2020 Joint Scientific Seminar on Energy Technologies between KAIST and DTU

Venue: On-line through ZOOM

Date: 2020, November 11(Wednesday), 12 (Thursday)

Time: 16:00-19:00 pm (KAIST), 08:00-11:00 am (DTU)

Coordinators: Prof. Phill-Seung Lee (KAIST), Prof. Jens Oluf Jensen (DTU)

Background: For more than 10 years, KAIST and DTU have collaborated within research, education and innovation. A Memorandum of Understanding with a focus on green technology has been signed. Today, the energy agenda is dominant in both Korea and Denmark – both countries have leading positions in the green transition.

Scope: To strengthen the collaboration between the two universities within green energy technology and renewable energy. The event is meant to increase mutual visibility and inspire the development of new projects and collaboration.

Topics:

- Green energy technology: Hydrogen production, CO_2 management
- Renewable energy: Wind turbines, Energy storage system

Structure: Four sessions with alternating presentations from the two universities will be held two by two in parallel over two days.

Joint Seminar 2020

Wednesday 11th November 2020

Opening Remarks

Link to the ZOOM URL: https://kaist.zoom.us/my/pslee

Chair: Prof. Phill-Seung Lee (KAIST)

KAIST time	DTU time	Speaker
16:00-16:30	08:00-08:30	His Excellency, Ambassador Sang-Jin Park, Ambassador of the Republic of Korea to Denmark
		Ms. Stine Jørgensen, Vice-Director of the Danish Agency for Education and Science
		Prof. Choongsik Bae, Dean, College of Engineering, KAIST
		Prof. Philip J. Binning, Senior Vice President at DTU

SESSION 1: Green Energy Technology - Hydrogen Production

Link to the ZOOM URL: https://us02web.zoom.us/j/7450033963

Chairs: Prof. EunAe Cho (Materials Sci. and Eng.) and Prof. Søren Linderoth (DTU Energy, Department Head)

Description: This session deals with production and utilization of hydrogen as a green fuel for the next generation, mainly focusing on water electrolysis and fuel cells. A wide range of innovative technologies is covered from materials to system-level.

KAIST time	DTU time	Presentation	Speaker
16:30-16:50	08:30-08:50	Hydrogen system research: from production to utilization	Prof. Joongmyeon Bae (Mechanical Eng., KAIST)
16:50-17:10	08:50-09:10	Solid oxide electrolysis	Senior Researcher Henrik Lund Frandsen (DTU Energy)
17:10-17:30	09:10-09:30	Ex-solution, new supported catalyst design for hydrogen production and utilization	Prof. Woochul Jung (Materials Sci. &

			Eng., KAIST)
17:30-17:40	09:30-09:40	Break	
17:40-18:00	09:40-10:00	High-temperature alkaline electrolysis	Senior Researcher Christodoulos Chatzichristodoulou (DTU Energy)
18:00-18:20	10:00-10:20	Exploring support materials for low-Ir OER electrode of PEM water electrolysis	Prof. EunAe Cho (Materials Sci. & Eng., KAIST)
18:20-18:40	10:20-10:40	Alkaline electrolysis by ion-solvating membranes	Prof. Jens Oluf Jensen (DTU Energy)
18:40-19:00	10:40-11:00	Closing remarks	Chairs

SESSION 2: Renewable Energy - Wind Turbines

Link to ZOOM URL: https://kaist.zoom.us/my/pslee

Chairs: Prof. Sang Bong Lee (Aerospace Eng, KAIST) and Prof. Taeseong Kim (Dept. of Wind Energy, DTU)
Description: This session covers wind energy topics including (1) wind turbine wake modeling: high-fidelity simulation, reduced order model, turbulence generation, (2) offshore floating wind turbines: floating platform design, mooring, (3) next generation large-scale wind turbines: blade reinforcement, tower, substructure, and (4) wind energy grid integration: wind energy forecasting and extreme events resilience.

KAIST time	DTU time	Presentation	Speaker
16:30-16:50	08:30-08:50	Offshore wind plants and fatigue load	Prof. Sang Lee (Aerospace Eng. KAIST)
16:50-17:10	08:50-09:10	Development of a multi-channel temperature sensor to detect wind turbine icing in cold climatic regions	Prof. Taeseong Kim (Dept. of Wind Energy, DTU)
17:10-17:30	09:10-09:30	Autonomous inspection and continuous monitoring of wind turbines and other structures	Prof. Hoon Sohn (Civil and Environmental

			Eng. KAIST)
17:30-17:40	09:30-09:40	Break	
17:40-18:00	09:40-10:00	Accelerated hydrodynamic analysis for spar buoys with second-order wave excitation.	Asst. Prof. Antonio Pegalajar-Jurado (Dept. of Wind Energy, DTU)
18:00-18:20	10:00-10:20	Vortex method for wind turbine aerodynamics and wake dynamics	Prof. Hakjin Lee (Aerospace & Software Eng. Gyeongsang National University)
18:20-18:40	10:20-10:40	Floating wind turbines: Physics and efficient modelling. Examplified by the FloatStep project	Prof. Henrik Bredmose (Dept. of Wind Energy, DTU)
18:40-19:00	10:40-11:00	Closing remarks	Chairs

Thursday 12th November 2020

Session on R&D funding opportunities between Korea and Denmark

Link to the ZOOM URL: https://kaist.zoom.us/my/pslee

Chair: Prof. Jens Oluf Jensen (DTU)

KAIST time	DTU time	Presentation	Speaker
16:00-16:10	08:00-08:10	Horizon Europe and Korea	Ms. Barbara Spano (DTU Research Office)
16:10-16:20	08:10-08:20	KETEP (Korea Energy Technology Evaluation Program) Overview and Introduction of Korea Energy R&D	Dr. Sean Sangjoo BAEK (KETEP)
16:20-16:30	08:20-08:30	Innovation Fund Denmark and the EUREKA programme	Mr. Jens Peter Vittrup (Innovation Fund DK)
16:30-16:40	08:30-08:40	Collaboration between Denmark and Korea	Mr. Eske Rosenberg (ICDK Seoul)
16:40-16:50	08:40-08:50	Discussion Prof. Man-Sung Yim (KAIST), Ms. Barbara Spano (DTU Research Office), Dr. Sean Sangjoo BAEK (KETEP), Mr. Eske Rosenberg (ICDK Seoul), Mr. Jens Peter (Vittrup/Innovation Fund DK)	

SESSION 3: Green Energy Technology - CO2 Management

Link to the ZOOM URL: https://us02web.zoom.us/j/7450033963

Chairs: Prof. Jay H Lee (Chemical and Biomolecular Eng, KAIST) and Prof. Jakob Kjøbsted Huusom (Chemical & Biochemical Eng., DTU)

Description: This session covers various approaches to CO_2 management to help mitigate greenhouse gas emission leading to climate change. Topics include (1) CO_2 capture (2) thermochemical CO_2 conversion (3) photo/elector-chemical CO_2 conversion and (4) process synthesis and design for sustainability.

KAIST time	DTU time	Presentation	Speaker
16:30-16:50	08:30-08:50	Photo-assisted electrochemical CO2 reduction using gas-diffusion electrode	Prof. Hyungjoo Lee (Chemical and Biomolecular Eng., KAIST)
16:50-17:10	08:50-09:10	Conversion of CO2 to methanol and other chemicals	Prof. Anker Jensen & Assoc. Prof. Martin Høj (Chemical & Biochemical Eng., DTU)
17:10-17:30	09:10-09:30	Sensitivity analysis of CO2 capture materials in post-combustion flue gas	Prof. Jihan Kim (Chemical and Biomolecular Eng., KAIST)
17:30-17:40	09:30-09:40	Break	
17:40-18:00	09:40-10:00	Simulation-based optimization framework for process synthesis and design under uncertainty	Prof. Gürkan Sin (Chemical and Biochemical Eng., DTU)
18:00-18:20	10:00-10:20	Development of amine-containing solid adsorbents for post-combustion CO2 capture	Prof. Minkee Choi (Chemical and Biomolecular Eng., KAIST)
18:20-18:40	10:20-10:40	Syngas biomethanation - a technological platform for efficient conversion of CO2, H2 and CO to valuable fuels and chemicals	Assoc. Prof. Ioannis V. Skiadas (Chemical and Biochemical Eng., DTU)
18:40-19:00	10:40-11:00	Closing remarks	Chairs

SESSION 4: Renewable Energy - Energy Storage System

Link to the ZOOM URL: *https://kaist.zoom.us/my/iesel*

Chairs: Prof. Daejun Chang (Mechanical Eng, KAIST) and Prof. Anders Erlandsson (Mechanical Eng, DTU)
Description: This session deals with energy storage systems for renewable energy, including

(1) thermomechanical ESS utilizing latent, sensible, gravitational, hydroelectric, compressed air, liquid air, (2) electrochemical ESS: batteries (rechargeable, redox), (3) Chemical ESS: hydrogen (gas, liquid, solid), power-to-gas (methane, ammonia, LOHC), and other ESSs.

KAIST time	DTU time	Presentation	Speaker
16:30-16:50	08:30-08:50	Free-shape free-scale liquid hydrogen storage tanks: from land vehicles to ships	Prof. Daejun Chang (Mechanical Eng., KAIST)
16:50-17:10	08:50-09:10	Potential and challenges with e-fuels on board	Prof. Anders C. Erlandsson, (Thermal Energy Systems, Mech. Eng. DTU)
17:10-17:30	09:10-09:30	A novel liquid air energy storage (LAES) system for improving the efficiency	Juyeol Ryu (Institute for Advanced Engineering)
17:30-17:40	09:30-09:40	Break	
17:40-18:00	09:40-10:00	Carnot batteries coupled to district and waste heat sources	Asst. Prof. Erasmus Damgaard Rothuizen, (Thermal Energy Systems, Mech Eng. DTU)
18:00-18:20	10:00-10:20	Advances in Zn-based aqueous redox batteries (Video Recorded)	Prof. Hee-Tak Kim (Chemical and Biomolecular Eng., KAIST)
18:20-18:40	10:20-10:40	Computer and AI-based discovery of clean energy materials	Prof. Tejs Vegge, (DTU Energy)
18:40-19:00	10:40-11:00	Closing remarks	Chairs