

Kansha Lab.

[Process Design for Sustainable Energy Society]

Institute of Industrial Science
 Collaborative Research Center for Energy Engineering

<http://www.energy.iis.u-tokyo.ac.jp/>

Process System Engineering

Exergy Loss Minimization for Industrial Process

To construct a sustainable society, it is necessary to reduce energy consumption in industrial section consuming a plenty of energy in Japan. For this issue, we must introduce energy circulation in industrial processes and minimization of process exergy loss during operation. In this research, theoretical investigation to design such processes is performed.

Development of Energy and Material Co-production

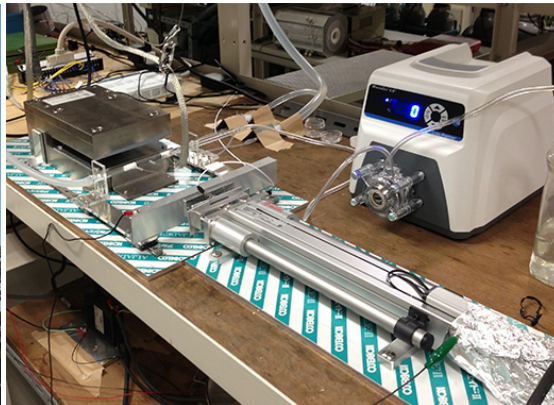
The drastic energy saving and minimization of CO2 emission can be achieved by restructuring of industrial structure based on the co-production of energy and material. In this research, the feasibility of this co-production system and new design tools for this system are investigated.

Process Control

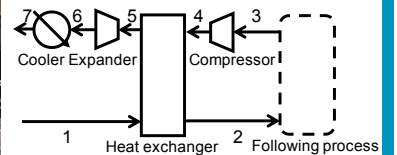
The operation systems of the proposed industrial energy saving processes have been developed for the purpose of safety and high efficiency. Especially, most of the chemical plants have difficulty installing the new processes due to their nonlinear dynamic characteristics such as reaction. Thus, we are designing a suitable control and operation systems for these new processes in this research.



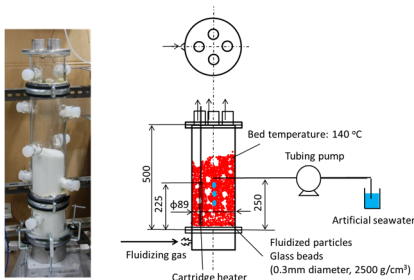
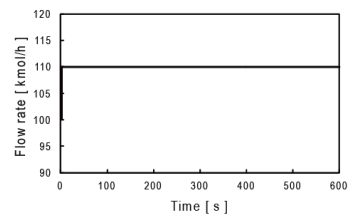
Pilot self-heat recuperative distillation for bioethanol
 Nippon Steel Engineering
 Kitakyushu Environmental Technology Center



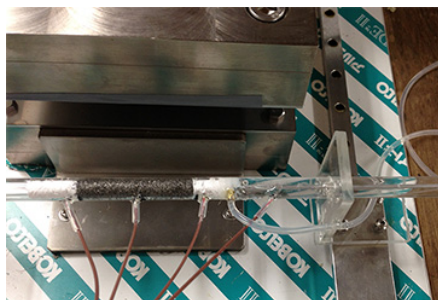
Exergy recuperative experimental device
 by magnetocaloric effect



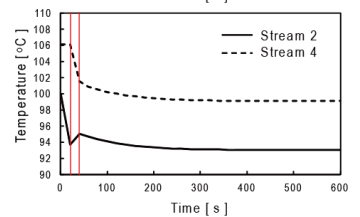
Flow Diagram for Gas Stream
 Using Self-Heat Recuperation



Fluidized Bed Evaporator



Exergy recuperative experimental device with magnet (zoom in)



Step Change of Flow Rate
 (+10%) and Responses