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MgO-modified activated biochar for biojet fuels from pyrolysis of sawdust on a simple tandem micro-pyrolyzer

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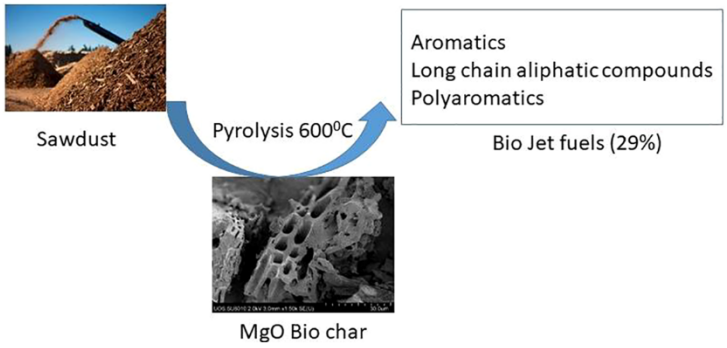
HIGHLIGHTS

- MgO-modified KOH activated biochar was prepared from pyrolysis of rice husk.
- A single-step conversion of sawdust to bio-jet fuel over MgO/AC is reported.
- Acid and base sites of MgO/AC played major role for the jet fuel production.
- 10 wt% MgO/AC catalyst produced a maximum yield of jet fuels (29%) at 600 °C.
- Bio jet fuel production over MgO/AC is a green and environmental friendly process.

GRAPHICAL ABSTRACT



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ABSTRACT

The aim of this work was to study on MgO-modified KOH activated biochar (AC) catalysts, in the pyrolysis of sawdust for the direct production of bio-jet fuels using a tandem micro-pyrolyzer. AC catalysts with various MgO contents (5 to 20 wt%) were synthesized using an impregnation method. The mesopores generated (4 to 18 nm) in the carbon has a great potential in the conversion of oxygenated to jet fuel. The importance of basic nature in the catalysts is demonstrated with the maximum bio-jet fuel yield of 29 % at 10 % MgO. Further, the temperature of 600 °C and a catalyst/sawdust ratio of 10 are identified as the optimal conditions. The nanosize of MgO and the synergism of acid and base sites seemed to enhance deoxygenation, via decarboxylation and decarbonylation, and oligomerization, which are required for jet fuel formation in high amounts from sawdust pyrolysis.

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