SEMINAR SERIES

International Institute for Carbon-Neutral Energy Research
Kyushu University

Title **Performance Enhancement of Polymer Electrolyte Membrane Fuel Cell (PEMFC)**

Speaker Prof. Min Soo KIM
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Date & Time Friday, September 29, 2017 3:00 p.m.
Place I2CNER hall, I2CNER Bldg.1, Ito campus, Kyushu University

Abstract

PEMFC has been considered as one of the most powerful alternative energy sources to replace fossil fuels. PEMFC generates electricity by converting chemical energy of hydrogen and oxygen into electrical energy and it has many advantages such as relatively low operating temperature (60~80°C), fast response, high efficiency, and relatively cheap operating cost.

Although most important part in PEMFC is fuel cell stack, PEMFC system needs additional equipment called MBOP (mechanical balance of plant) to make the whole system work properly. Therefore, developing a technology to improve MBOP is of paramount importance because it helps PEMFC work better in view of a power consumption, efficiency, and size. MBOP consists of three main parts such as fuel processing system (FPS), air processing system (APS), and thermal management system (TMS). Each part is essential to operate fuel cell system adequately and several researches related to MBOP have been carried out in our laboratory.

In this seminar, diverse ideas to improve the performance of PEMFC will be introduced, and our MBOP researches will be covered. These include air recirculation system to reduce the size of humidifier, air supply system with flow pulsation, water purge by abrupt pressure reduction, humidification and evaporative cooling by water injection, etc. Crossover phenomenon in PEMFC system will be discussed in relation with nitrogen purge. Furthermore, new channel design for high performance fuel cell and upgraded cooling system using two-phase boiling heat transfer will be also introduced.

About the Speaker

Prof. Kim got his B.S, M.S., and Ph.D. at Seoul National University. After spending three years at the National Institute of Standards and Technology in U.S., he joined the faculty at Seoul National University in 1994. His research focuses on thermal energy system including heat pumps, refrigeration units, and fuel cell systems. He published more than 200 international and domestic journal papers and more than 350 conference papers. He has about 30 registered patents on thermal systems. He is a member of ASME (American Society of Mechanical Engineers), ASHRAE (American Society of Heating, Refrigeration, and Air-Conditioning Engineers), IIR (International Institute of Refrigeration), KSME (Korean Society of Mechanical Engineers), SAREK (Society of Air-Conditioning and Refrigeration Engineers of Korea), and NAEK (National Academy of Engineering of Korea). In 2010, he served as policy advisor to minister of the Ministry of Education, Science and Technology, and he was also a member of Presidential Advisory Council on Education in 2011. In 2012, he worked as vice dean for strategic planning of the college of engineering of SNU. Presently, he is president of Korean National Committee of IIR. He received the Academic Accomplishment Award from SAREK in 2006, and from KSME in 2013. In 2012, he got Asian Academic Award jointly from SAREK/CAR/JSRAE. In 2007, his lab. was designated as National Research Laboratory by the Ministry of Science and Technology. In 2016, he was selected as 70 Excellent PhDs of College of Engineering of SNU.

Host: Professor Yasuyuki Takata

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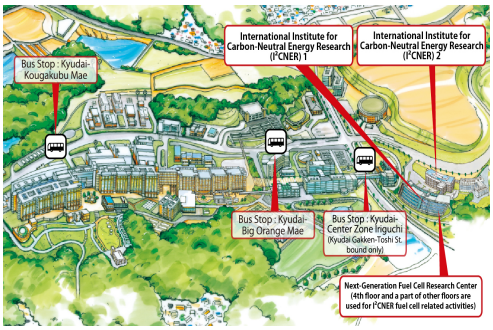

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