

LOW TEMPERATURE ELECTROLYSIS

- STORAGE OF SURPLUS ELECTRICITY



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An electrolysis cell uses electricity to split water molecules (H_2O) into hydrogen (H_2) and oxygen (O_2). In this way, electrical energy is transformed into chemically bound energy in the hydrogen molecules. This is the reverse of the process that occurs in a fuel cell.

Electrolysis cells can be used for the production of hydrogen using surplus power, e.g., from wind turbines. The hydrogen can be stored and - using a fuel cell - reconverted into electricity again when the demand arises. This allows the storage of electricity when production exceeds demand. Hydrogen can also be used for the production of synthetic fuels.

Our research is both on high and low (below approx. 400 °C) temperature electrolysis. At low temperatures two types of cells are currently used: alkaline electrolysis cells and polymer electrolyte membrane (PEM) cells, each with their strengths. The alkaline cells can use non-noble metal catalysts in their electrodes, while the PEM cells have higher efficiencies. Our work aims at combining the two cell technologies by the development of alkaline membranes and matching electrodes. This allows us to combine the advantages of both cell types. The operation temperature of an alkaline electrolysis cell is approx. 80 °C but our development also targets new materials for operation at higher temperatures, 200-400 °C, to increase the efficiency of the cells.

The Department of Energy Conversion and Storage is building on its extensive experience in fuel cells as the basis for electrolysis research.

In a number of projects with partners from both industry and academia, we are developing the technology for a number of different applications. Our research ranges from fundamental investigations of the electrochemical properties of materials to the manufacture and testing of entire cells and modules.

ABOUT THE DEPARTEMENT

We focus on functional materials and their applications for sustainable energy technologies

FURTHER INFORMATION

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