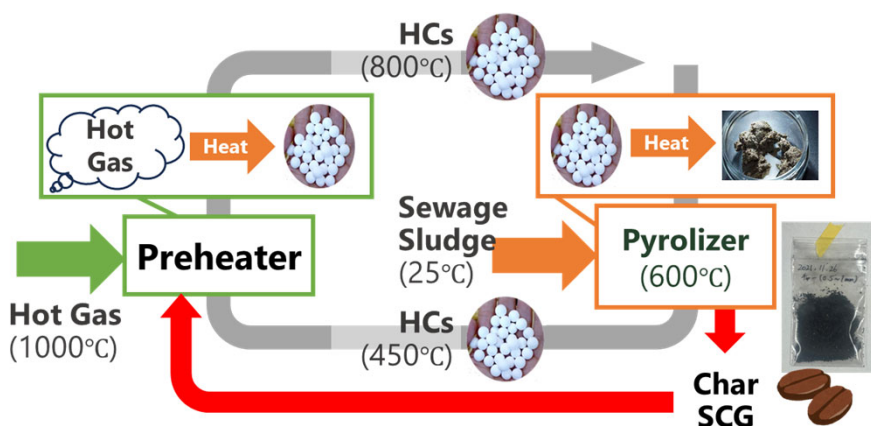


Purpose of Research

— This research targets a small-scale indirect biomass gasification plant. The thermal management is controlled by the circulation of heat carriers, HCs. One challenge is tar condensation, a highly viscous byproduct that can cause pipe blockages and disrupt heat exchange. In the AGM process, tar is removed by thermal cracking. However, the HC temperature has a deviation. Consequently, we are investigating improving heat exchange efficiency by combusting biomass fuel near HCs.

Summary of Research

We conduct two experiments. One is biofuel combustion experiments to investigate heat transfer from biofuels to HCs. The other is analyzing the movement of HCs and biofuels in the furnace to optimize the combustion environment. Then, considering two experiments, we scale up to the demonstration scale using CFD simulations.



Reuse char and SCG as additional fuels for HCs heating

Fig. Research overview diagram

Points

- ✓ High accuracy analysis enables by combining experiments and CFD simulation
- ✓ Environmental impact assessment based on LCA methods

Future Developments

- 2026 Combustion experiments & In-furnace behavior analysis
- 2027 Bio-fuel selection considering ash generation trouble
- 2028 Analysis at demonstration scale by using CFD simulation

Comparison with Conventional or Competitive Technologies

- Bio-fuel combustion improved the heat supply performance
- HCs temp. rising improved tar decomposition performance

Expected Applications

- Reduction of maintenance costs
- Additional H₂ product with tar decomposition
- Utilization of waste in local area
- Construction of hydrogen supply chain in local area

Challenges in Implementation

- Combustion characteristics differ for each biomass fuel
- Reduction of ash generation with bio-fuel combustion

Looking for the collaborative companies

- Engineering know-how
- Verification at demonstration considering the practical scale