UDENRIGSMINISTERIET
Ministry of Foreign Affairs of Denmark

Ministry of Higher Education and Science Denmark

South Korea – Denmark Network Webinar
The Frontier of Global Renewable Energy Transition

Tuesday 29 Oct. 2024

CET (DK) 08:30 – 10:00

KST (KOR) 16:30 – 18:00

Teams Link

Contact:
xcu@energy.aau.dk

As a continuous effort to promote and foster scientific collaboration among some of the world's leading research institutions in South Korea and Denmark on renewable energy, hydrogen technology, biofuels and Power-to-X (PtX), or XtP, the webinar is launched under the newly established Global Innovation Network Program: "Network between South Korea and Denmark" among KOR partners Korea Institute of Science and Technology (KIST), Korea Advanced Institute of Science & Technology (KAIST), Ulsan National Institute of Science & Technology (UNIST), Kyung Hee University (KHU), Korea Institute of Energy Research (KIER) and Danish partners Aarhus University (AU), University of Southern Denmark (SDU), Technical University of Denmark (DTU), Aalborg University (AAU), Energy Cluster Denmark (ECD). This webinar brings together scientists from the KOR and DK to discuss compelling scientific challenges of the green transition and to explore opportunities for collaboration among the partners. These events will feature short thematic presentations followed by Q&A.

Theme 1: Power-to-X pathway: ammonia and urea synthesis

DK: 08:30 KOR 16:30
#1 Electrocatalytic Synthesis of Ammonia and Urea
Youngkook Kwon, Associate Professor, ykwon@unist.ac.kr
Ulsan National Institute of Science and Technology (UNIST)

Abstract: The electrocatalytic hydrogen cycle with nitrogen and carbon resources is gaining attention for renewable energy and environmental benefits. Recent advances in electrosynthesis of ammonia (NH_3) from N_2 or NOx and urea ($CO(NH_2)_2$) from N_2 or NOx alongside CO_2 present cleaner, energy-saving alternatives to the traditional processes. This presentation will discuss our contributions to ammonia and urea synthesis.

DK: 08:55 KOR 16:55
#2 Sorption-enhanced ammonia synthesis development and co-simulation with Power-to-X system
Tianbao Gu, Postdoc, tig@energy.aau.dk
Aalborg University (AAU)

Abstract: Sorption-enhanced NH_3 synthesis offers a promising approach to decentralized ammonia production powered by renewable energy, thereby realizing Power-to-X solution. This presentation will present the advances of NH_3 synthesis-absorption integrated reactor design in pilot scale, leveraging CFD modeling and optimization techniques. The co-simulation of the NH_3 reactor model with Power-to-X system will be also performed, to accomplish the entire process simulation-from grid energy input to NH_3 production.

Theme 2: Solid oxide electrolyzer: diagnostics and pressurized operation

DK:09:20 KOR 17:20
#3 Diagnostics Study on the Degradation of SOC Stack using Electrochemical Impedance Spectroscopy
Ji Haeng Yu, Principal Researcher, jhyu@kier.re.kr,
Korea Institute of Energy Research (KIER)

Abstract: KIER successfully developed an 80-cell stack that operated at 0.8 A/cm^2. A 10-cell stack was operated for ~3,000 hours in SOFC and SOEC modes to evaluate its lifetime. The electrochemial impedance spectra were analyzed to compare the electrolyzer's polarization resistance and the degradation with the fuel cell. It was found that the polarization resistance in air electrodes affects on the SOEC lifetime, which is different from SOFC mode operation.

DK: 09:45 KOR 17:45
#4 Solid oxide electrolyzer operation under pressurized condition and AC:DC method
Xiaoti Cui, Associate Professor, xcu@energy.aau.dk
Aalborg University (AAU)

Abstract: Solid oxide electrolyzer (SOE) are anticipated to be one of the main electrolysis technologies over the coming decades.The MESH project lead by AAU has built a setup for conducting SOE cell testing under elevated pressure (up to 6 bar). The aim is to investigate the performance of the novel patented AC:DC operation under high-pressure operation for SOE. The presentation will briefly introduce the experimental activities at AAU and preliminary results of cell testing.

Organizing committee & moderation: Prof. Youngkook Kwon (UNIST), Ji Haeng Yu (KIER), Xiaoti Cui (AAU)

GINP
South Korea – Denmark