

SOLID OXIDE FUEL CELLS

- CLEAN AND EFFICIENT POWER FOR THE FUTURE



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A fuel cell converts the chemically bound energy of a fuel directly into electricity. This allows fuel cells to have a higher efficiency than traditional generators and power plants. The Department of Energy Conversion and Storage is developing high-performance solid oxide fuel cells (SOFCs) consisting of thin layers of advanced ceramics (and for certain types also metals). A number of key advantages make SOFC technology very promising:

- High electrical efficiency
- Fuel flexibility (natural gas, hydrogen, ethanol, bio fuels, diesel...)
- Low emissions (NO_x , CO_2)
- Low noise
- Modular concept (from kilowatts to megawatts)
- Well suited for combined heat and power (CHP) due to a relatively high operation temperature (550-1000 °C).

Small units of 1-5 kilowatts could, for example, be used as auxiliary power units for trucks which today use inefficient and polluting diesel generators. Units of a similar size could also be used for combined heat and power for individual households (micro-CHP). Larger units will be attractive for distributed generation, e.g. for hotels, supermarkets and hospitals.

We have been doing SOFC research since the late 1980s. Today, we are among the world leaders in this field. Our research ranges from fundamental investigations of materials and their structural and electrochemical properties to the manufacture of complete cells with industrially relevant processes. Thus, our process lab facility has the capacity to produce thousands of cells. Moreover, we have extensive knowledge about advanced characterization and testing of fuel cells which makes it possible to investigate their electrochemical performance and durability in great detail. Sophisticated experimental equipment allows us to measure the mechanical and microstructural properties that are very important for cell lifetime.

The Department for Energy Conversion and Storage has a long tradition for close collaboration with industry partners and research institutions all over the world, and we participate in several Danish and European projects on the development of SOFC technology.

ABOUT THE DEPARTEMENT

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

FURTHER INFORMATION

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