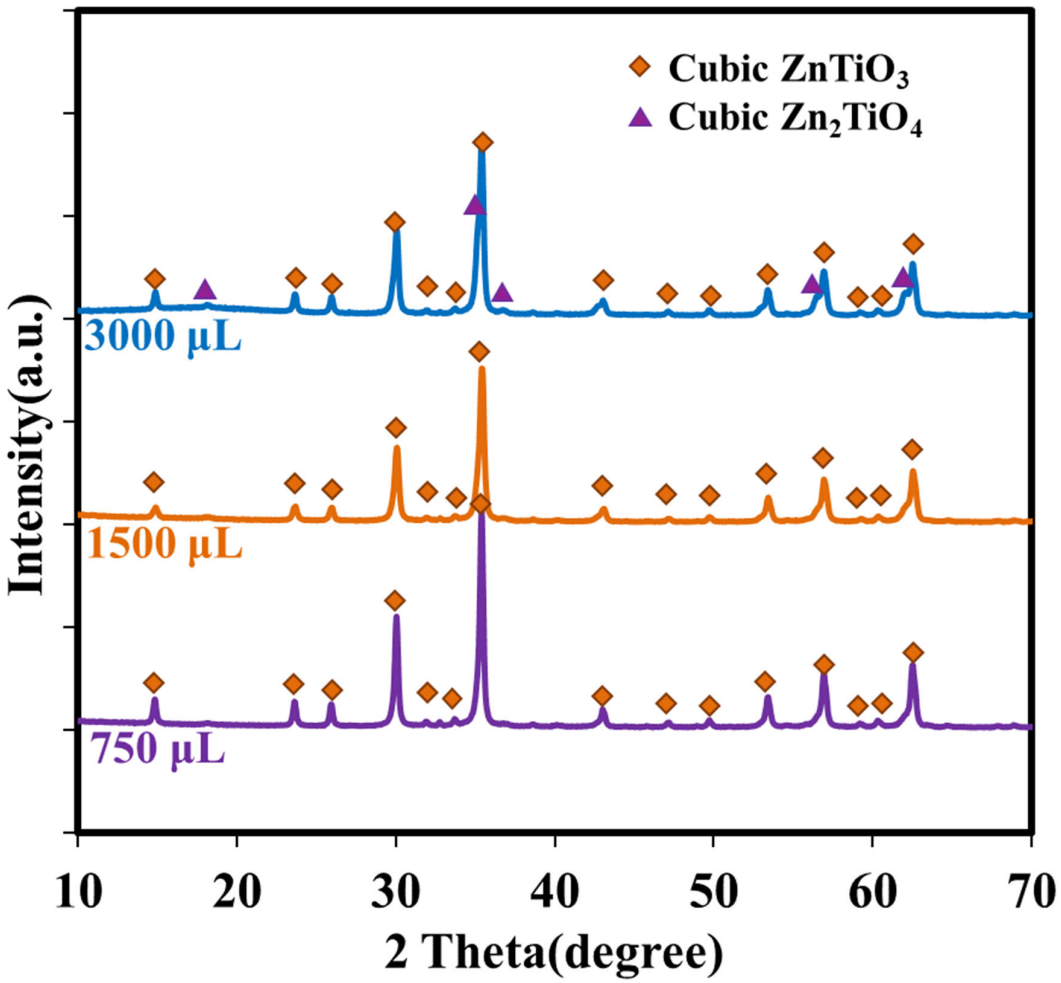

Figure S1. XRD patterns of $ZnTiO_3$ photocatalysts (synthesized by adding 5 g PVP) under the calcination temperature of 700 °C with various amounts of NH_4OH addition (750, 1500, and 3000 µL).

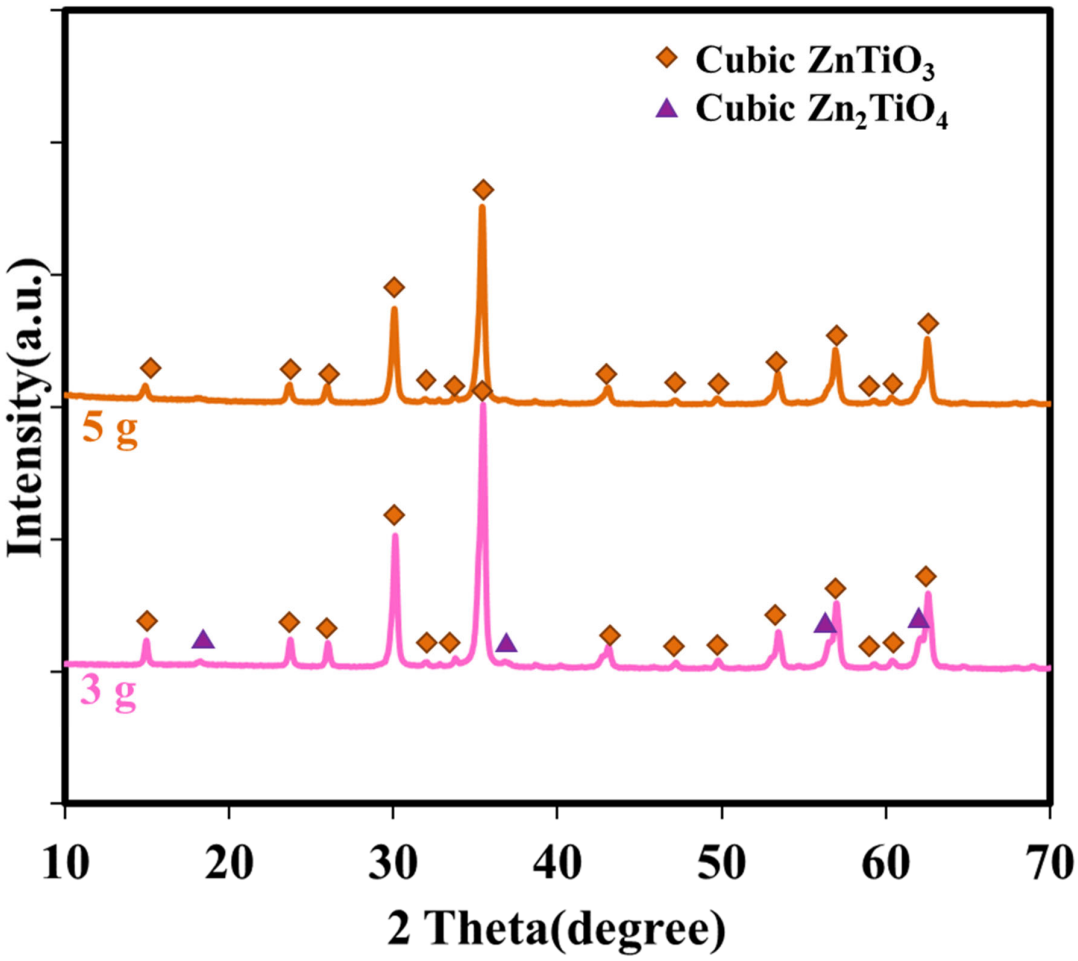

Figure S2. The XRD patterns of $ZnTiO_3$ photocatalysts prepared by adding 3g and 5 g PVP under the calcination temperature of 700 °C with NH_4OH addition of 1500 µL.

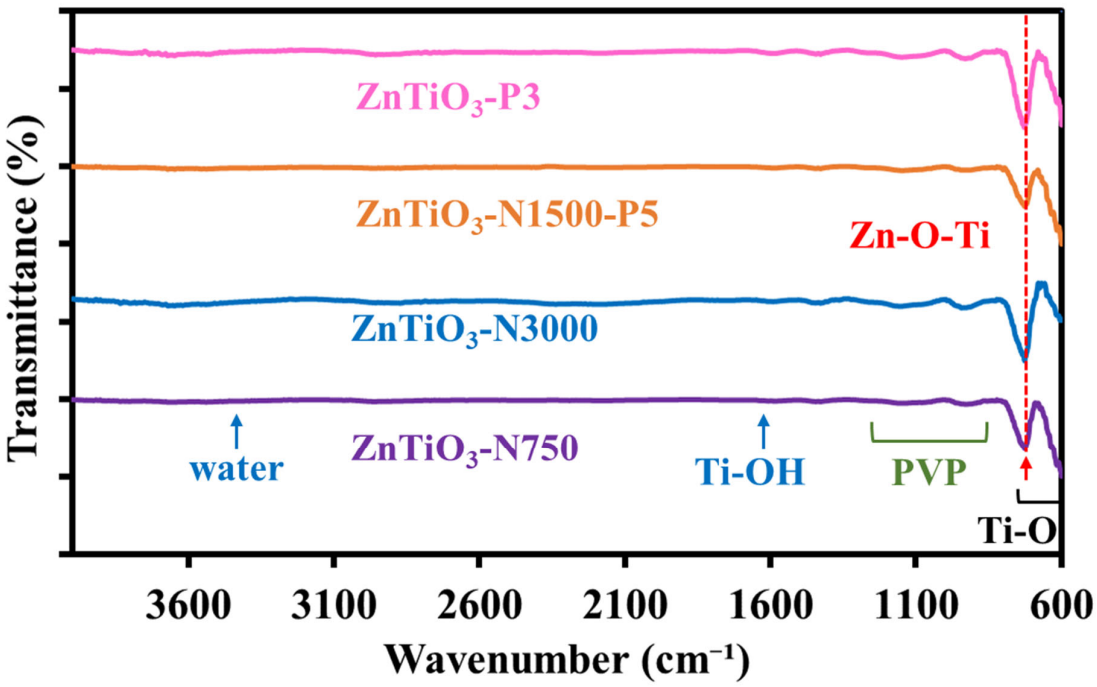

Figure S3. FTIR spectra of various $ZnTiO_3$ prepared by various conditions

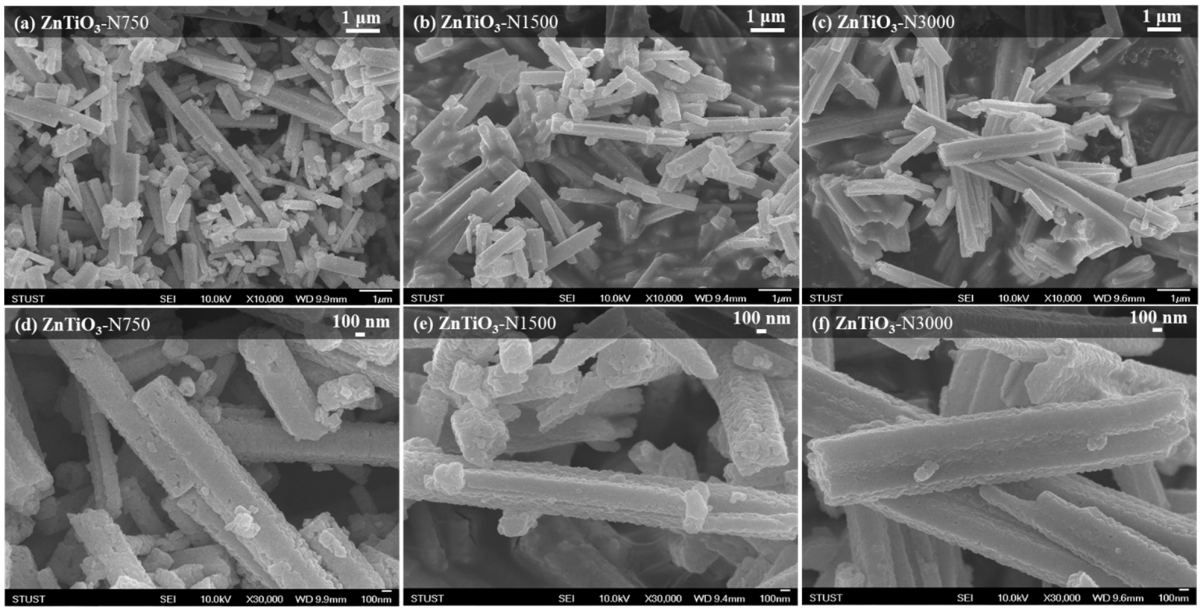

Figure S4. (a)-(d) and (d)-(f) the SEM images at the magnification of 10,000× and 30,000× of $ZnTiO_3$-N750, $ZnTiO_3$-N1500, and $ZnTiO_3$-3000

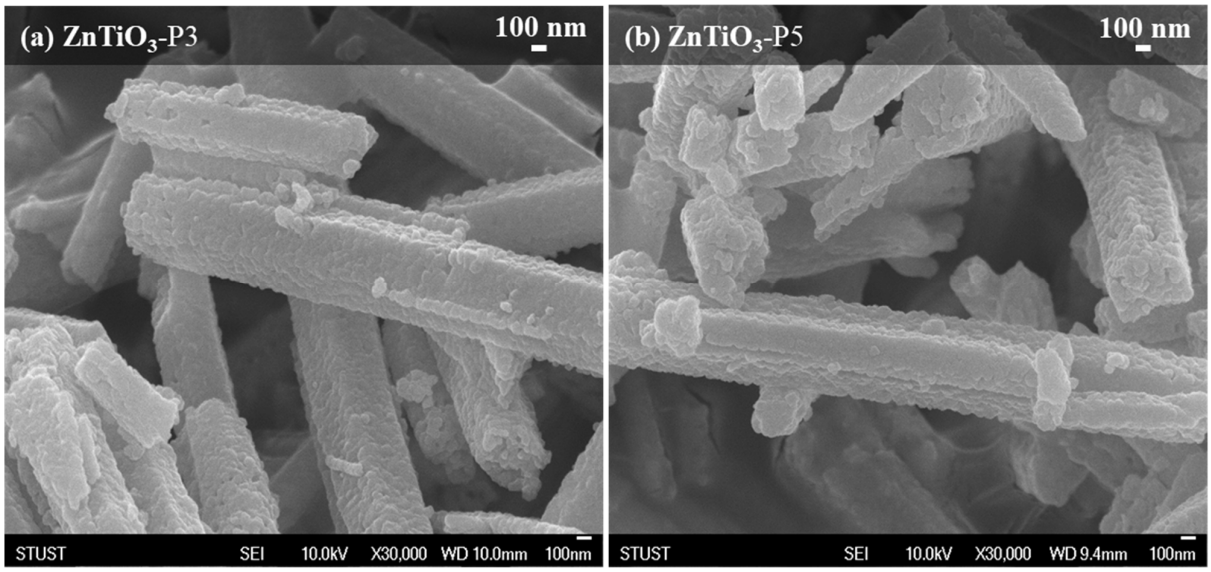

Figure S5. the SEM images at the magnification of 30,000× of (a) $ZnTiO_3$-P3 and (b) $ZnTiO_3$-P5.

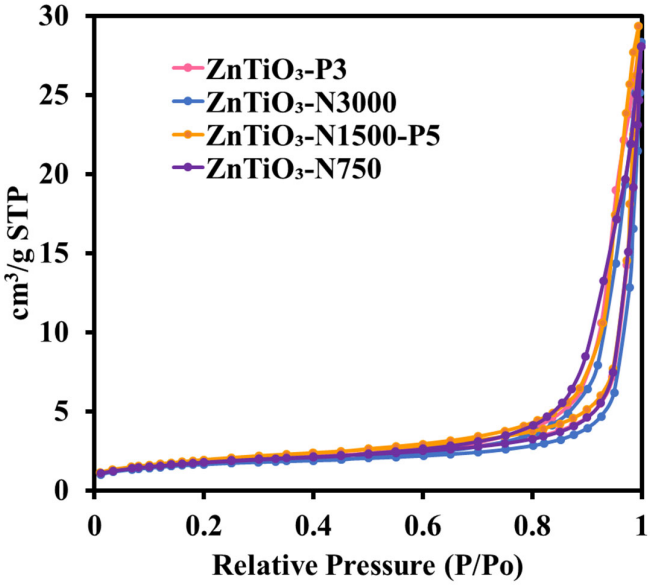

Figure S6. N_2 adsorption-desorption isotherms of $ZnTiO_3$ prepared various NH_4OH and PVP modification.

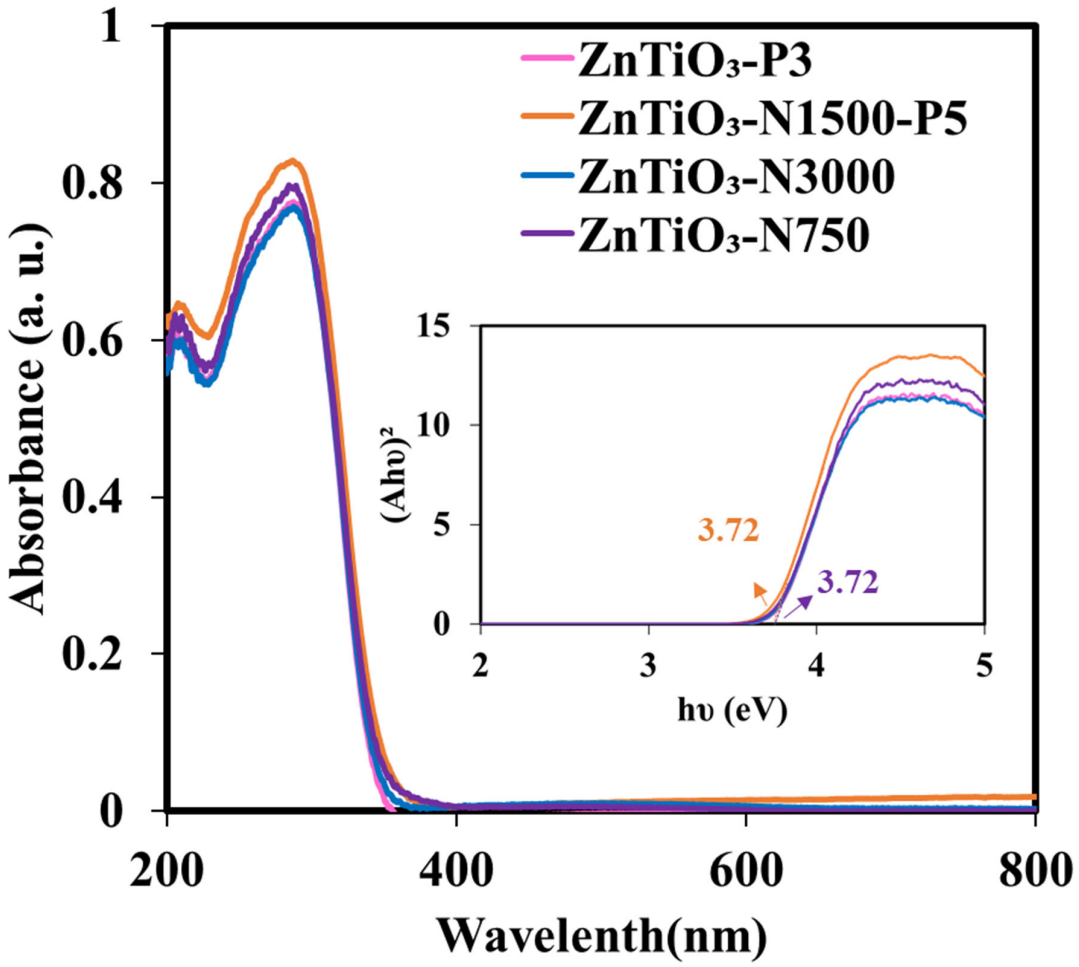

Figure S7. UV-Vis result of $ZnTiO_3$ prepared by various amounts of NH_4OH and PVP modification.

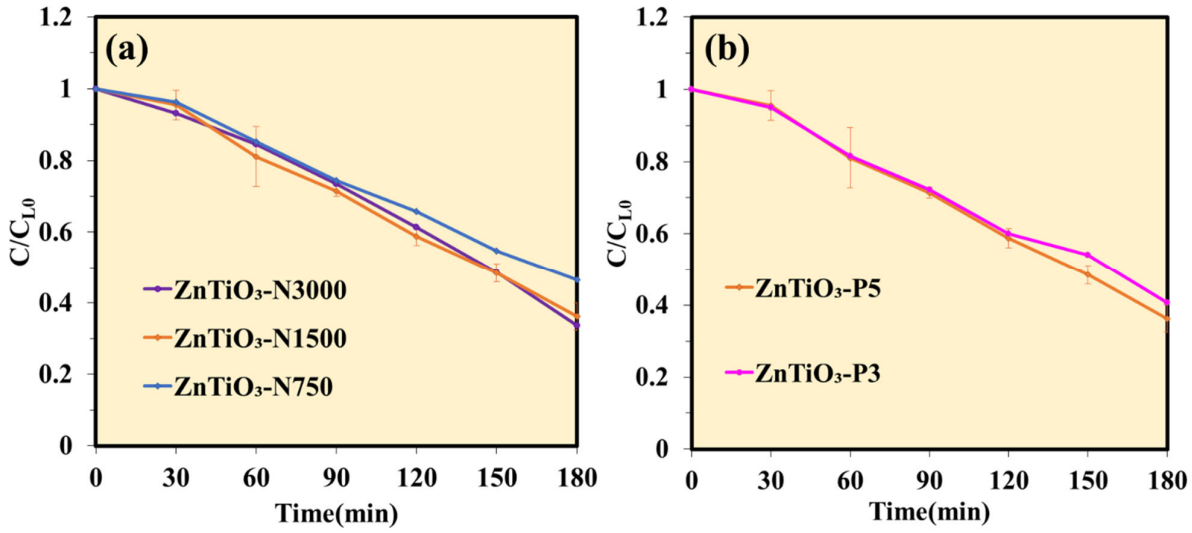

Figure S8. The changes of C/C_{L0} with reaction time (a) for various amounts of NH_4OH addition and (b) for various amounts of PVP addition.

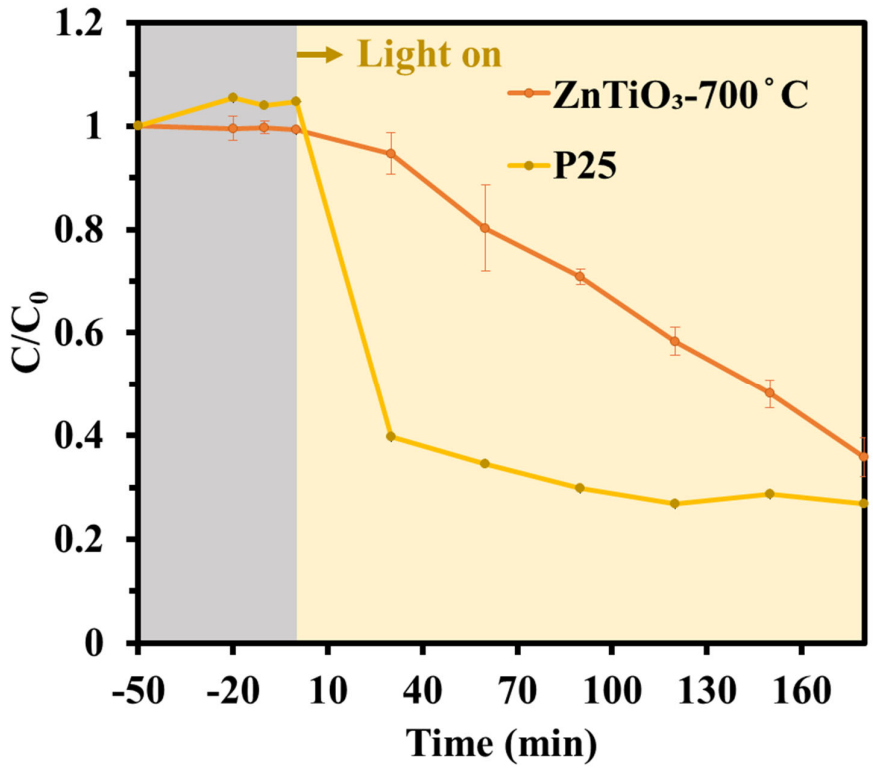

Figure S9. The changes of C/C_0 with reaction time by using P25 and $ZnTiO_3$-700°C.

Table S1. the comparison of activities over different photocatalysts to degrade AMX.

Photocatalysts	Light	Dosage	AMX conc.	Results	Ref. (Year)
$FeSO_4·7H_2O + H_2O_2$	672 W/m^2 UV light	$FeSO_4·7H_2O$ (30 mg/L)/	10 mg/L	(1) H_2O_2 (375 mg/L) was neccesary. (2) fully degrade AMX in 12 min irradiation via photo-Fenton	[1] (2019)
Magnetic fluorinated mesoporous g-C_3N_4	UV light: low-pressure lamp for (maximum emission 250nm); Visible light: 500 W halogen lamp with a UV cutoff filter (>400 nm)	1 g/L	91.4 mg/L	(1) UVC lamp: AMX was degraded by 75%~90% in 120 min irradiation. (2) Visible light: AMX was degraded by 30% in 120 min irradiation.	[2] (2019)
graphite carbon nitride (g-C_3N_4)	300 W xenon lamp (with filter > 420 nm)	0.1 g/L	1, 5, 10 mg/L	AMX was degraded by 99%, 69%, 40% for AMX solution of 1, 5,	[3] (2019)

				10 mg/L, respectively, in 60 min irradiation.	
Ba $(Ti_{0.950}Sc_{0.025}Nb_{0.025})O_3$	average solar flux of ~1030 mW/ cm^2	0.5 g/L	50 mg/L	AMX was degraded by 52.8% in 210 min irradiation.	[4] (2018)
(1) GrO (2) GrO + MIL-68(In)-NH_2 (3) MIL-68(In)-NH_2 (4) MIL-68(In)-NH_2 / GrO	300 W Xe lamp (with filter > 420 nm)	0.6 g/L	20 mg/L	(1) GrO: 20% (2) GrO+ MIL-68(In)-NH_2: 40% (3) MIL-68(In)-NH_2: 60% (4) MIL-68(In)-NH_2/GrO: 90% The degradation was achieved in 210 min irradiation.	[5] (2017)
hetero-junction p-CuO/n-ZnO	(1) sunlight irradiation (109 mW/cm^2) (2) 200 W tungsten lamp	0.5 g/L	50 mg/L	(1) sunlight irradiation (109 mW/cm^2): 90% (2) 200 W tungsten lamp: 70%	[6] (2016)

				Above-mentioned degradation was achieved in 240 min irradiation.	
TiO_2/zeolite (1) acid treatmented & 300 °C (2) acid-alkali treatmented & 300 °C (3) acid-alkali treatmented & 450 °C	47W Hg-lamp (cut-off wavelength ≤290 nm)	2 g/L	30 mg/L	(1) acid treatmented & 300 °C: 61% (2) acid-alkali treatmented & 300 °C: 88% (3) acid-alkali treatmented & 450 °C: 72% The degradation was achieved in 240 min irradiation.	[7] (2015)
(SPR)-Ag/TiO_2	500 W tungsten-halogen lamps with high-pass UV filter	1 g/L	20 mg/L	0wt%, 0.5wt%, 1wt%, 3wt%, 5wt% Ag/TiO_2 degraded AMX by 27.9%, 28.7%, 57.7%, 63.5%, 61.1% in 300 min irradiation.	[8] (2014)

TiO_2 (P25)	9 W UV-A (predominantly at 350–400 nm)	0.5 g/L	2.5–30 mg/L	AMX was fully degraded in 45 min	[9] (2012)
ZnO	6 W UV lamp (emitting radiation at 365 nm)	0.5 g/L	104 mg/L	(1) pH=5: 59% (2) pH=8: 72% (3) pH=11, 100% The degradation was achieved in 120 min irradiation.	[10] (2010)
$ZnTiO_3$-700°C	UV LEDs (8W ×4, within 280~320 nm)	0.5 g/L	10 mg/L	AMX was degraded by 63.8% in 180 min irradiation	This study

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