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1st UK-Japan Symposium on Advanced Materials for Hydrogen and Fuel Cells

(online) - Thursday 9th December 2021 8:30 – 13:45 (GMT)

UK Lead: Dr Mohammed S. Ismail (University of Sheffield)

Lead from Japan: Dr Stephen Lyth (Kyushu University)

The symposium, sponsored by the Japan Society for the Promotion of Science (JSPS) in London, was the first of its kind between UK and Japan. It was hosted by the Translational Energy Research Centre (TERC) at the University of Sheffield and Kyushu University Platform of Inter/Transdisciplinary Energy Research (Q-PIT). It came as a result of a long-standing collaboration between the co-hosts Dr Mohammed Ismail from the University of Sheffield and Dr Stephen Lyth from Kyushu University. The symposium brought together world-leading experts from UK and Japan on developing, synthesising and characterising novel, high-performance and cost-effective materials for the hydrogen technologies, particularly the main two cost-drivers for hydrogen fuel cell technologies: the catalysts and the membrane electrolytes.

The symposium attracted more than 35 attendees from all over the world. The event began with opening remarks from Prof Naoto Kobayashi, the director of JSPS London. This was followed by a keynote speech delivered by Prof Mohamed Pourkashanian, the director of the Translational Energy Research Centre, that shed light on some of the global context of hydrogen and fuel cell research and its contribution to net-zero emission targets. The audience enjoyed hearing talks highlighting the latest advancements in the field presented by experts from six world-leading UK and Japanese universities.

Namely, in the first session, chaired by Dr Lyth, there were four talks. The first talk was delivered by Prof Shinya Hayami from Kumamoto University and was on using graphene oxide as a solid electrolyte for hydrogen fuel cells. Dr Keisuke Takahashi from Hokkaido University delivered a talk that shows how machine learning techniques, fed with data generated from high-throughput small-scale reactions, could be used to design high-performance catalysts. The third talk was delivered by Dr Masamichi Nishihara from Kyushu University; it was on a recently-developed polymer membrane electrolyte that is highly impermeable to oxygen, thus improving the lifetime of hydrogen fuel cells. The first session was concluded by a talk delivered by Dr Mohammed Ismail (University of Sheffield) and was on exploring the impact of the trapezoidal flow channels, that have been increasingly used in automotive fuel cell stacks (e.g. Toyota Mirai), on the key performance indicators of hydrogen fuel cells including the pressure drop along the channels and the output power.

The second session, chaired by Dr Ismail, included three talks. The first talk in this session was delivered by Dr Lyth (Kyushu University) and was on describing the latest advances associated with the non-precious catalysts (carbon foam based) and membrane electrolytes (cellulose based) developed by his research group. Dr Jet Lee delivered a talk on advanced functional materials from porous assembly designs, intended to be used in electrochemical applications. The last talk in the second session and in the symposium was delivered by Dr Ahmad El-Kharouf from the University of Birmingham and was on describing the latest advances in the hydrogen fuel cell stacks designed for aircrafts.



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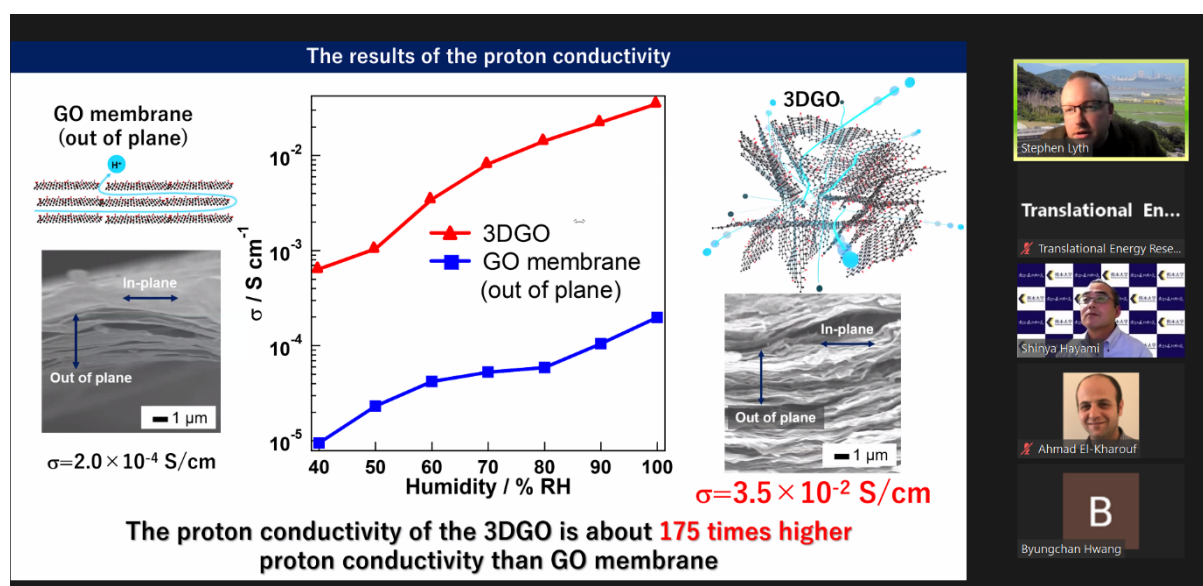
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Between the first and the second sessions, Ms Miyoshi, from JSPS London, shared some of the funding opportunities available from JSPS. The event also included a poster session during which eleven PhD students from Kyushu University and the University of Sheffield presented their research projects in short 3 minute presentations. Prizes were awarded to the best four presentations, as voted for by the speakers from the main event. The winners of the cash prize, kindly provided by JSPS, were won by Mustafa Ercelik, Jinbei Tia and Florence Lee from the University of Sheffield and Irfan Kusdhany from Kyushu University.

Speaking about the event and the partnership, Dr Ismail said: "This symposium, which is kindly sponsored by JSPS London, is a clear manifestation of the long-standing research collaboration between University of Sheffield and Kyushu University on hydrogen and fuel cells. We have witnessed today insightful talks from world-leading experts in the field and fantastic presentations from promising postgraduate students. This event and similar future events will undoubtedly cement the collaborative ties between the researchers from the two countries that ultimately aim to reach global net-zero emission targets".

Dr Lyth said: "It was wonderful to be able reconnect researchers from Japan and the UK after almost two years, as well as welcoming new faces to this growing consortium of collaborators. The topics of this symposium are increasingly being covered in mainstream news outlets, with hydrogen regularly mentioned by presidents, politicians, and prime ministers. As such, I hope that events such as this can stimulate new ideas reaching across continents, and help to establish the next generation of technologies, as well as a new generation of young researchers. I am extremely grateful to the team at the University of Sheffield for their tireless efforts in organising this enjoyable event, as well as to JSPS London for enabling this important exchange of knowledge".

- Dr Mohammed S. Ismail, University of Sheffield



A screenshot from the symposium which shows a slide from a presentation by Prof Shinya Hayami (Kumamoto University) on the use of graphene oxide as solid membrane electrolyte



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