## Supplementary Online Materials

# Co-catalytic pyrolysis of biomass and waste triglyceride seed oil waste oil in a novel reactor to produce olefins and aromatics integrated with self-heating and catalyst regeneration processes

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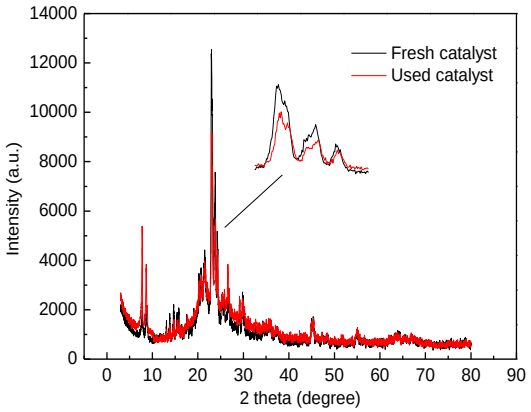
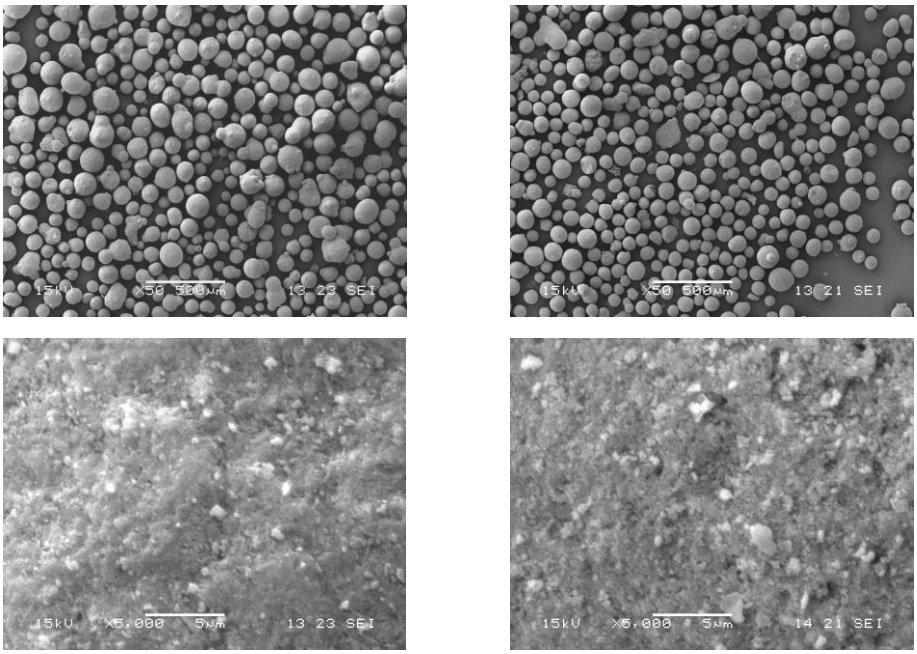



**Fig. S1** X-Ray diffraction (XRD) patterns before reaction (black line) and after reaction (red line)



(a) (b)

**Fig. S2** SEM images of the catalysts: (a) before reaction; (b) after reaction

# Experimental

According to cold experimental results of the IIFB reactor, when the ratio of height of bed materials to diameter of bed ($H_0/D_t$) is 3, the operating range of spout-fluidized bed flow pattern was very wide, which is beneficial to the stability of biomass catalytic pyrolysis and char combustion processes.[1] In this work, we used $H_0/D_t$=3, which means that the volume of bed materials is about 360 mL.

**Table S1** Main characteristics of the rice stalk (air-dry basis)

| | Proximate analysis (wt.%) | | | | Ultimate analysis (wt.%) | | | |
|---|---|---|---|---|---|---|---|---|
| | Fixed carbon | Volatile | Ash | Moisture | C | H | O[a] | N |
| Rice stalk | 16.25 | 66.26 | 14.54 | 2.95 | 35.36 | 4.78 | 44.36 | 0.96 |
| Waste oil | - | - | - | - | 79.6 | 11.9 | 8.5 | - |

[a] By difference.

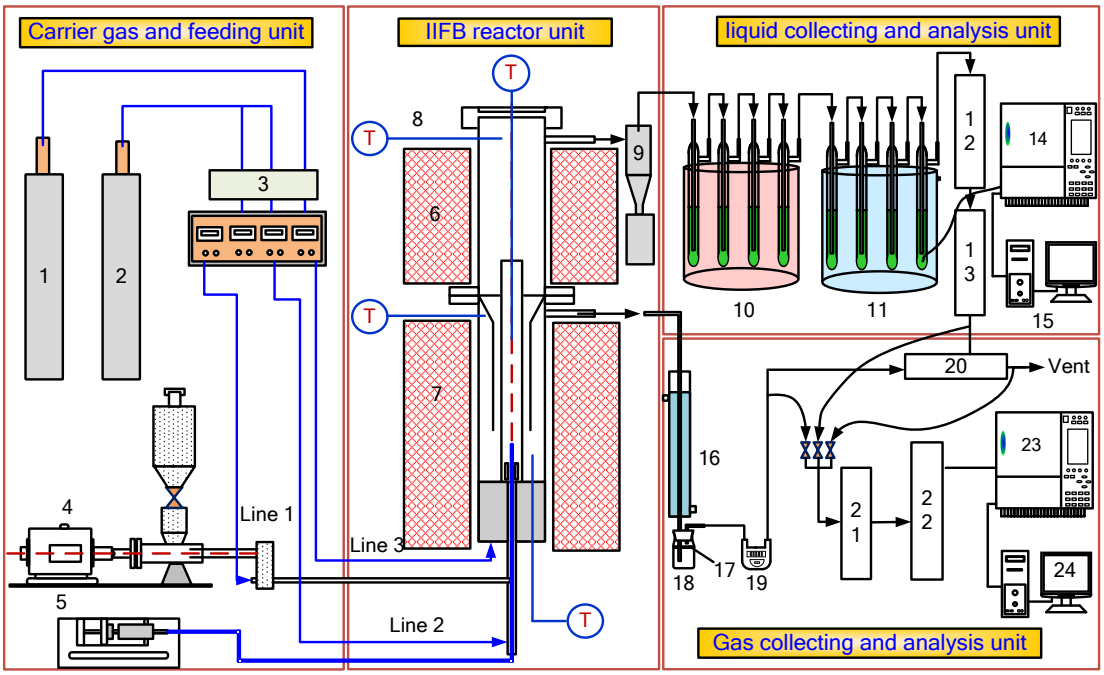



**Fig. S3** The experimental setup of internally interconnected fluidized bed reactor system: 1. $O_2$; 2. $N_2$; 3. Mass flow controller; 4. Anger feeder; 5. Feeding pump; 6,7. Heater; 8. Temperature controller; 9. Cyclone; 10. Ice condenser; 11. Dry ice condenser; 12,21. Cotton wool filter; 13,22. Silica gel filter; 14.GC/MS; 15,24. Date collecting computer; 16. Condenser; 17. Fine particle filter; 18. Particle container; 19. Accumulative flowmeter; 20. Gas mixer; 23. GC/FID/TCD

1. H. Y. Zhang, R. Xiao, Q. W. Pan, Q. L. Song and H. Huang, *Chem Eng Technol*, 2009, **32**, 27-37.