Supporting Information File

Comparison of Ag and AgI modified ZnO as heterogeneous photocatalysts for simulated sunlight driven photodegradation of metronidazole

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Synthesis of Ag/ZnO composites

(1) The molar ratio of Zn^{2+} and Ag^{+} is (100:0.5). 2.5 mL 0.01 M $AgNO_3$ solution and 7.5 mL deionized water was added to 30 mL ethanol, then 1.098g $Zn(CH_3COO)_2 \cdot 2H_2O$ was dissolved into the former solution. After continuous stirring for 10 min, 2 g NaOH was added. Then stirred for another 10 min.

(2) The molar ratio of Zn^{2+} and Ag^{+} is (100:1). 5 mL 0.01 M $AgNO_3$ solution and 5 mL deionized water was added, the amount of ethanol, NaOH, and $Zn(CH_3COO)_2 \cdot 2H_2O$ was the same as that in (1).

(3) The molar ratio of Zn^{2+} and Ag^{+} is (100:2). Only 10 mL $AgNO_3$ solution was added, the amount of ethanol, NaOH and $Zn(CH_3COO)_2 \cdot 2H_2O$ was the same as that in (1).

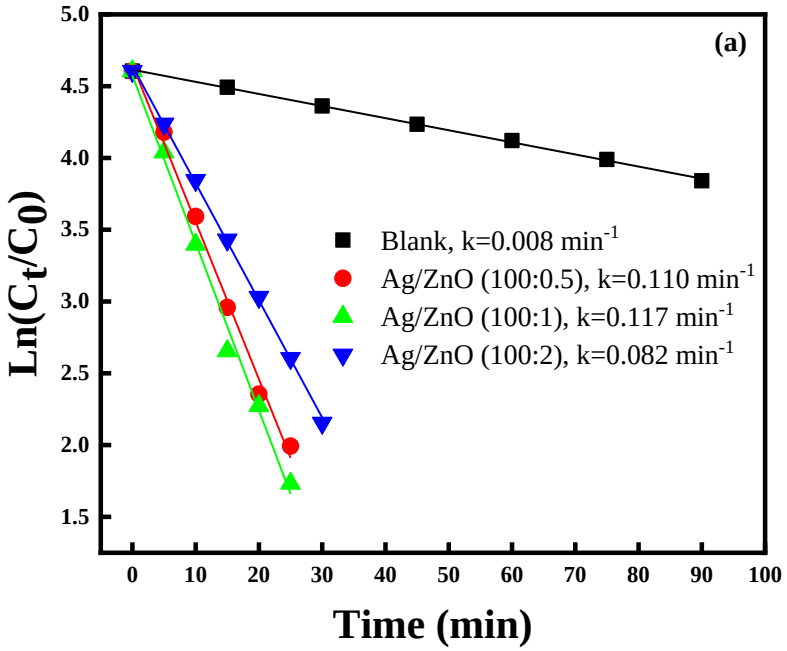
The solution was transferred into three Teflon-lined stainless-steel autoclaves (50 mL), respectively, and subsequently sealed and heated at 160 ℃ for 12 h. Finally, the brown-colored precipitate was washed with deionized water and ethanol for several times and then dried at 70 ℃.

Synthesis of AgI/ZnO composites

Firstly, 1.7 g silver nitrate (0.01 mol) was dissolved in the volume bottle and then set to 100 mL to get silver nitrate solution 0.1 mol/L. 3.32 g of potassium iodide solid (0.02 mol) was dissolved in a volumetric bottle of 200 mL and the KI solution of 0.1 mol/L was obtained. ZnO was prepared as the method previously mentioned. Take 0.81g (0.01 mol) ZnO in the beaker of the 1% mL, according to the load of different AgI, the corresponding silver nitrate solution to the beaker. The prepared sample is recorded as

AgI/ZnO (X), where X represented the ratio of the amount of AgI to ZnO in a composite photocatalytic material. X takes 0.1,0.2 and 0.4 in this experiment. Then potassium iodide solution was added to the mixed solution drop by drop, with magnetic stirring of a few minutes, so that the silver ammonia completely converted into AgI. Finally, the different content composites could obtain by centrifugal separation, washing and drying of 70 ℃.

Kinetic analysis



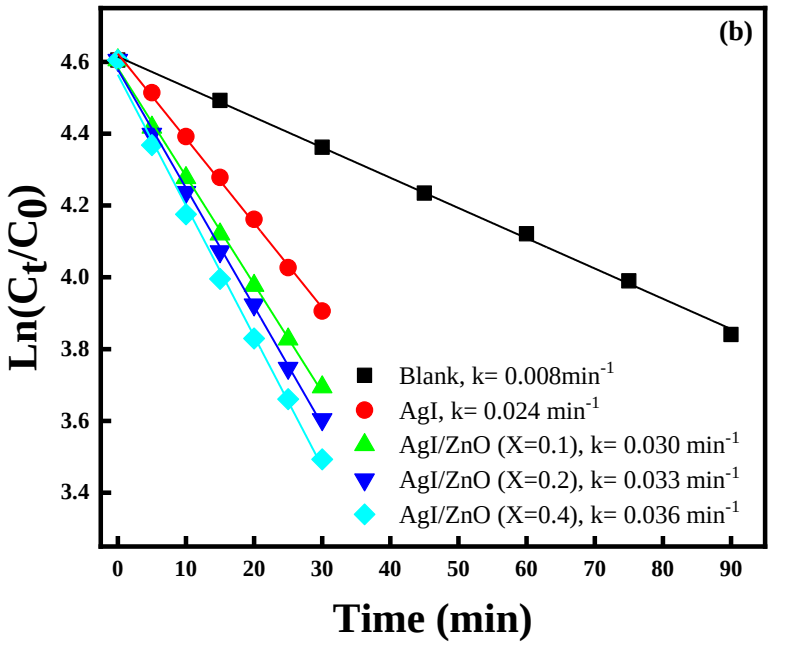


Figure. S1. Kinetic analysis of photocatalytic degradation of MNZ with (a) Ag/ZnO, (b) AgI/ZnO.

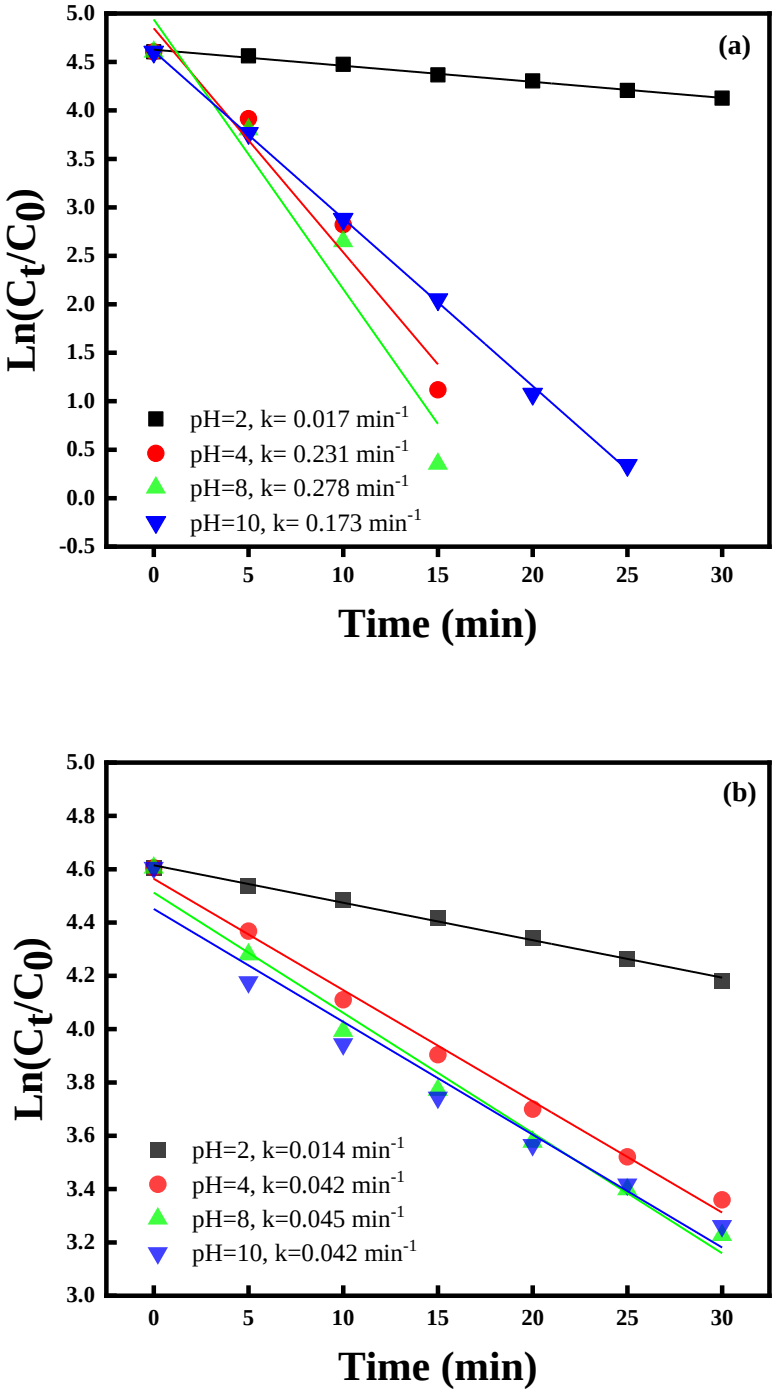


Figure. S2. Kinetic analysis of photocatalytic degradation of MNZ in different initial pH conditions with (a) Ag/ZnO, (b) AgI/ZnO.

Zeta potential

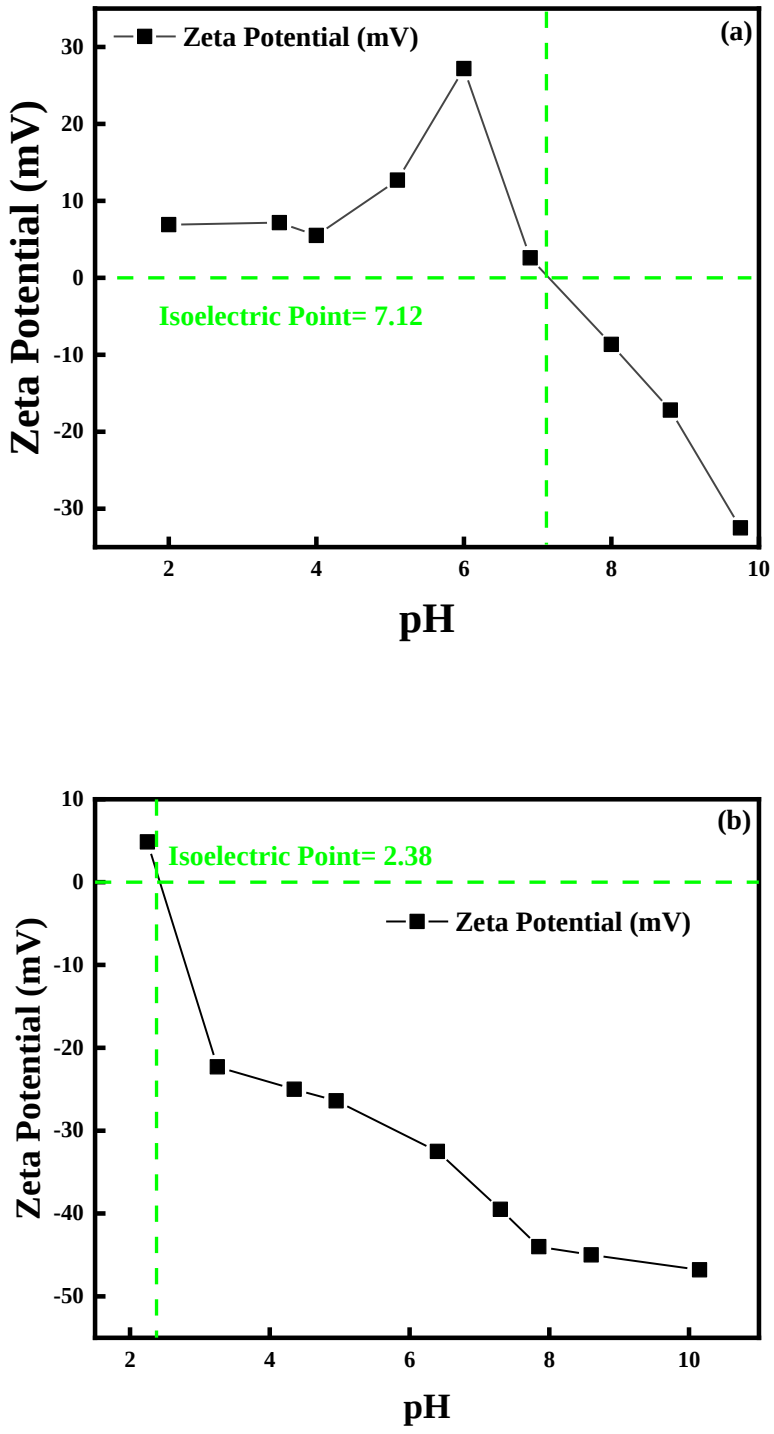


Figure. S3. Effect of pH on the Zeta potential and isoelectric point of (a) Ag/ZnO (100:1), and (b) AgI/ZnO (X=0.4).

TOC removal

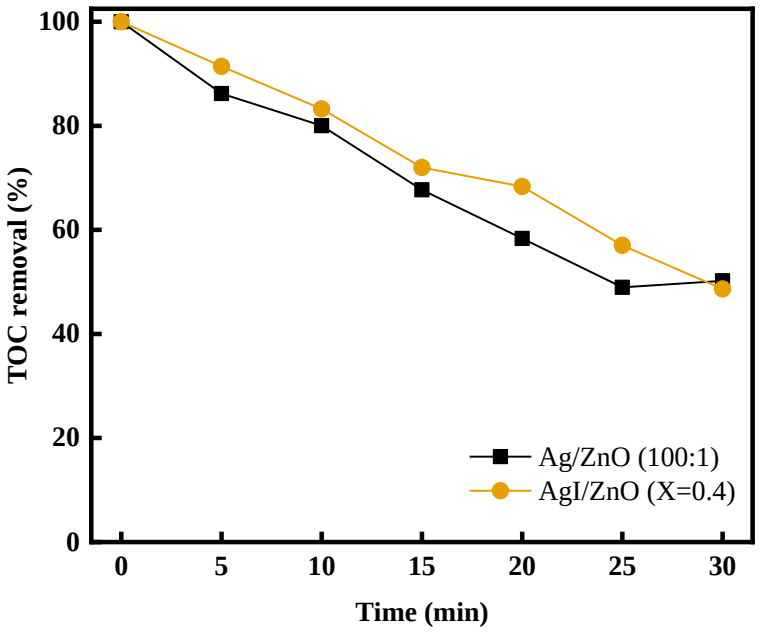


Figure. S4. TOC removal by Ag/ZnO (100:1) and AgI/ZnO (X=0.4).

Histograms of k values

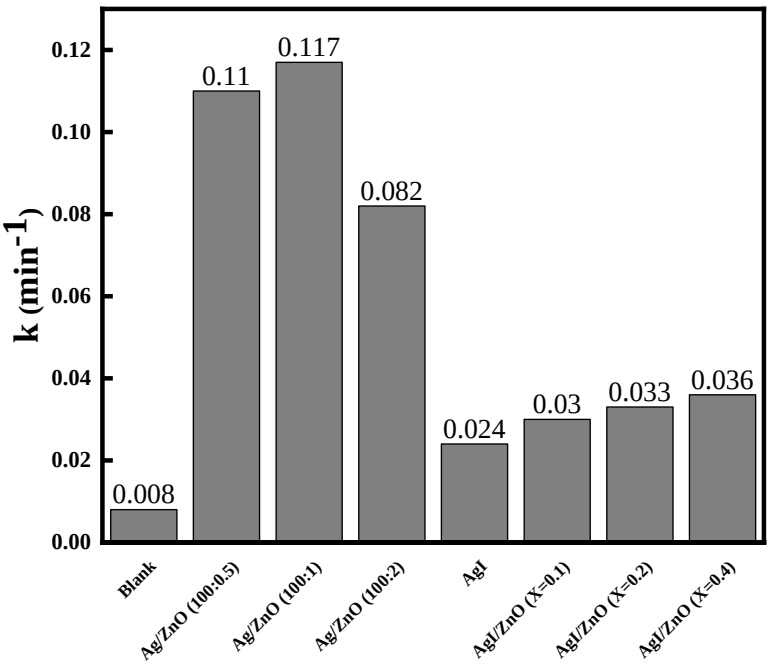
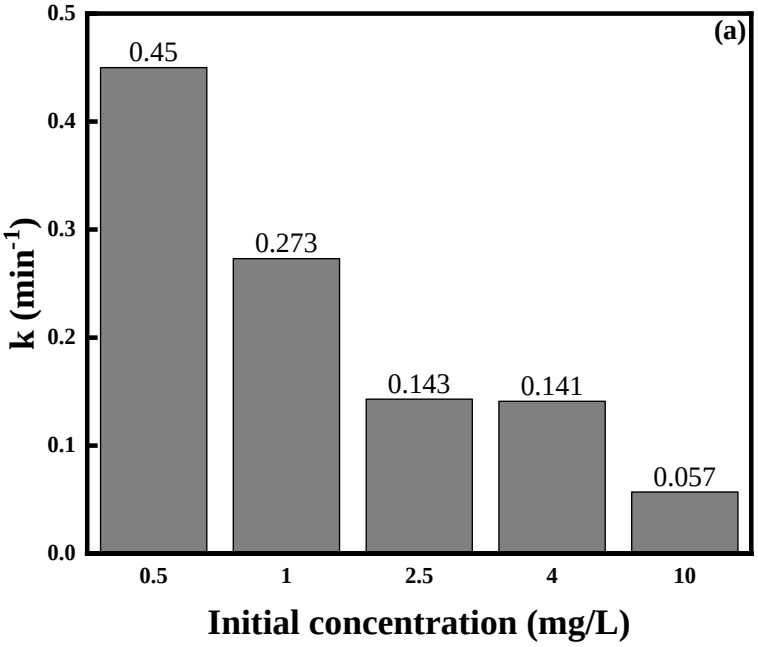


Figure. S5. The pseudo-first order apparent reaction rate constants (k) of different catalysts.



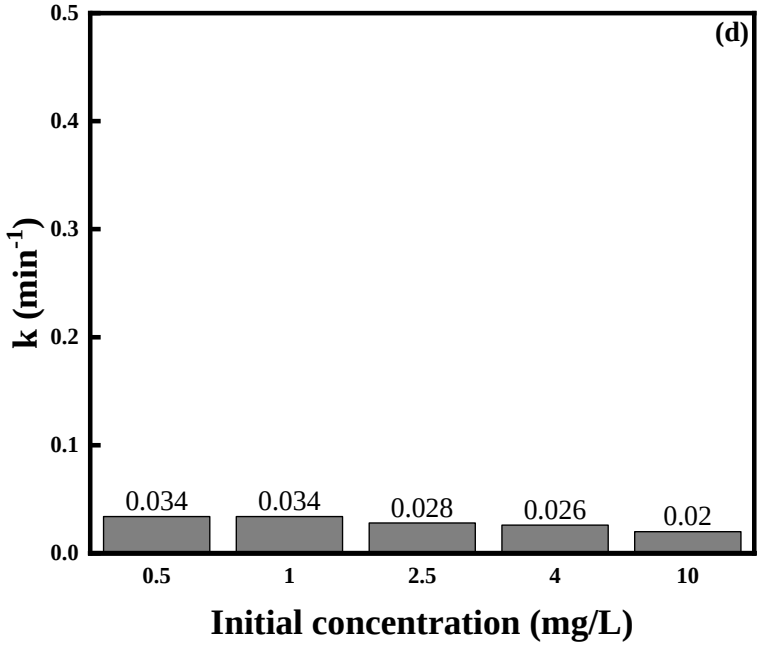
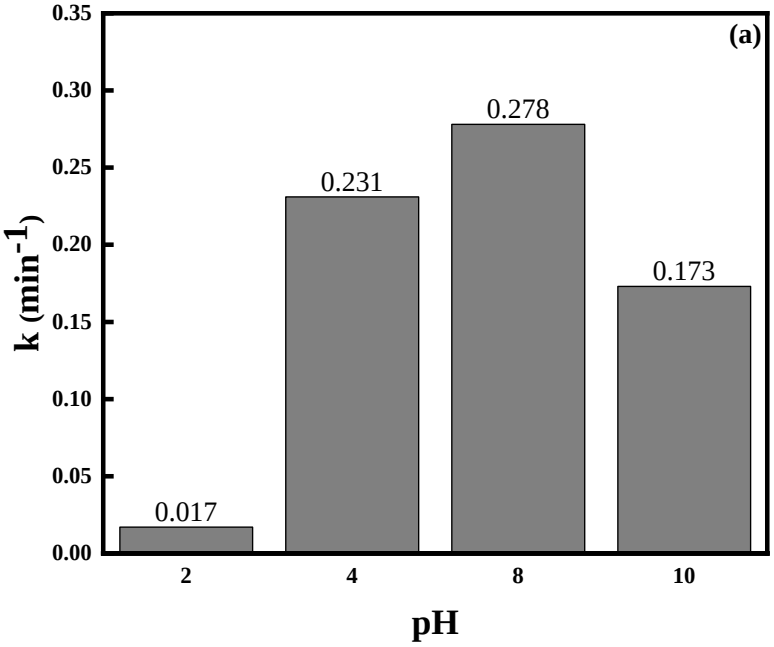


Figure. S6. The pseudo-first order apparent reaction rate constants (k) of MNZ photocatalytic degradation with (a) Ag/ZnO (100:1) and (b) AgI/ZnO (X=0.4) under conditions of different initial MNZ concentrations.



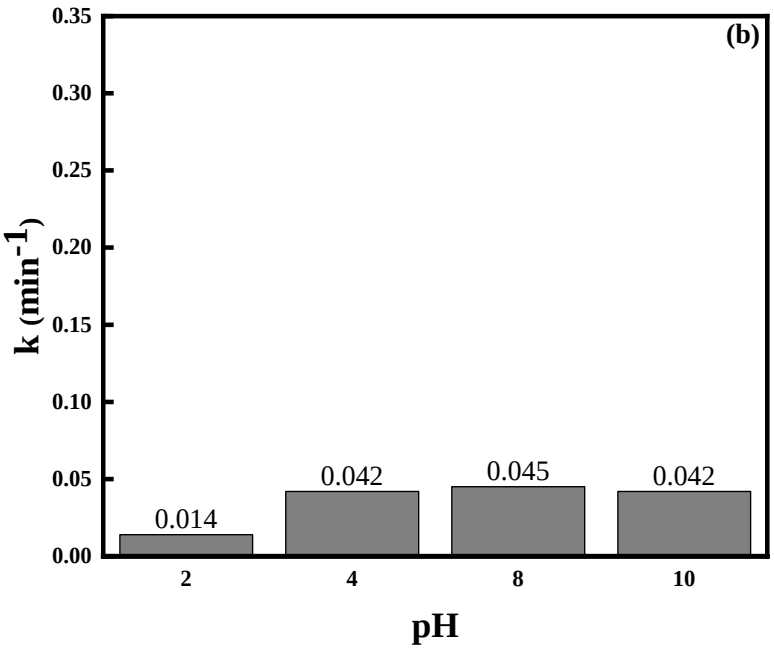


Figure. S7. The pseudo-first order apparent reaction rate constants (k) of MNZ photocatalytic degradation with (a) Ag/ZnO (100:1) and (b) AgI/ZnO (X=0.4) under different initial pH conditions.