Electronic Supplementary Information

Bio-based Polyurethane Foam Preparation Employing Lignin from Corn Stalk Enzymatic Hydrolysis Residues

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Fig. S1  Reaction of the synthesis of BPU foams.
### Table S1  Experimental conditions of single factor

| Factor                  | Level | 1   | 2   | 3   | 4   | 5   |
|-------------------------|-------|-----|-----|-----|-----|-----|
| C(NaOH) (g/L)           |       | 20  | 30  | 40  | 50  | 60  |
| L-S ratio (mL/g)        |       | 20:1| 30:1| 40:1| 50:1| 60:1|
| Temperature(°C)         |       | 30  | 40  | 50  | 60  | 70  |
| Time (h)                |       | 1.5 | 2   | 2.5 | 3   | 3.5 |

### Table S2  Box-Behnken design for experiments

| Factor                  | Number | Level | -1  | 0   | 1   |
|-------------------------|--------|-------|-----|-----|-----|
| C(NaOH) (g/L)           | A      | 30    | 40  | 50  |
| L-S ratio (mL/g)        | B      | 30:1  | 40:1| 50:1|
| Temperature(°C)         | C      | 50    | 60  | 70  |
| Time (h)                | D      | 2     | 2.5 | 3   |
| Number | NaOH concentration | liquid-solid ratio | temperature | time | Y/% |
|--------|--------------------|-------------------|-------------|------|-----|
| 1      | -1                 | 0                 | 0           | 1    | 55.02 |
| 2      | 0                  | -1                | 0           | -1   | 58.27 |
| 3      | 0                  | -1                | 0           | 0    | 62.50 |
| 4      | -1                 | 0                 | 1           | 0    | 50.35 |
| 5      | -1                 | 0                 | -1          | 0    | 50.12 |
| 6      | 1                  | 1                 | 1           | 0    | 52.41 |
| 7      | 0                  | 0                 | -1          | -1   | 55.44 |
| 8      | 0                  | -1                | 0           | 0    | 58.68 |
| 9      | 0                  | 0                 | 0           | 0    | 62.5  |
| 10     | 1                  | 0                 | 0           | 1    | 53.21 |
| 11     | 0                  | 1                 | -1          | 0    | 40.25 |
| 12     | 0                  | 0                 | 1           | -1   | 60.79 |
| 13     | 0                  | -1                | -1          | 0    | 55.31 |
| 14     | 0                  | 0                 | -1          | 1    | 52.31 |
| 15     | 1                  | 0                 | 0           | 0    | 53.21 |
| 16     | -1                 | 1                 | 0           | -1   | 50.48 |
| 17     | 0                  | 1                 | 0           | 1    | 48.31 |
| 18     | -1                 | -1                | 0           | 0    | 48.59 |
| 19     | 0                  | 0                 | 0           | 0    | 62.50 |
| 20     | -1                 | 0                 | 0           | -1   | 55.12 |
| 21     | 1                  | 0                 | 1           | 0    | 55.56 |
| 22     | 0                  | 0                 | 1           | 1    | 58.54 |
| 23     | 0                  | 0                 | 0           | 0    | 61.1  |
| 24     | 1                  | 1                 | 0           | 0    | 40.18 |
| 25     | 0                  | -1                | 1           | 0    | 49.35 |
| 26     | 1                  | 0                 | -1          | 0    | 43.91 |
| 27     | 0                  | 1                 | 1           | 0    | 48.21 |
| 28     | 0                  | 0                 | 0           | 0    | 61.1  |
| 29     | 0                  | 1                 | 0           | -1   | 52.53 |