

Realization of a low carbon society through game changing technologies

R&D Project Title Chemical heat pump for P2H2P

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Summary :

Renewable energies (RNE) such as solar power and wind power own large fluctuations in output, and power generation curtailment occurs frequently, which hinders the utilization development of RNE. It is necessary to strengthen energy storage for the large introduction of RNE in the future. Batteries are good candidates, however, P2H2P (Power-to-Heat-to-Power) (Fig. 1) has possible as a lower cost energy storage way. The point of P2H2P is having highly efficient heat storage function. Chemical heat storage is capable of high-density, long-term heat storage that exceeds conventional latent heat and sensible heat storage. Therefore, we will develop a chemical heat pump (CHP) with chemical heat storage capability. The issues of calcium oxide / water CHP is a candidate, and the durability enhancement and high thermal conductivity of the material were subjects. Then, we developed new composite material which has high repetitive reaction durability and thermal conductivity. Using this material, we will demonstrate CHP that can store a heat source at 500 °C and raise the output temperature to 600°C (Fig. 2), which was difficult in the past. It can be expected to contribute to the efficiency improvement and market development of P2H2P.

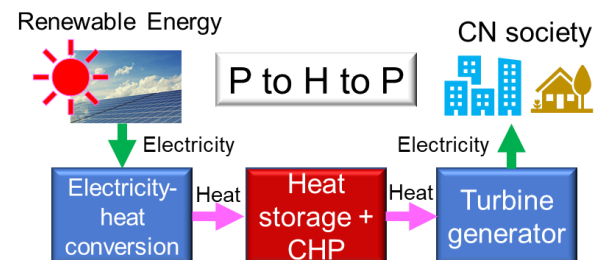


Fig. 1 Principle of P2H2P (CHP: chemical heat pump)

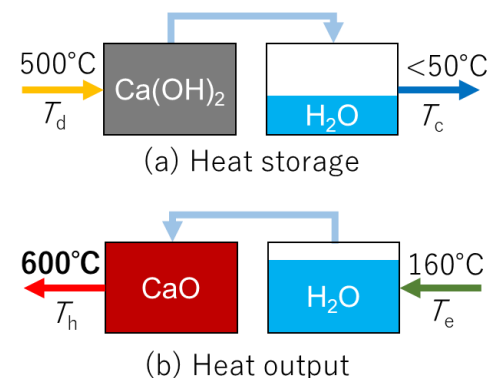


Fig. 2 CaO/H₂O CHP (a) heat storage mode, (b) heat output mode