Press Release

Jülich Cooperates for Fuel Cells

19th World Hydrogen Energy Conference (WHEC) from 3–7 June 2012 in Toronto: Forschungszentrum Jülich at one of the biggest conferences and exhibitions for hydrogen and fuel cells

Forschungszentrum Jülich consistently sets new records and delivers top international results with its research activities in the area of fuel cells. Collaborations with partners from research and industry throughout the world play an important role here. In the German pavilion, scientists from the Institute of Energy and Climate Research (IEK-3) are showcasing five different areas of expertise within fuel cell and hydrogen research that could be of interest to future cooperation partners.

Process and systems analysis

IEK-3 evaluates economic, energy-related and environmentally relevant aspects of specific technologies, potential overall systems and infrastructures for the energy sector on behalf of partners from research, politics and industry. The focus is on research projects dealing with fuel cells, electrolysis, fuel reforming and membrane-based carbon dioxide separation. The broad experimental experience at the institute is used as a basis to develop very detailed application-oriented models. These models are then compared with conventional applications and competing technologies, such as battery systems and cryogenic separation processes.

Modelling and simulation

The modelling and simulation of fuel cells requires tailor-made approaches that describe complex processes ranging from the material, cell and stack level right up to the the entire system. IEK-3 uses diverse simulation tools to investigate the interplay of fundamental physical and chemical processes, such as the transport of water vapour. The researchers also work on designing and refining advanced cell stacks and entire systems for applications such as on-board power supply in vehicles and aircraft. They work closely with the Physicochemical Fuel Cell Laboratory and also avail of the Jülich supercomputers to generate simulation results of the highest quality.

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Analysis

The Physicochemical Fuel Cell Laboratory develops and applies measuring techniques to investigate the structure of components for fuel cells, electrolysers and reformers. Different characteristics of individual functional layers can be analysed, including degradation processes, corrosion and water vapour transport as well as structural, physical and chemical properties. In this way, the performance efficiency, lifetime and costs can be improved and precise specifications can be defined to improve fabrication.

Manufacturing technology

In order to ensure a swift market launch of fuel cells, costs must be reduced and quality must be improved. This requires special automated production processes, which IEK-3 develops on a laboratory and pilot-plant scale. In 2009, it set up a Pilot Fabrication Facility to manufacture individual cell components such as gas diffusion layers and electrodes as well as membrane-electrode assemblies using automated production processes.

Automated assembly

Fuel cell researchers at Jülich also develop and test production systems for mass production. They work with commercial robot systems, for example, to assemble polymer electrolyte fuel cells, the first applications of which are already available on the market. IEK-3 developed a universal quick-release system for this purpose which automatically exchanges the tools used by the robot depending on the task at hand.

Further information:
Institute of Energy and Climate Research – Fuel Cells (IEK-3) http://www.fz-juelich.de/iek/iek-3/EN/Home/home_node.html

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