CEE

Y.KOBAYASHI LAB.

[Ultra High-Efficiency Energy Utilization Technology]

Collaborative Research Center for Energy Engineering

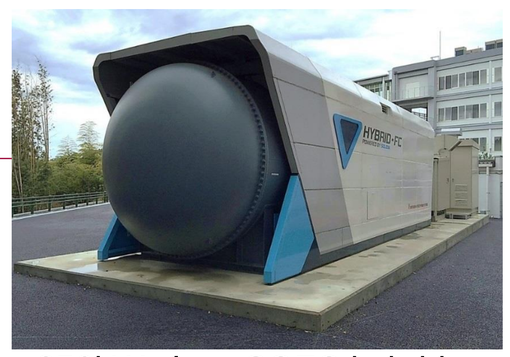
http://www.kobayashi-lab.iis.u-tokyo.ac.jp/

Advanced Energy Conversion Engineering

Japanese economic industry is at a turning point due to an increasing economic interdependence in international society and the saturation of domestic demand. Our primal goal is to enhance the development of innovative and truly valuable Japanese original technologies, devoted to highly efficient utilization of fossil fuel, distribution of power sources, rational use of renewable energy sources and the best energy mix with the maximized academic-industrial alliance.

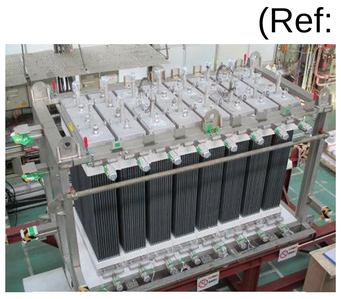
SOFC Hybrid System

High efficiency hybrid power generation system that combines SOFC (Solid Oxides Fuel Cell) and micro gas turbine. This system is positioned as low CO_2 emission next-generation distributed power source available for industrial and business. In addition, the use of the system for various applications such as the FCV is expected by taking out hydrogen from city gas fuel. We study the optimization and application of the fuel cell power generation system.



250kW class SOFC hybrid system demo. equip.
(Ref: MHPS)

GOOD DESIGN AWARD 2015

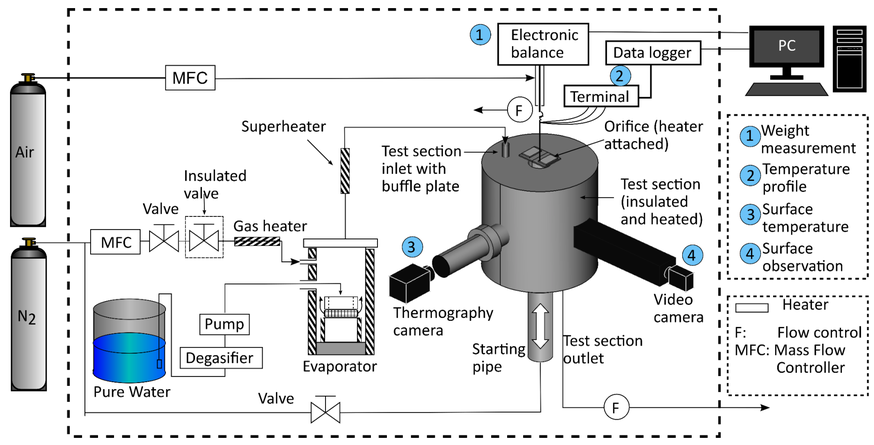


SOFC cell-stack
（Ref: MHPS）

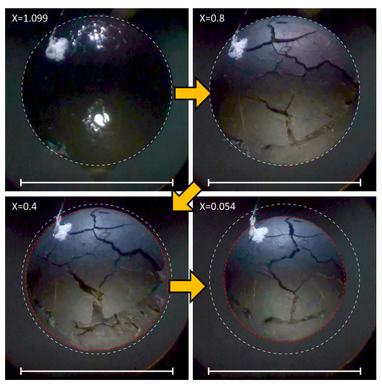
50kW class SOFC system
（Ref: Fuji Electric）

Ultra High Efficiency Lignite-Fired Power Generation System

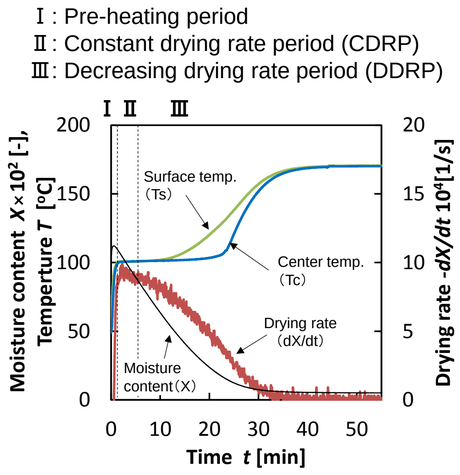
Lignite is rich in reserves, but its thermal efficiency is low and CO_2 emissions is large. Therefore, development of highly efficient utilization technologies of lignite is desired. We study to clarify the pyrophoric mechanism, which is a problem in the lignite drying, and to establish safety guidelines for the lignite drying by using the test equipment enabling simultaneous measurement of heat input and the drying speed in lignite drying. Moreover, realization of ultra high-efficiency lignite-fired system by combining this technique with IGCC is aimed.



Lignite drying test equipment schematic



Lignite drying process



Lignite drying mechanism

Nakoso IGCC demo. plant
（On commercial service from Apr. 2013）
（Ref: MHPS）

CCR (Carbon Capture and Reuse)

By synthetic methane production from electrolytic hydrogen and CO_2 recovered by CCS abroad, we aim to establish CCR technology that can supply hydrogen in Japan with the maximal use of NG transport, storage and distribution facilities. CCR can prompt the popularization of tri-generation (simultaneous supply of electricity, heat and hydrogen).

18Nm³/h-CH_4 demo. plant
（Ref: Hitz）