**Supporting Information file for:**

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

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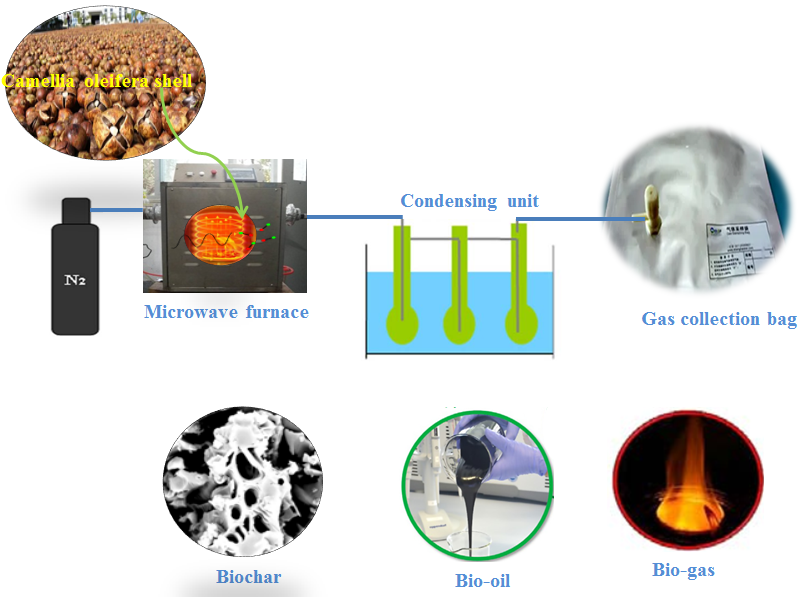
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**Fig.S1** The schematic diagram of pyrolysis system.

**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 |

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