# Supporting Information

## Ambient temperature preparing BiOBr supported zero pretreatment coal gasification fine slag for organic pollutants removal

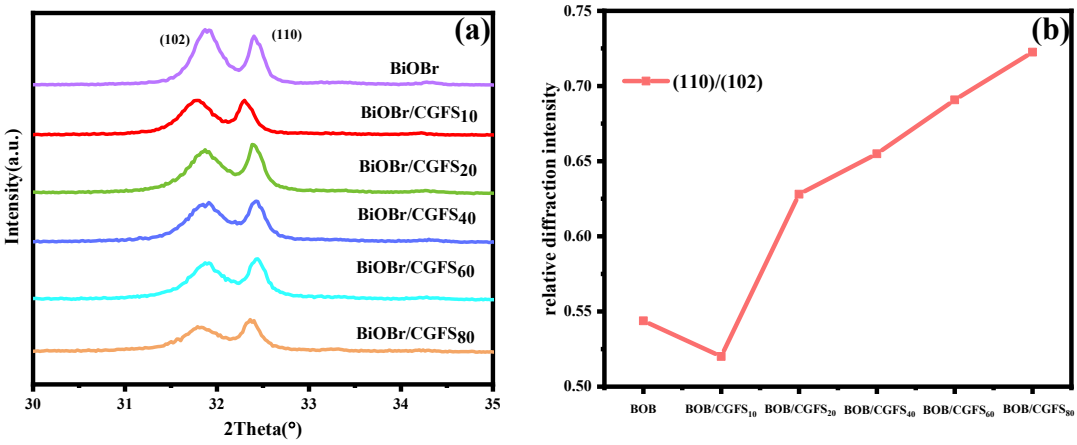


**Fig. S1** The effect of CGFS on the (102) and (110) sides of samples.

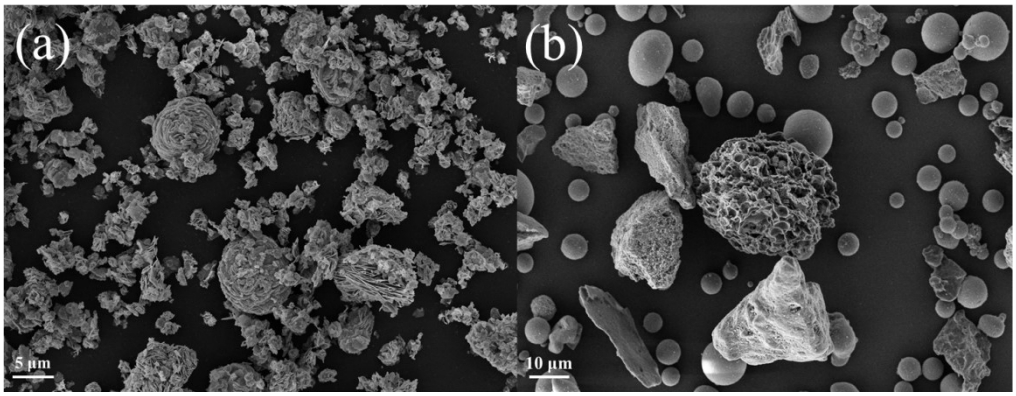


**Fig. S2** SEM images (a) BOB of BOB/$CGFS_{20}$; (b) CGFS of BOB/$CGFS_{20}$.

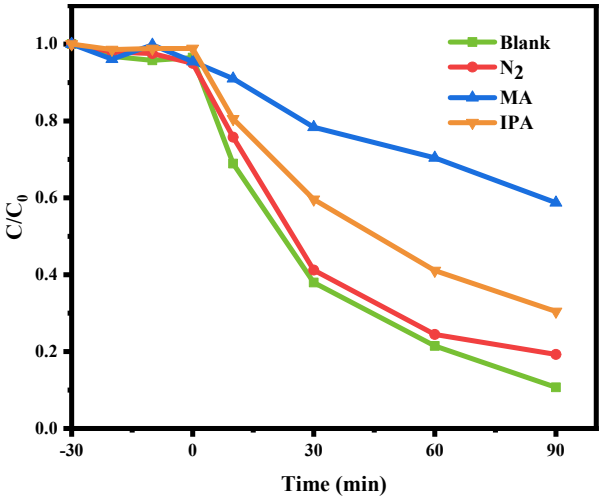


**Fig. S3** BOB/CGFS$_{20}$ photocatalytic degradation curves of phenol with added scavengers.

To get indications on the photocatalytic mechanism of this BOB/CGFS$_{20}$, different oxidant radical scavenger solvent/gas were added. MA, IPA and $N_2$ were used to eliminate the $h^+$, ·OH and $\cdot O_2^-$, respectively. As shown in Fig. S3, the added $N_2$ almost had little influence on the phenol degradation, indicating that $\cdot O_2^-$ radicals did not play a major role in the photocatalytic process. However, after adding MA and IPA, the photocatalytic activity had been greatly suppressed, suggesting that the photo-generated $h^+$ and ·OH were the main oxidative species in the degradation of phenol on BOB/CGFS$_{20}$ photocatalyst.

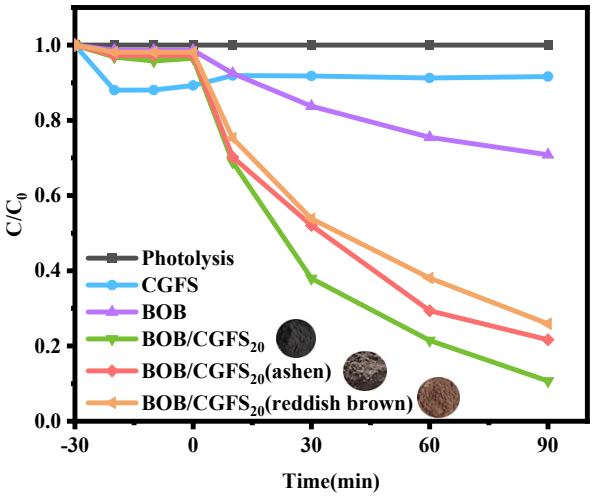


**Fig. S4** Photodegradation of phenol with different CGFS combine BOB under simulate sunlight. The coal gasification fine slag CGFS (ashen and reddish brown) samples are other two kinds of CGFS obtained from Jinneng Holding Power Group.

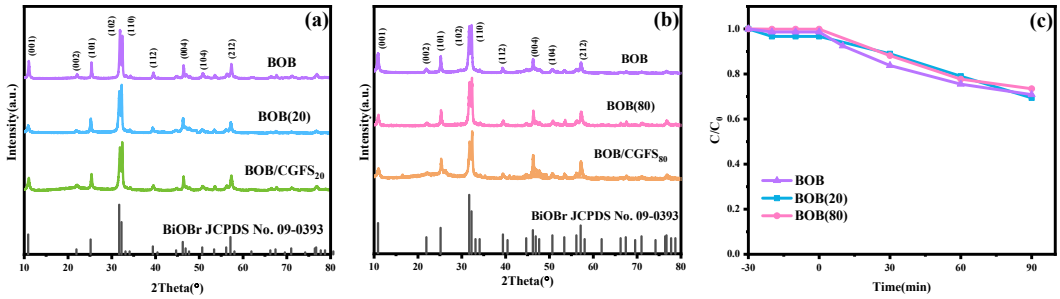


**Fig. S5** XRD patterns (a, b) and photocatalytic degradation activity of phenol (c) of BOB under different pH environment of the solution during preparation.

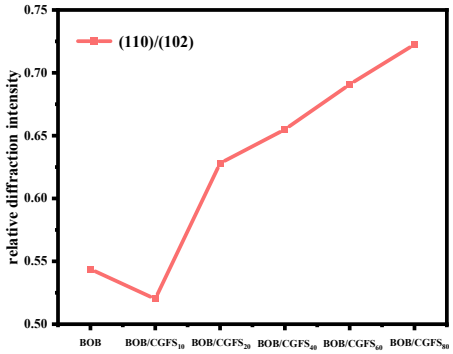


**Fig. S6** The effect of introducing CGFS on surface (102)/(110) of the sample

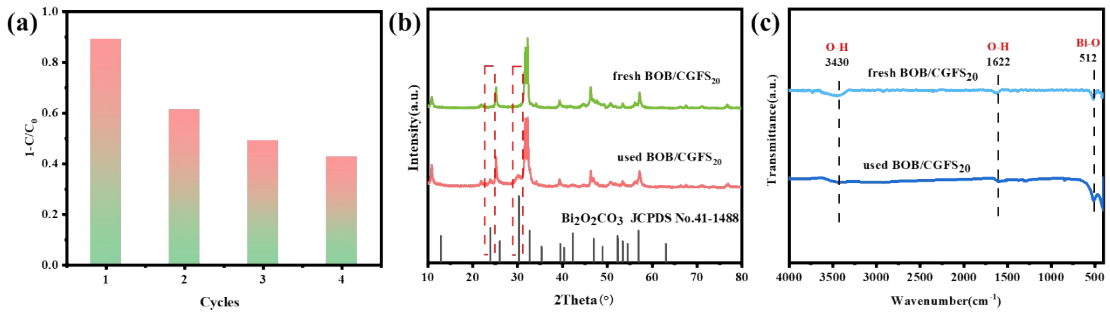


**Fig. S7** (a) BOB/CGFS$_{20}$ photocatalytic degradation of phenol cycle diagram; (b) XRD pattern of BOB/CGFS$_{20}$ before and after the reaction; (c) FT-IR pattern of BOB/CGFS$_{20}$ before and after the reaction.

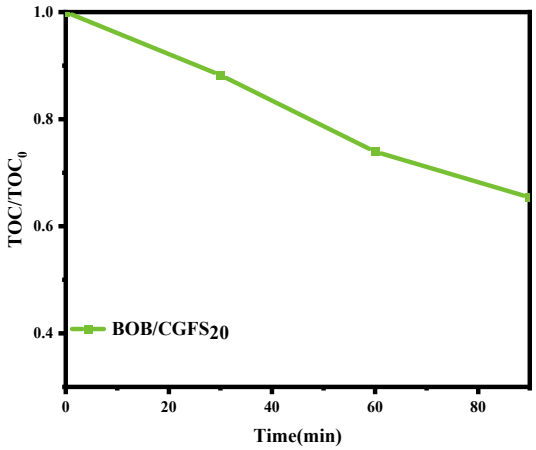


**Fig. S8** TOC diagram of BOB/CGFS$_{20}$ degradation real wastewater.

**Table S1**. Adjust the pH of BOB solution.

| Sample | BiOBr | BiOBr(20) | BiOBr(80) |
|---|---|---|---|
| pH | 2.0 | 2.3 | 2.8 |

**Table S2**. XRF analysis of CGFS (ashen).

| component | $SiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | CaO | MgO | $SO_3$ | $TiO_2$ | $K_2O$ | $ClO_2$ | $P_2O_5$ | other |
|---|---|---|---|---|---|---|---|---|---|---|---|
| percentage/% | 49.42 | 29.58 | 5.85 | 5.33 | 1.35 | 4.99 | 1.21 | 1.54 | 0 | 0.14 | 0.59 |

**Table S3**. XRF analysis of CGFS (reddish brown).

| component | $SiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | CaO | MgO | $SO_3$ | $TiO_2$ | $K_2O$ | $ClO_2$ | $P_2O_5$ | other |
|---|---|---|---|---|---|---|---|---|---|---|---|
| percentage/% | 40.80 | 27.97 | 7.36 | 13.15 | 1.84 | 5.66 | 1.20 | 1.28 | 0.02 | 0.18 | 0.54 |

**Table S4**. The ion concentration value in the solution tested by the inductively perkinElmer Avio 500 and ion chromatography

| ion | Br | Si | Al | Fe | Ca | Mg | $SO_4^-$ | Ti | K | $Cl^-$ | P | Bi |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mg/L | 46.59 | 0 | 0 | 0 | 2.338 | 0.503 | 2.357 | 0 | 0.328 | 0.4938 | 0.033 | 0 |