SUPPLEMENTARY INFORMATION

Charaterisation and instruments used

The instrumentation used is the same as our previously reported work[1].

Similarly, X-ray diffraction (XRD) analysis was conducted on a D8 Advance diffractometer using Cu Kα radiation (λ =1.5406 nm) in Bragg–Brentano mode. The morphology of the samples was examined through field-emission scanning electron microscope (FE-SEM, JEOL JSM-7500F, Japan) and transmission electron microscopy (TEM, JOEL, Germany). Electronic absorption measurements were carried out with a Cary 60 UV–vis spectrophotometer (Agilent Technologies, Malaysia). X-ray photoelectron spectroscopy (XPS) data were collected using a Kratos Axis supra+ spectrometer equipped with monochromatic Al Kα radiation (hv = 1486.6 eV) and operating at 150 W. Electrochemical impedance spectroscopy (EIS), Mott-Schottky and photocurrent response analyses were performed using an Autolab Potentiostat (PGSTAT204, Netherlands. The setup comprised a platinum wire as the counter electrode, an Ag/AgCl electrode (3.0 M KCl) as the reference electrode, and a working electrode prepared by coating a fluorine-doped tin oxide (FTO) substrate (1.5 cm × 1.5 cm) with 30 mg of the synthesized material. A binder mixture of 5 wt% PVDF and 100 μL NMP was used for the electrode preparation. For EIS analysis, measurements were conducted in a solution containing 5 mM $[Fe(CN)_6]^{3/4-}$ dissolved in 0.1 M KCl at an applied potential of +0.25 V without light, across a frequency range from 100 kHz to 0.1 Hz. Impedance data were analysed using a Randle circuit model. Mott-Schottky measurements were carried out under dark conditions with the 5 mM $[Fe(CN)_6]^{3/4-}$ in 0.1 M KCl electrolyte solution. And the photocurrent response measurements were conducted in 0.1 M Na_2SO_4 applying a bias potential of 1.5 V with reference to the Ag/AgCl electrode. Photoluminescence (PL) spectroscopy (F-186 2710, HITACHI, Japan) was employed to investigate the recombination rate of photogenerated charge carriers

Table 1: Showing the obtained data from XRD used for calculating crystallite sizes of the photocatalyst

$MgIn_2S_4$		BiOBr		BiOBr/ $MgIn_2S_4$	
Peak position (degrees)	**FWHM (degrees)**	**Peak position (degrees)**	**FWHM (degrees)**	**Peak position (degrees)**	**FWHM (degrees)**
14.07128	1.30655	10.76	0.20127	10.69999	0.42454
23.2358	0.88088	21.79354	0.21945	15.09867	0.16976
27.4249	1.1408	25.05949	0.18448	21.7476	0.36677
33.18004	0.95952	31.59747	0.2247	25.02694	0.25474
43.57844	0.81298	32.10289	0.17538	27.12746	0.12612
47.79584	0.74891	44.62209	0.27257	27.6914	0.1344
59.43211	0.57285	46.12019	0.22419	30.65506	0.29388
66.7231	0.70549	50.60354	0.30437	31.6741	0.80418
		53.27363	0.23933	39.18358	0.31081
		56.11155	0.34671	44.57879	0.44331
		57.0645	0.29811	46.40688	0.51934
		70.96042	0.37215	53.25278	0.24694
		76.58		56.09704	0.52359
				57.05223	0.37415
				66.19434	0.37943
				67.35958	0.29026
				70.96453	0.40785
				76.57283	0.55285

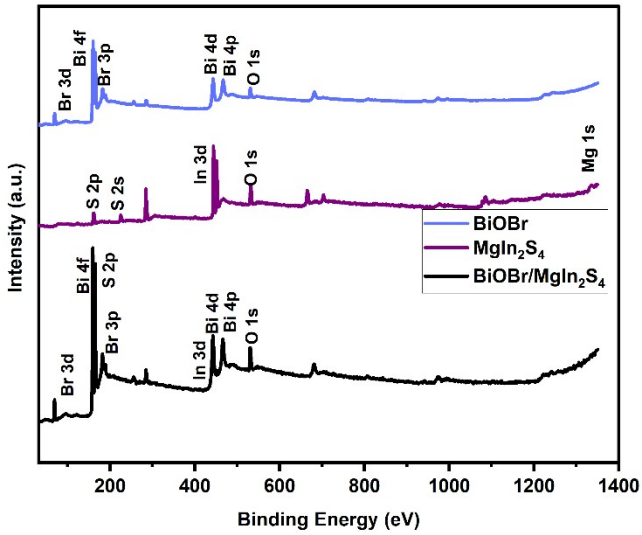

Figure S1: XPS survey scan of BiOBr, $MgIn_2S_4$ & $BiOBr/MgIn_2S_4$.

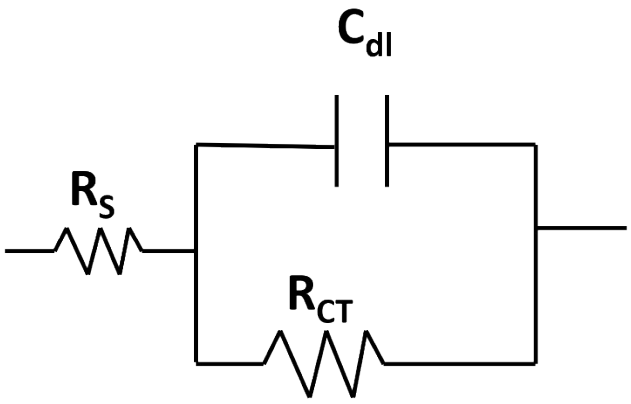

Figure S2: Nyquist Circuit model used for fitting EIS data

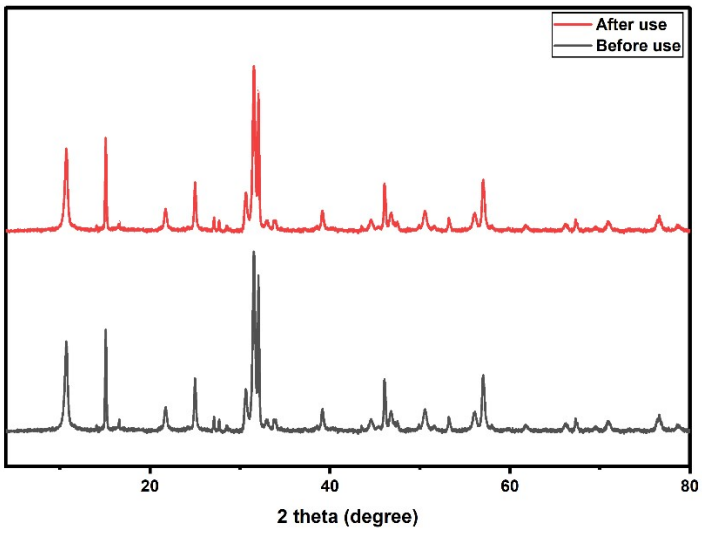

Figure S3: XRD pattern of BiOBr/$MgIn_2S_4$ before and after degradation

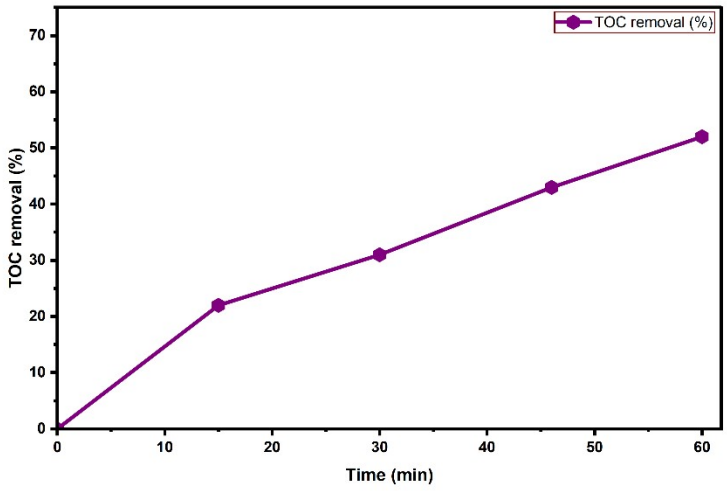

Figure S4: Total organic carbon removal

Table S2: Comparison of CIP degradation by previously reported heterojunction photocatalyst.

Catalysts	Catalyst Dosage	CIP parameters	Degradation Efficiency (%)	Rate	Ref
CeO_2 /ZnO	25 mg	15 mg/L, 100 mL, 60 min	60 %	0.0130 min^{-1}	[2]
Cd0.5Zn0.5S/CeO2	30 mg	5 mg/L, 50 mL, 30 mins	86%	0.0454 min-1	[3]
CeO_2 –Ag/AgBr	50 mg	10 mg/L,	93%	0.0201 min^{-1}	[4]

		50 mL 120 min			
MoS_2/CeO_2	50 mg	10 mg/ml, 100 mL, 120 mins	89%	0.017 min^{-1}	[5]
$BiOBr/MgIn_2S_4$	40mg	5 mg/ml, 50 mL, 45 mins	90	0.031 min^{-1}	This study

References

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