**Supporting Information file for:**

**Utilization of camellia oleifera shell for production of valuable products by pyrolysis**

Xiao Liu a, Weibo Mengb, Song Cheng b,c\*, Baolin Xingb,c\*, Yunze Zhengb, Xuanye Renb, Mengya Xueb, Chuanxiang Zhang b, Hongying Xiad

 (a. School of Energy Science and Engineering, Henan Polytechnic University, Jiaozuo, 454003, China

b. College of Chemistry and Chemical Engineering, Henan Polytechnic University, Jiaozuo 454003, China；

c. Collaborative Innovation Center of Coal Work Safety and Clean High Efficiency Utilization, Jiaozuo, 454003, China)

d. Faculty of Metallurgical and Energy Engineering, Kunming University of Science and Technology, Kunming 650093, Yunnan, China)

**Corresponding author: Song Cheng, Email address: cskmust@163.com**



**Fig.S1** The schematic diagram of pyrolysis system.

**Table S1** Pyrolysis products produced from different types of biomass

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Precursor | Bio-gas (%) | Bio-oil(%) | Biochar(%) | Reference |
| COS | 51.53 | 21.67 | 26.80 | This work |
| Pine dust | 60.00 | 22.70 | 17.30 | (Chen et al., 2008) |
| Corn stover | 41.30 | 32.70 | 26.00 | (Lei et al., 2009) |
| Aspen | 38.90 | 35.90 | 35.20 | (Wan et al., 2009) |
| Peanut shell | 46.20 | 16.60 | 37.20 | (Mamaeva et al., 2016) |

**Table S2** Compositions of bio-oil at 400-800℃

|  |  |  |  |
| --- | --- | --- | --- |
| Item | Components | 400℃ 500℃ 600℃ 700℃ | 800℃  |
| Relative content (%) |
| 1 | Cyclohexan-1,4,5-triol-3-one-1-carboxylic acid | 0.63 | 0.44 | 0.71 | 0.36 | 0.56 |
| 2 | 2-Methoxytetrahydrofuran | 0.35 | 0.62 | 2.75 | - | - |
| 3 | 2-Methyl-l-methylmannopyranoside | 0.43 | 2.62 | - | - | - |
| 4 | Cyclobutene, 2-propenylidene- | - | 0.65 | 0.28 | 0.62 | 0.60 |
| 5 | 1,3,5-Cycloheptatriene | 0.76 | 0.54 | 0.62 | - | - |
| 6 | Butanoic acid | 0.45 | 0.96 | 0.57 | 0.73 | 0.82 |
| 7 | Furan, 2-(methoxymethyl)- | 3.77 | 1.26 | 1.02 | 3.03 | 4.46 |
| 8 | Cyclopentanone | 2.81 | 2.5 | 1.02 | 2.62 | 2.24 |
| 9 | Cyclopentanone, 2-methyl- | 0.67 | 0.20 | 0.35 | 0.38 | - |
| 10 | 3-Furaldehyde | - | - | - | 0.63 | 0.34 |
| 11 | Furfural | 10.48 | 7.44 | 7.79 | 7.20 | 3.91 |
| 12 | Cycloheptanone, 3-methyl- | 0.59 | 0.43 | 0.24 | 0.51 | - |
| 13 | Ethylbenzene | 3.53 | 3.30 | 1.59 | 1.84 | 1.92 |
| 14 | Toluene | 0.31 | 0.20 | 0.45 | - | - |
| 15 | p-Xylene | 3.06 | 2.48 | 1.71 | 4.15 | 4.72 |
| 16 | Benzene, 1,3-dimethyl | 6.00 | 5.12 | 3.47 | 2.02 | - |
| 17 | Ethanone, 1-(2-furanyl)- | 1.00 | 0.85 | 1.30 | 1.50 | 1.68 |
| 18 | 2-Furanethanol, á-methoxy-(S)- | 0.49 | 0.25 | 0.30 | 0.67 | - |
| 19 | 2-Furancarboxaldehyde, 5-methyl- | - | - | -0.69 | 0.85 | 0.78 |
| 20 | Phenol | 31.23 | 40.68 | 51.31 | 28.75 | 38.50 |
| 21 | 2-methyl- Phenol | 2.31 | 10.99 | 14.16 | 10.46 | 13.38 |
| 22 | Cresol | - | - | - | - | 0.67 |
| 23 | 3-methyl- Phenol | 16.71 | 9.17 | 11.89 | - | 7.59 |
| 24 | Phenol, 2,5-dimethyl- | 0.47 | 0.32 | 1.37 | - | - |
| 25 | Phenol, 3,4-dimethyl- | - |  | 0.34 | 0.98 | 1.08 |
| 26 | Phenol, 2,3-dimethyl- | 1.03 | 0.99 | 0.27 | 0.41 | - |

**Table S3** Electrochemical performance of various materials applied to lithium ion batteries.

|  |  |  |
| --- | --- | --- |
| Material | Energy storage potential | References |
| Seaweed biochar | <200mAh g−1 | Salimi et al. (2019) |
| Carbonized straw biochar  | < 300mAh g−1 | Ryu et al. (2015) |
| MDF/Fe | 307 mAh g−1 | Gomez et al. (2018) |
| ABiochar composite | 340 mAh g−1 |  This work |

**Table S4** The detailed information of the cost and income

|  |  |
| --- | --- |
| Item | Value |
| Feedstock | $35,000/year |
| Processing Labor | $12,000/year |
| Electricity purchased | $8,640/year |
| Pyrolysis machinery depreciation | $30,000/year |
| Maintenance | $10,000/year |
| Consumables | $9,150/year |
| Insurance and taxes | $4,000/year |
| Transportation of Bio-oil to Market | $3,000/year |
| Total capital invest and operating cost | $111,790 |
| Sale of bio-oil | $23,850 |
| Sale of bio-char | $134,000 |
| Total annual income | $157,850 |
| Total annual revenue | $46,060 |

Reference

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