**ZnO/CdO/ reduced graphene oxide and its high catalytic performance towards degradation of the organic pollutants**

*Synthesis of ZnO/CdO nanoparticles*

Briefly 4 mL of 0.5 M solution of Zn(CH3COOH)2.2H2O and 4 mL of 0.5 M solution of Cd(CH3COO)2.2H2O were added to a conical flask containing mixed solution of 50 mL distilled water, 2.8 g NaOH, 10 mL of PEG (*M*w= 400), blended well by stirring for 15 min at 70 °C. Subsequently, the mixed solution was left for 4 days at room temperature. White crystalline products were collected, centrifuged, washed with distilled water and ethanol several times and dried at 60 °C in an oven, then calcinated at 400 °C for 1 h.

*Evaluation of reactive oxygen specious (ROS)*

Firstly, three 5 mL 1, 5 diphenylcarbazide (DPCI) solution (10-2 M) were added to three volumetric flasks marked with 1-3, respectively. And then two 1.2g/L ZnO/CdO/reduced graphene oxide were added to 1 and 3, respectively. All of the three solutions were diluted to 25 mL with distilled water. The solutions 1 and 2 were put into an ultrasonic apparatus away from light directly under ultrasonic irradiation and solution 3 was placed away from light without ultrasonic irradiation, just under stirring. After 45 min, from each sample a 10 mL solution was taken and extracted with benzene-tetrachloride carbon (volume ratio =1:1), then the UV-Vis spectra of all solutions were determined.

*Determination of the kind of ROS*

Three 5 mL DPCI solution (10-2 M) were added in to three volumetric flasks marked as a-c respectively. And then 1.2 g/L of ZnO/CdO/reduced graphene oxide was added to each one. 2.5 mL of {(L-His, Thiourea and Vitamin C (VC)) 5×10-3 M} added into (a-c) flasks, respectively. All solutions were diluted to 25 mL with double distilled water. The entirely of the solution was transferred in to two conical flasks. One of the conical flasks was placed under ultrasonic irradiation and the other stored under stirring. After 45 min, from each samples a 10 mL solution was taken and extracted with benzene-tetrachloride carbon (volume ratio = 1:1), then the UV-Vis spectra of all solutions were obtained



Fig. S-1. FTIR spectra of (a) Graphene oxide. (b) ZnO/CdO/reduced graphene oxide



Fig. S-2. UV-Vis spectra of a) graphene oxide, b)ZnO/CdO nanoparticles and c)ZnO/CdO/reduced graphene oxide



Fig. S-3. Percentage removal of the organic pollutants at first 30 min without ultrasonic (adsorption study)



 Fig. S-4. UV-Vis spectra of (a) MEF, (b) RhB, (c) MO and 4-NA

Reaction condition: catalyst: 1.2 g/L, initial concentration of MEF, 4-NA and azo dyes 10 mg/L, and ultrasonic power 1200W/L



Fig. S-5. The sonocatalytic degradation of MEF under ultrasonic irradiation

Experimental condition: initial concentration of MEF: 10 mg/L, ultrasonic power: 1200 W/L, catalyst: 1.2 g/L, pH = 7.5.



Fig. S-6. Effect of dosage of catalyst on sonocatalytic reaction

Experimental condition: initial concentration of MEF: 10 mg/L, ultrasonic power: 1200 W/L, catalyst: ZnO/CdO/reduced graphene oxide (10/100), pH = 7.5.



Fig. S-7. Effect of initial concentration of MEF on sonocatalytic reaction

Experimental condition: ZnO/CdO/reduced graphene oxide (10/100): 1.2 g/L, ultrasonic power: 1200W/L pH = 7.5.



Fig. S-8. Effect of ultrasonic output power on degradation MEF.

Experimental condition: ZnO/CdO/reduced graphene oxide (10/100): 1.2 g/L, initial concentration of MEF: 10 mg/L pH=7.5.



 Fig. S-9.Removal efficiency of the as-synthesized nanocomposites with MEF, azo dyes and 4-NA.

Reaction condition: ZnO/CdO/reduced graphene oxide (10/100): 1.2 g/L, initial concentration of MEF, azo dyes, 4-NA: 10 mg/L, ultrasonic power 1200W/L pH = 7.5.



 Fig. S-10. Effect of inorganic and organic scavengers on the sonocatalytic degradation of MEF in the presence of ZnO/CdO/reduced graphene oxide (experimental conditions: [ZnO/CdO/reduced graphene oxide (10/100)] = 1.2 g/L, [MEF] = 10 mg/L, [Scavenger] = 10 mg/L and US power = 1200 W/L, US time: 120 min). pH = 7.5, systemic temperature = 25±0.2°C



Fig. S-11.Absorbance of DPCO in DPCI + as-prepared nanocomposites solutions in the presence of various quenching reagents. Experimental condition: with and without ultrasonic irradiation, ([DPCI] = 10-2 M, [ZnO/CdO/reduced graphene oxide (10/100)] =1.2g /L, [His] = [VC] = [Thiourea] = 5.0×10-3 M and US power = 1200 W/L Ultrasonic time: 45min