

Summary report

14th International Summer School on Advanced Studies of Polymer Electrolyte Fuel Cells and Hydrogen

Yokohama - Graz, 29 Aug - 6 Sept 2022

The Summer School on Advanced Studies of Polymer Electrolyte Fuel Cells was organised for the fourteenth time in cooperation between **Yokohama National University** and **Graz University of Technology**.

thermodynamics (Dr. Reimer, Jülich), measurement technology (Prof. Kuroda, YNU, Prof. Habrioux, Univ. Poitiers and Dr. Reimer, Jülich), lifetime (Prof. Bodner, TUG and Squadrito, CNR), modelling (Prof. Katrašnik, Univ. Ljubljana), hydrogen technology & hydrogen production (Prof. Kuroda, YNU and Lammer, TUG) and hydrogen applications (Prof. Ota, YNU).

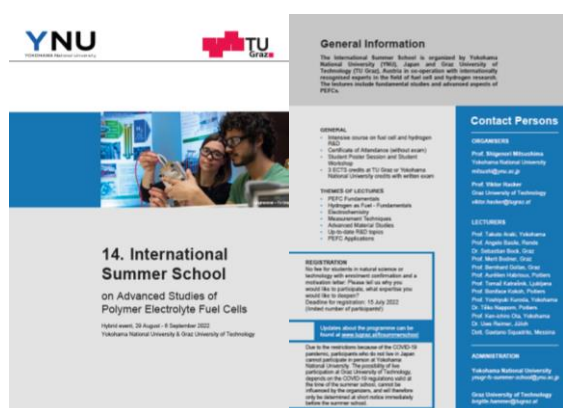


Fig. 1: Announcement of the Summer School on PEFCs

The goals of this event include deepening the expertise of the participants, international and cultural exchange between researchers, and the opportunity to make new contacts and deepen existing ones. The event was held online, organized by Yokohama National University and also (partly) on-site at TU Graz.

Intensive course

The seven-day program was opened by Prof. Mitsushima and Prof. Hacker, where they placed an emphasis on the long-standing tradition of the summer school and the cooperation between the Universities. The 14th International Summer School on PEFCs attracted 63 participants from 16 different universities and companies.

14 speakers from Austria, France, Germany, Italy, Japan and Slovenia covered the basics and principles of fuel cells (Prof. Hacker, TUG and Prof. Mitsushima, YNU), electrochemical basics (Prof. Gollas, TUG), catalysis (Dr. Napporn, Univ. Poitiers), kinetics (Prof. Kokoh, Univ. Poitiers), mass transport (Prof. Araki, YNU),



Fig. 2: Opening of the Summer School by Prof. Mitsushima (Yokohama National University) and Prof. Hacker (TU Graz)



Fig. 3: Online group photo of participants of the International Summer School on PEFCs.

Students were able to present and discuss their own research work online in a poster session. A total of 25

posters were presented in short talks and individual discussion sessions. An international committee headed by Dr. Uwe Reimer awarded **four prizes to students** from Japan and Austria for the outstanding presentation of their work.

Interactive events

Several interactive sessions were held as part of the event and to promote communication and cooperation between the participants. Students got to know each other during an interactive group work and presentations. On the last day of the summer school, this cooperation among the participants was initiated once again by assigning groups the tasks of coming up with innovative applications for fuel cells and designing and calculating system requirements. These were then presented and discussed with other participants and professors.



Fig. 4: Expert feedback and input to the discussion from Prof. Mitsushima (top), Dr. Reimer (bottom left) and Prof. Hacker (bottom right).

Publication of the lecture materials

The book “From Fundamentals to Applied Research” (Hacker/Mitsushima), 2018, Elsevier, is used as lecture material. The abstracts of the 25 poster presentations were summarised in the abstract book.

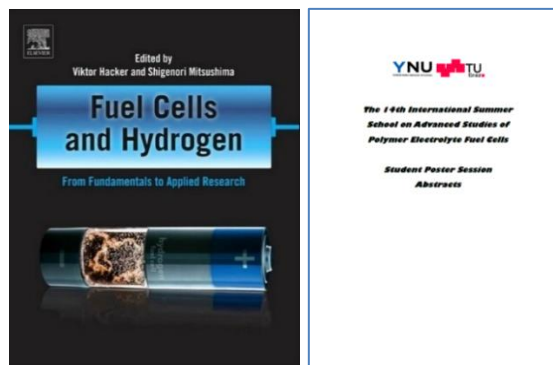


Fig. 5: Lecture notes Fuel Cells and Hydrogen, Elsevier and Abstract Book of the Poster Session.

The contributions in the abstract book cover fuel cell and hydrogen research, starting from catalyst development to research on gas diffusion layers, degradation analysis, hydrogen production and purification, bubbles in electrolyzer systems and the hydrogen storage medium toluene.

Further documentation on the summer school can be found at www.tugraz.at/fcsummerschool. The next Summer School on Advanced Studies of Polymer Electrolyte Fuel Cells and Hydrogen is scheduled for the end of **August 2023 at Graz University of Technology**.

Acknowledgement

We would like to express our special thanks for the support of the summer school by all lecturers and the organization and hosting in Japan by Prof. Kuroda. We would also like to thank the people on site for the organization and technical support, here especially to Brigitte Hammer and Mathias Heindinger.

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