Supporting Information

A Combustion Synthesis Route for Magnetically Separable Graphene Oxide-$CuFe_2O_4$-ZnO Nanocomposite with Enhanced Solar Light-Mediated Photocatalytic Activity

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Preparation of graphene oxide–$CuFe_2O_4$ nanocomposite (GC)

The Graphene oxide-$CuFe_2O_4$ (GC) were synthesized by a one- step combustion method, using nitrates (Cu $(NO_3)_2$. $6H_2O$ and Fe $(NO_3)_3$ $.9H_2O$) and citric acid as oxidizer and fuel, respectively. First, required amounts of GO, nitrates and citric acid were added to deionized water (50 mL), followed by 30 min of ultrasonic treatment. Mole ratios of both Fe/Cu and glucose/nitrates were 2:1. Then, the solution was placed on an electric jacket at a temperature of 300 °C to remove the solvent, until combustion reaction took place and a black and fine GC was obtained.

Preparation of graphene oxide–ZnO nanocomposite (GZ)

The Graphene oxide-ZnO (GZ) were synthesized by a one- step combustion method, using zinc nitrates (Zn $(NO_3)_2$. $6H_2O$) and citric acid as oxidizer and fuel, respectively. First, required amounts of GO, nitrates and citric acid were added to deionized water (50 mL), followed by 30 min of ultrasonic treatment. Then, the solution was placed on an electric jacket at a temperature of 300 °C to remove the solvent, until combustion reaction took place and a black, loose GZ was obtained.

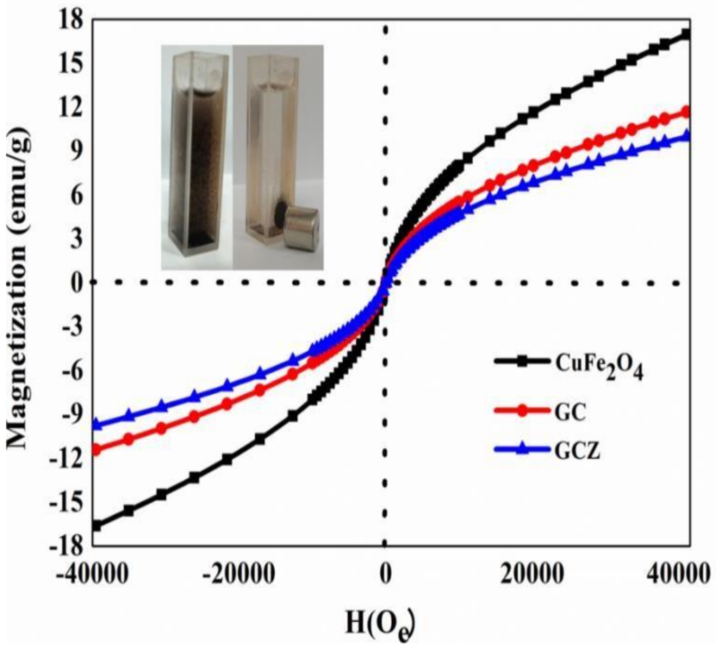

Fig. S1. Hysteresis loops of pure $CuFe_2O_4$, GC and GCZ. The inset is the magnetic separation property of GCZ nanocomposite.

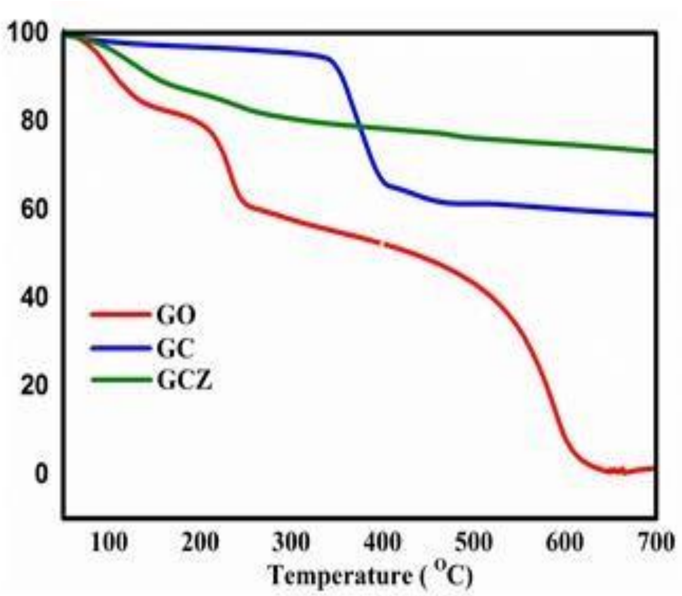

Fig. S2. TGA curve of GO, GC and GCZ nanocomposite.

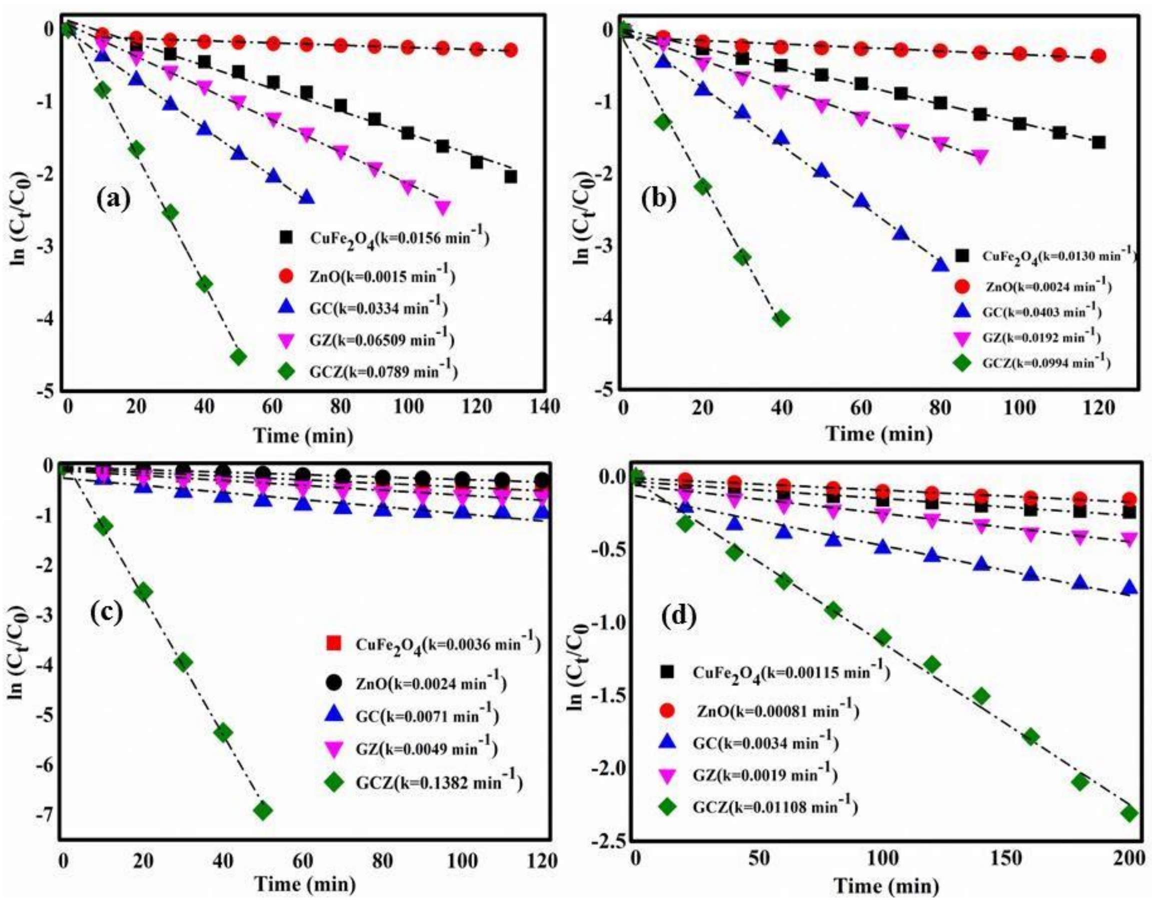

Fig. S3. Kinetics plot for the degradation of a) RhB, b) MB, c) MO and d) Phenol organic pollutant using different nanocomposite under sunlight.

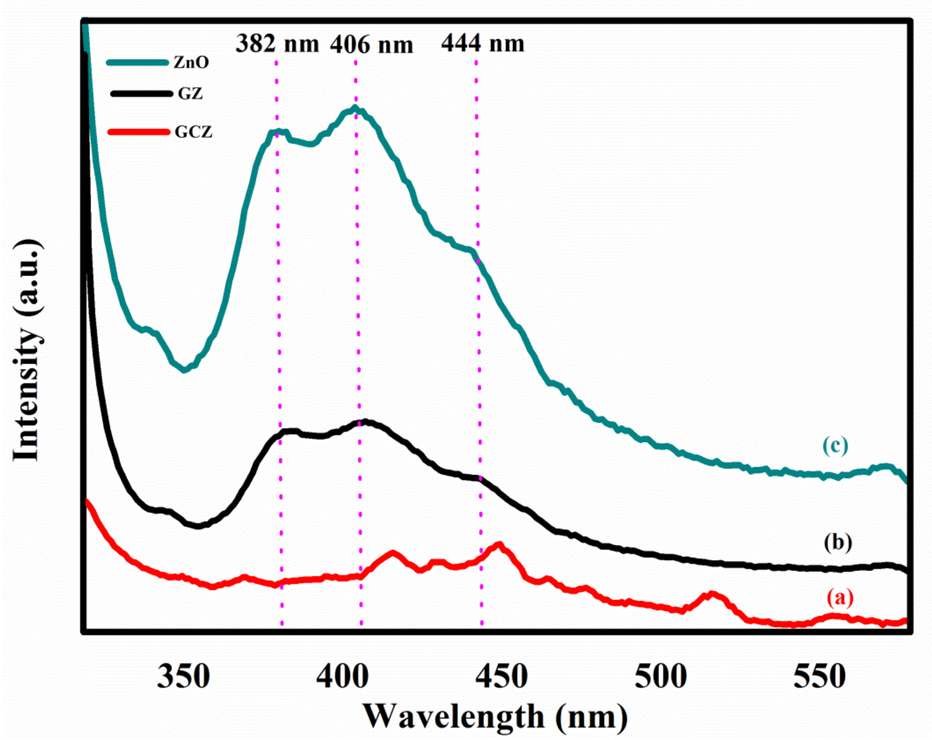

Fig. S4. Photoluminescence spectra of synthesized a) GCZ, b) GZ, and c) ZnO nanocomposite.

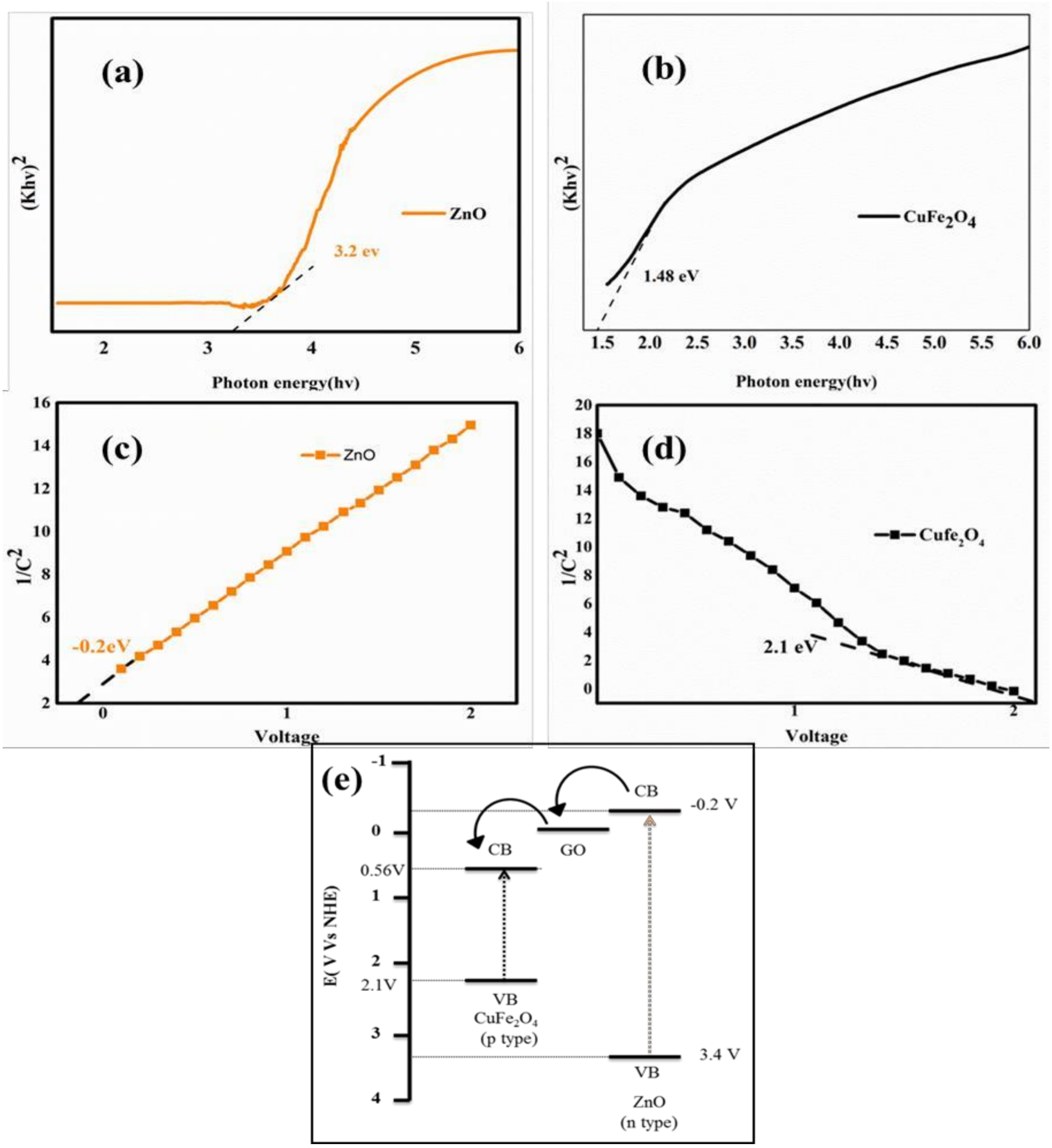

Fig. S5. Mott–Schottky plots of (a) ZnO and (b) $CuFe_2O_4$ (the measurements were carried out in 0.1 M Na_2SO_4 at pH ~ 6. Tauc plots of (c) ZnO and (d) $CuFe_2O_4$, and (e) Schematics of the potential energy diagram for the $CuFe_2O_4$-ZnO heterojunction.

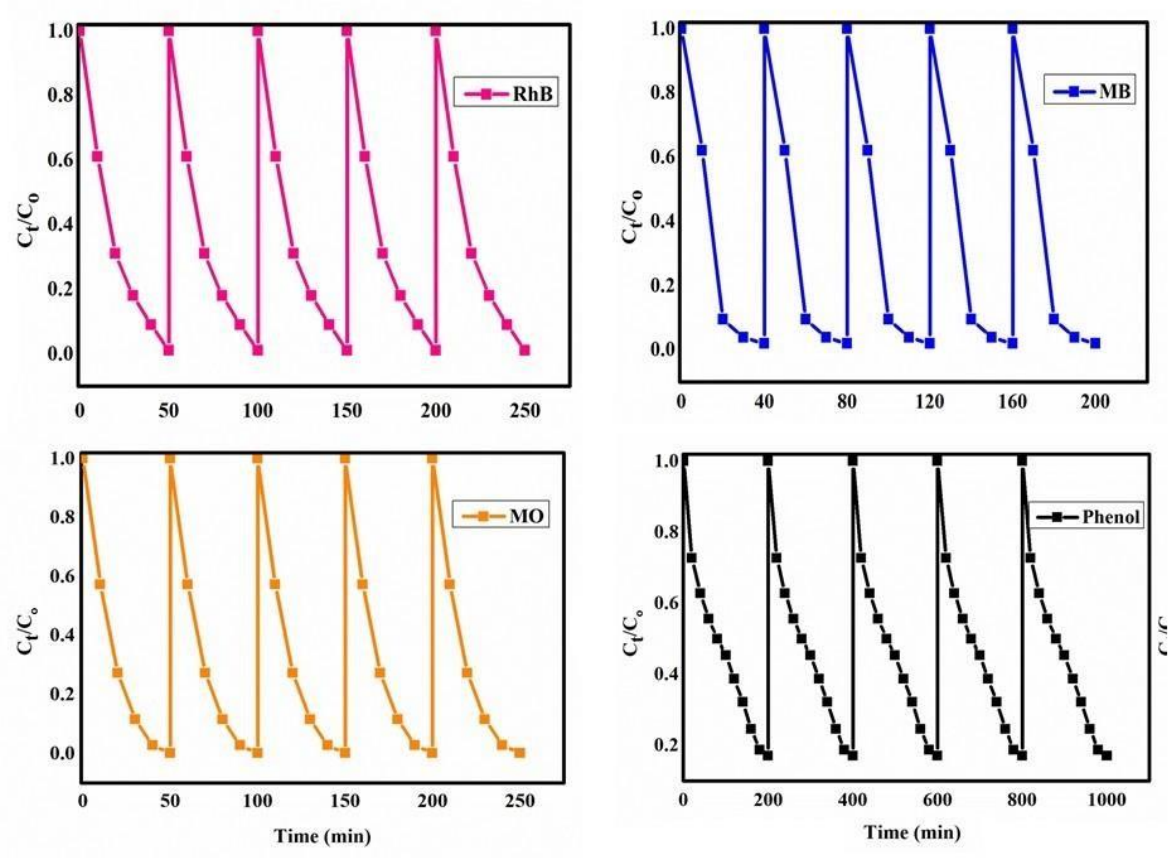

Fig. S6. Recyclability of GCZ nanocomposite in five successive experiments for photocatalytic degradation of RhB, MB, MO and Phenol as organic pollutant in aqueous media under sunlight irradiation.

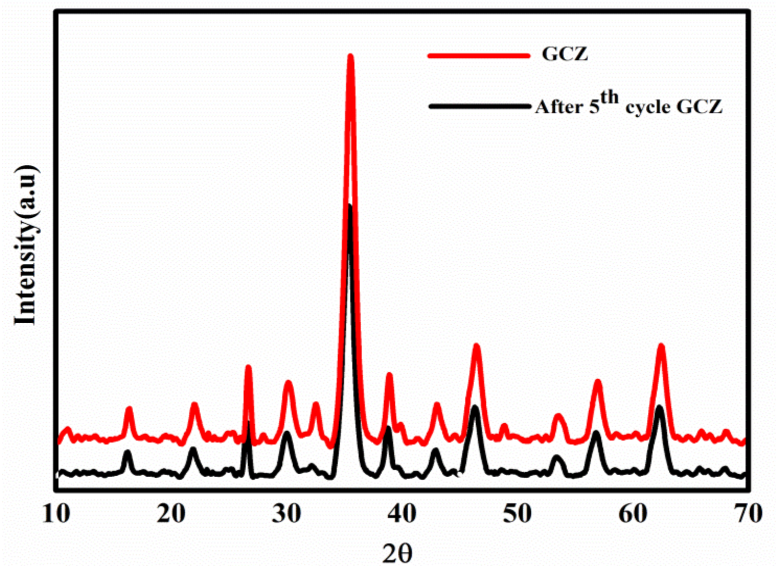

Fig. S7. XRD patterns of GCZ nanocomposite before and after the photocatalysis.

Table.S1. Degradation percentages of dye obtained by different photocatalysts reported in literature.

Photocatalyst	**Dyes**	**Concentration (mg L^{-1})**	**Irradiated source**	**Volume/catalyst ml : mg**	**% degradation : time**	**References**
Graphene–TiO_2–Fe_3O_4	RhB	5mgL^{-1}	300 W Hg lamp	50ml/10mg	100/25 min	100
Graphene–$CoFe_2O_4$-CdS	MB	20mg/L	40 W lamp	100ml/25 mg	80/180 min	101
P25/$CoFe_2O_4$/graphene	MB	40mg/L	500 W Xenon lamp	30 ml/30 mg	100/240 min	102
GO–SnO_2–TiO_2	MB,CR	20 mg/L	Sunlight	50 mL/ 10 mg	96 / 60min	42
Graphene-TiO_2-ZnO	Phenol	40mg/L	1000 W Xenon	100 mL//125mg	98 / 70min	103
rGO -TiO_2-CdS	RhB, MB	20 mg/L	500 W Xenon lamp	80mL/50 mg	87.5/ 20 min 97.5/20 min	64
TiO_2/Cu_2O/rGO	MB	25 mg/L	Sunlight	100mL/ 80 mg	100 / 300 min	104
rGO/SnS_2/$ZnFe_2O_4$	P-Nitro Phenol	10 mg/L	300 W xenon lamp	100ml/100 mg	100/ 120 min	105
GO-$CuFe_2O_4$-ZnO	RhB, MB, MO	40mg/L	Sunlight	50 mL/ 10 mg	100/50 min 100/40 min 98/50 min	Present work
GO-$CuFe_2O_4$-ZnO	Phenol	50mg/L	Sunlight	50 mL/ 10 mg	88/180 min	Present Work