

Media communiqué

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3rd Fuel Cell Research Symposium: "Modeling and Experimental Validation – From in-situ Diagnostics to Multiscale Modeling"

Fuel Cells – Modeled for a Sustainable Future

"Models are absolutely essential to accelerate the introduction of fuel cell technology to the marketplace," according to Dr. Alphons Hintermann, the initiator of the Fuel Cell Research Symposium. With this statement Hintermann, outgoing Program Leader in the Swiss Federal Office for Energy (FOE), went right to the heart of the matter. The symposium, a two day event held at the Empa in Duebendorf, was an occasion for the 70-odd participating experts on fuel cells to discuss the future of these devices. In a series of thirty lectures they described their technical and scientific work in the field of fuel cell research and development and presented their latest results, as well as new instruments for creating models and testing them experimentally.

"It is important that models can be tested by comparing their results with experimental data," explained Peter Holtappels of the Empa's High Performance Ceramics Laboratory and co-organizer of this year's symposium. He was himself surprised by the liveliness of the exchange of ideas between those participants who model and those who experiment. Particularly impressive was the work of Mathias Reum's group at the Paul Scherrer Institute, where they have developed a new measurement technique for low-temperature fuel cells. This allows them to determine the current distribution in a fuel cell with sub-millimeter resolution. Prof. Alexej Kornyshev of Imperial College, London, on the other hand, has been investigating the fundamental physico-chemical processes which take place in so-called polymer electrolyte membrane fuel cells. He has succeeded in calculating the exact movements of water molecules during the chemical exchange processes.

Other researchers shed light on the physico-chemical basics involved in novel energy sources, lectured on the materials aspects of fuel cells and described complete energy systems (such as buildings) in which fuel cells supply heat and electric power in combination with other energy conversion techniques and conventional heating plant. The depth of complexity involved in the practical application of such technical concepts became clear during discussions with representatives of the industrial exhibitors at the symposium.

Predicting interactions

In the area of high temperature cells interest is focused primarily on understanding and trying to predict the interactions between the individual fuel cell components at elevated temperatures. In this context the tendency for unwanted reactions to take place and the rate at which they occur play a central role. New developments in cells, stacks and systems for both low and high temperature fuel cells were also presented, ranging in size from small battery-eliminator units all the way up to full scale power station systems.

During the symposium it became clear how individual projects complemented one another. One example of a very successful cooperation was the modeling of high temperature fuel cells at the Swiss Federal Institute of Technology in Lausanne, which used experimental measurement data supplied by the German Aerospace Center DLR in Stuttgart. In the pan-European "Generic Fuel Cell Modeling Environment Project" too, cooperative work between several independent research groups is a specific condition. In the GenFC project, in which the Empa is also a participant, the aim is to bring various levels of modeling together to create a universal tool for the design and evaluation of fuel cell systems.

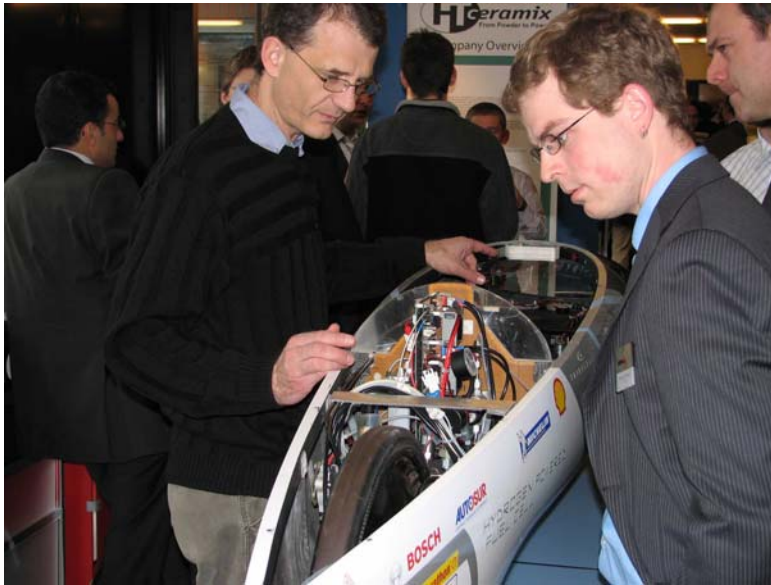
Next Symposium in 2007 in Juelich

In the light of the enormous interest generated by all the previous fuel cell research symposia, it was decided to continue holding them in future too. A steering committee, consisting of representatives from the DLR, the Research Center Juelich and the ETH-Domain institutions involved (ETHZ, EPFL, PSI and Empa) was chosen to plan future activities. Already at this year's symposium the organizers had a struggle to maintain the workshop-like atmosphere in the face of so many participants. Despite the careful planning and perfect organization, feedback from participants indicated that they would liked to have had a little more time set aside for discussion and personal contact.

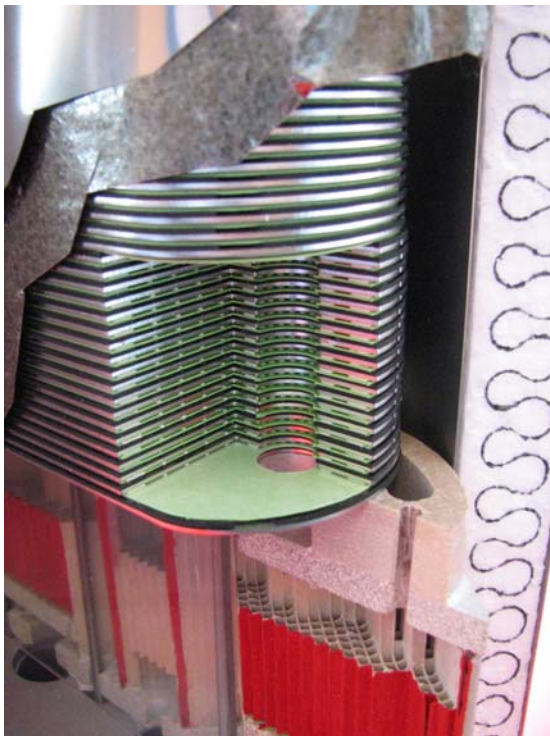
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In a separate exhibition, the newest developments and prototypes from Swiss companies were on display, for example the PacCar from the Paul Scherrer Institute.



In a separate exhibition, the newest developments and prototypes from Swiss companies were on display, for example here a ceramic fuel cell stack using natural gas, with integrated gas pre-heating.

Images and text available in electronic form from remigius.nideroest@empa.ch