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 5 Nov. 2024

CET (DK) 08:00 – 10:00

KST (KOR) 16:00 – 18:00

TEAMS link

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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: Crucial Pathways for Implementation of Solar Technologies

DK: 08:00 KOR 16:00
#1 Current challenges in theoretical studies on energy materials based on density functional theory
Minho Kim, Assistant professor, minho.kim@khu.ac.kr
Kyung Hee University (KHU)

Abstract: Density functional theory leads to an efficient and reasonably accurate understanding on heterogeneous energy materials for renewable conversion from light to chemicals. Aside from computational efficiency, it is theoretically attracting questions to 1) relate the conventional activity descriptors based on adsorption energy with the structural descriptors that are measurable in experiments and 2) account for the stability of materials. In this presentation, I will introduce some electronic and structural descriptors that are closely related with each other and provide a rational strategy to design a highly-active and stable catalyst.

DK: 08:30 KOR 16:30
#2 Scaling up thin films and devices for energy conversion and storage technologies through Roll-to-Roll (R2R) manufacturing
Morten Madsen, Professor, madsen@mci.sdu.dk
University of Southern Denmark (SDU)

Abstract: Advanced thin films for energy conversion and storage technologies have become an important part of our green transition, where new technologies should be mass produced at low cost and support a barrier-free market implementation, e.g. solar energy devices for photovoltaic, water splitting applications, as well as energy storage devices such as supercapacitors. This talk will focus on the transfer of such new thin film technologies from research to industrial scale, using Roll-to-Roll processing technology. The emphasis will be on new routes for improving device performance via detailed tuning of thin film properties to support industrial implementation at low-cost.

Theme 2: Upscaling for Proton Exchange Membrane (PEM) based Water Electrolysis

DK:0 9:00 KOR 17:00
#3 Development of Low Iridium Loading Porous Transport Electrode (PTE) for PEM Water Electrolysis
Hyun S. Park, Principal Research Scientist, hspark@kist.re.kr,
Korea Institute of Science & Technology (KIST)

Abstract: The development of enhanced electrocatalysts and optimization of electrode structure is of great importance for the practical and widespread deployment of PEMWEs. The reduction of iridium (Ir) catalyst use in the anode of PEMWE is essential for the large-scale commercialization of PEMWE considering the scarcity of Ir. However, a high amount of Ir (a few mg/cm2) is still required on the anode owing to inefficient material utilization. It is envisioned that the Ir loading on the anode should be lowered (e.g., to 0.05 mg/cm2) to meet the demand on the PEMWE system for practical green hydrogen production. In this presentation, strategies will be discussed to reduce the use of Ir catalysts in the anode of PEMWE, so to accelerate the large-scale commercialization of PEMWEs.

DK: 09::30 KOR 17:30
#4 Ir-based OER electrocatalysts: Scalable synthesis and degradation mechanism studies
Raghunandan Sharma, Dr. Special Consultant, rash@igt.sdu.dk
University of Southern Denmark (SDU)

Abstract: Development of highly active and stable electrocatalysts for oxygen reduction reaction (OER) in acidic water electrolyzers is of unprecedented importance amid the ongoing environmental crises. However, scalability aspects of the synthesis routes are often overlooked. In the presentation, strategies to upscale the common synthesis methods for the Ir-based OER electrocatalysts, i.e. hydrolysis, microwave assisted reduction and solid-state synthesis, being explored in our group will be introduced. As another aspect of the OER electrocatalyst development, insights into degradation of their OER activity during *ex-situ* potentiodynamic stress tests will be discussed based on ongoing activities through dynamic project experience and industrial collaborations.

Organizing committee & moderation: Prof. Min Hyung Lee (KHU), Morten Madsen (SDU), Jong Hyun Jang (KIST), Shuang Ma Andersen (SDU)

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