

A Method For Integrating Bioprocessing With Pyrolysis For Valuable Chemicals And Carbon From Biomass

Application Number: 202111039582

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ABSTRACT

A method (100, 200) for integrating bioprocessing with pyrolysis to produce valuable chemicals and carbon from waste biomass is provided. The method (100) may treat pretreated waste biomass with natural microbes such as *T. fusca* and *P. thermoglucosidasius* to obtain simple sugars and ferment simple sugars to obtain a fermentation broth containing valuable chemicals as one of the components. Further, the method (100) may include putting the fermentation broth under a centrifugal force to separate valuable chemicals from rest of the components. Further, the method (100) may include processing the biomass components like unutilized waste biomass and microbes through pyrolysis to obtain pyrolytic carbon. In one another embodiment, a method (200) may be provided to form valuable chemicals and pyrolytic carbon from waste biomass using natural microbes such as *T. reesei* and *P. thermoglucosidasius*.

KEY APPLICATION AREAS

1. Waste biomass valorization and biorefinery.
2. Biofuel and biochemical production.
3. Pyrolytic carbon production.
4. Agricultural and municipal waste management.
5. Circular bioeconomy and sustainable resource recovery.
6. Industrial bioprocessing integrated with thermochemical conversion.

POTENTIAL USE

1. Conversion of agricultural, forestry, fruit, and paper waste into value-added products.
2. Production of bioethanol and lactic acid through microbial fermentation of waste

biomass.

3. Production of pyrolytic carbon (biochar/carbon materials) from residual biomass via pyrolysis.

4. Integrated waste-to-value processing, maximizing carbon utilization while minimizing residual waste.

5. Generation of combustible biofuels compatible with existing fuel infrastructure.

6. Industrial biomass recycling and sustainable waste management for municipal solid waste and lignocellulosic residues.