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Development status of poly-generation system using various fuels with CO_2 capture

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Abstract

The authors are developing the basic technologies for a poly-generation system with CO_2 capture[1] (Fig. 1). The poly-generation system uses $O_2/CO_2/H_2O$ blown entrained gasifier which was developed for an Oxy-fuel IGCC system[2]. It is utilized various fuels such as coal, waste plastics and biomass. The poly-generation system does not only generate electricity but also synthesizes a chemical material. And by controlling the flow rate of syngas to the power generation facility and chemical synthesis process, power generation can be adjusted in response to electricity demand. CO_2 is captured by power generation and used for fuel carrier gas and as gasifying agent in the gasifier. And remaining CO_2 is used for utilization and storage.

In this presentation, the development status of the poly-generation system will be introduced. In the gasification technology development, several gasification tests were conducted using 3 tons/day gasifier and gasification experimental facility which simulates reductor section of gasifier. Furthermore, primary draft of gas clean-up processes for the poly-generation system was proposed through lab-scale experiments.

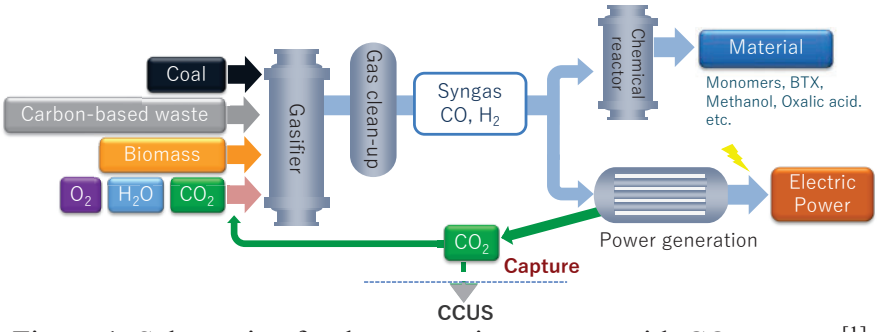

Figure 1 Schematic of poly-generation system with CO_2 capture[1]

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References

[1] Umemoto, S., et al., 11th International Freiberg Conference on Circular Technologies, 05-4, 2023.
[2] Oki, Y., et al., Mechanical Engineering Journal, Vol. 3, Issue 5, 16-00351, 2016.