# EXPERIMENTAL INVESTIGATION OF DEMONSTRAION-SCALE HYDROGEN PRODUCTION PLANT USING HYPERTHERMOPHILIC MICROORGANISM

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**Short Communication**

## Abstract

The increasing demand for clean energy, global concern about climate change have resulted in an increased global willingness to accept as hydrogen economy as a potential long-term solution to the environmental crisis. Although most hydrogen is produced by the steam reforming of natural gas, it can be produced from various feedstocks and production pathways. Hydrogen can be produced from the gas containing carbon monoxide based on water gas shift reaction in thermochemical or biological process. Biological water gas shift processes, while slower than chemical reactions, have a number of advantages such as higher yields, requirement of minimum energy due to lower operating temperatures and pressures, and lower cost. By- product gas in steel manufacturing plant or syngas in coal gasification plant which contains carbon monoxide can be converted to hydrogen gas using water gas shift process. In the present investigation, the experimental results of demonstration scale hydrogen production plant using syngas from coal gasification plant will be explained. In this plant, biological water gas shift process using Thermococcus onnurineus NA1 which is microorganism with high efficient in H2 production. Demonstration scale hydrogen production process is designed and constructed with the capacity of 500 Nm3/h syngas from coal gasification plant. As a result of process design, CO conversion efficiency of the process is 94.4% and 0.98 ton/d of hydrogen that can be utilized to run around 2,000 hydrogen fuel cell vehicles can be produced. The demonstration plant produces hydrogen using syngas from 300 MW IGCC(Integrated Gasification Combined Cycle) plant operated by Korea Western Power Co., Ltd. Syngas inflow conditions are 61.5% CO, 31.3% H2, 5.8% CO2 and 1.3% N2. Normal operation pressure and temperature of main reactor are 7.8 bar,g and 78˚C.

## Biography

Hyungtaek Kim is a professor in Ajou University, Suwon, Korea.

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