Electronic Supplementary Material (ESI) for New Journal of Chemistry.


# Supplementary Information

Table S1 Various catalysts and solvents for lignin depolymerization.

| Catalyst | Solvent | Lignin (g) | Catalysts (g) | Ethanol (mL) | Water (mL) |
|---|---|---|---|---|---|
| Blank | Water | 0.5 | 0 | 0 | 20 |
| GB-60 | Water | 0.5 | 0.25 | 0 | 20 |
| Blank | EtoH-Water | 0.5 | 0 | 10 | 10 |
| GB | EtoH-Water | 0.5 | 0.25 | 10 | 10 |
| GB-60 | EtoH-Water | 0.5 | 0.25 | 10 | 10 |
| GB-120 | EtoH-Water | 0.5 | 0.25 | 10 | 10 |

Table S2 BET results of the prepared porous glass beads under different conditions.

| Treating condition | Surface area ($m^2/g$) | Pore volume ($m^3/g$) | Pore size (nm) |
|---|---|---|---|
| GB | 1.4 | | |
| GB-60 | 205.2 | 0.27 | 5.3 |
| GB-120 | 183.1 | 0.28 | 5.9 |

Table S3 Entire element composition of GB, GB-60 and GB-120

| Sample | Entire elements content (wt %) | | | | | |
|---|---|---|---|---|---|---|
| | Si | Na | Ca | Mg | Al | K |
| GB | 18.7 | 6.8 | 5.5 | 2.3 | 0.5 | 0.5 |
| GB-60 | 24.5 | 6.1 | 6.3 | 2.7 | 0.6 | 0.6 |
| GB-120 | 31.5 | 4.7 | 6.8 | 3.0 | 0.7 | 0.6 |

Table S4 Elemental composition of PEL, ELR, TLR and NLR.

| lignin residues | Elemental composition (wt %) | | | Elemental ratio | |
|---|---|---|---|---|---|
| | C | H | O | H/C | O/C |
| PEL | 63.1 | 5.9 | 31.0 | 1.1 | 0.4 |
| ELR-WE-60 | 71.9 | 6.5 | 21.6 | 1.1 | 0.2 |
| TLR-WE-60 | 63.1 | 6.5 | 30.4 | 1.2 | 0.4 |
| SHLR-WE-60 | 40.9 | 6.2 | 53.0 | 1.8 | 1.0 |

Table S5 Entire elements composition of GB-60 after multiple catalytic cycles

| Sample | Entire elements content (wt %) | | | | | |
|---|---|---|---|---|---|---|
| | Si | Na | Ca | Mg | Al | K |
| GB-60-1 | 29.1 | 6.1 | 6.8 | 3.0 | 0.8 | 0.6 |
| GB-60-2 | 36.5 | 5.2 | 7.3 | 3.1 | 1.0 | 0.7 |
| GB-60-3 | 36.6 | 5.2 | 8.0 | 3.3 | 1.1 | 0.6 |

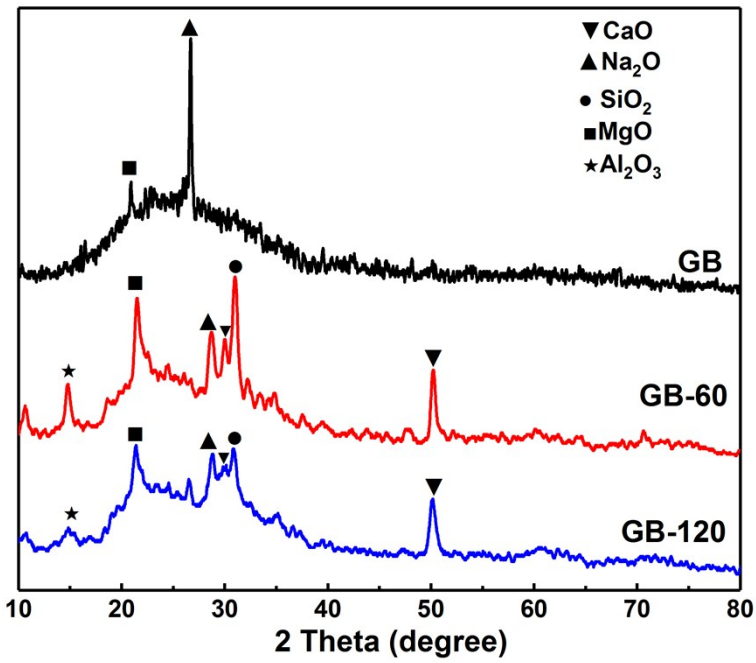


Fig.S1 XRD pattern of GB, GB-60 and GB-120

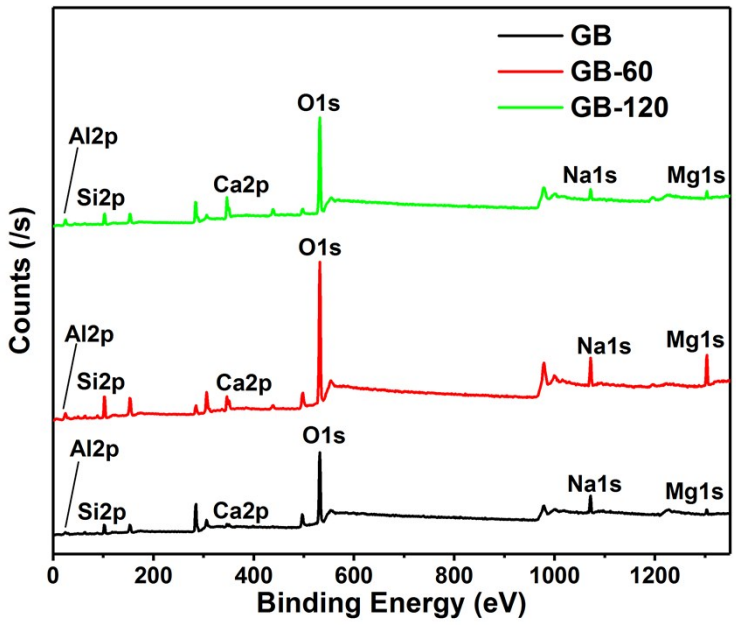


Fig.S2 XPS spectra of GB, GB-60, GB-120

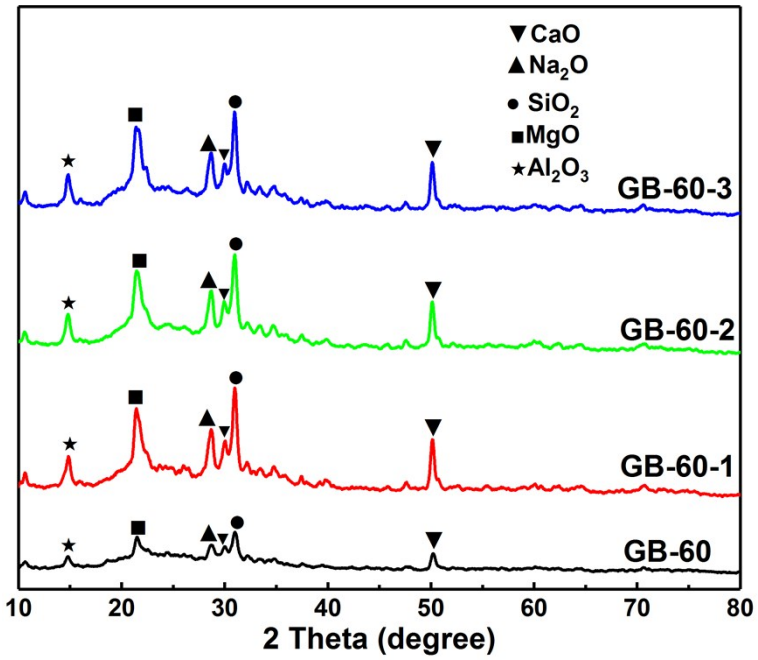


Fig.S3. XRD pattern of the GB-60 after multiple catalytic cycles

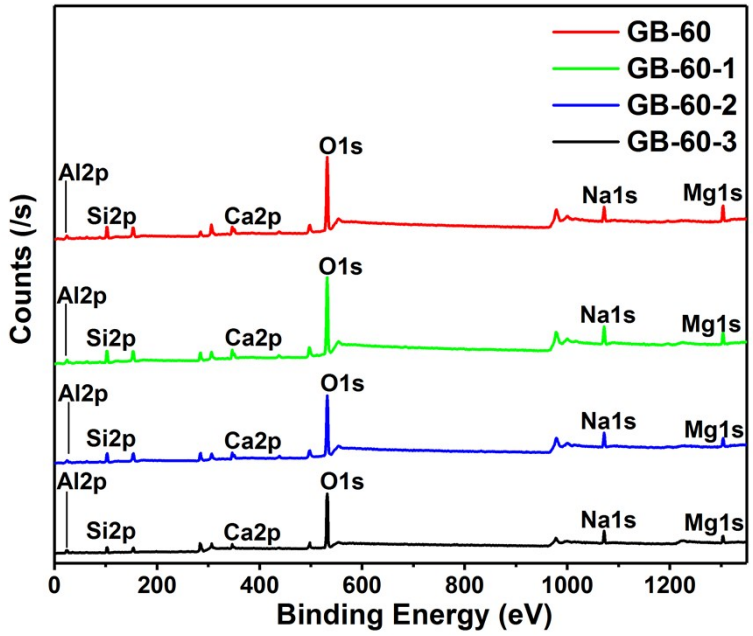


Fig.S4. XPS spectra of the GB-60 after multiple catalytic cycle.

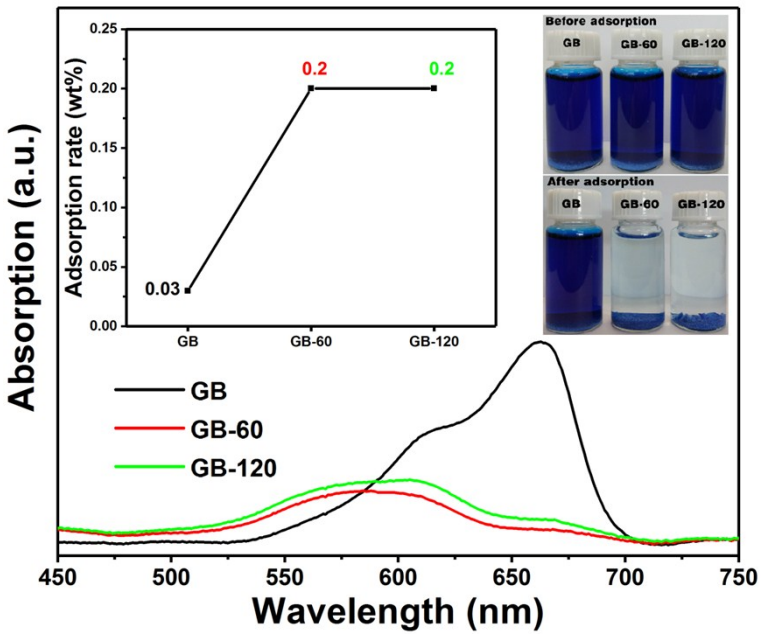


Fig.S5 Adsorption curve of methylene blue solution with GB, GB-60 and GB-120

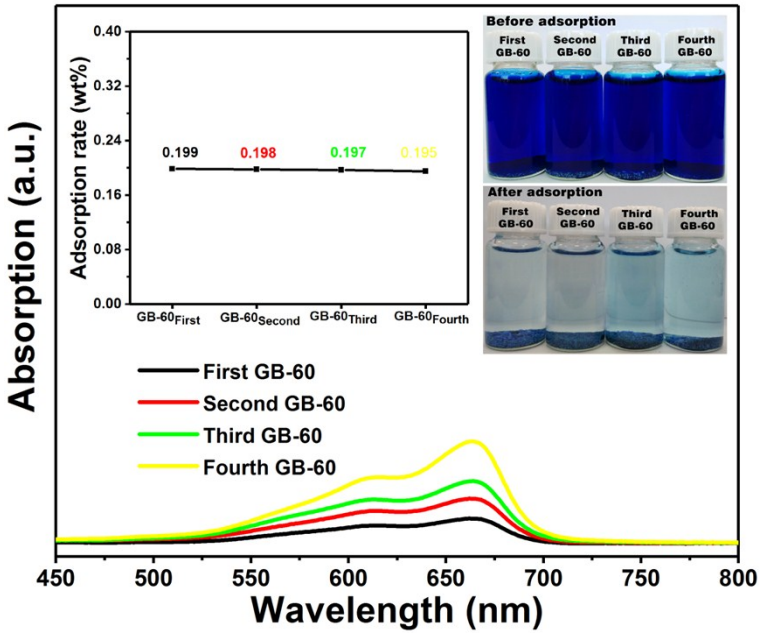


Fig.S6 Adsorption curve of methylene blue solution with GB-60 after multiple catalytic cycles