

Project Information



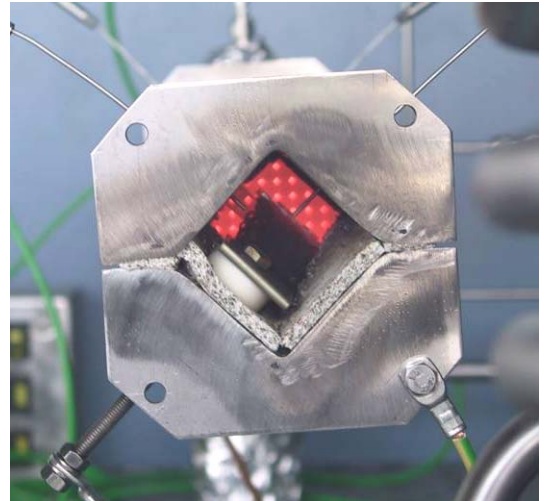
Subject: Development of a high-efficient compact reformer for fuel cells basing on an electrically conductive SiC ceramic(s)

Applicant: Fachhochschule Gelsenkirchen

Project duration: 01.01.02 – 31.12.03

Project partners: Fachhochschule Gelsenkirchen
ENKAT GmbH

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Project description:

The principal intention of this project is to develop a high-efficient and compact natural gas reformer basing on an electrically conductive SiC ceramic. These special electrical characteristics, combined with a likewise good thermal conductivity and outstanding thermal mechanical properties are the main reasons why this ceramic is particularly qualified for the employment in fuel cell reformers. Always optimal thermal conditions can be realized by creating an appropriate voltage in the reformer respectively at the catalytically coated surface. It must be pointed out however for efficiency reasons that the heat necessary for the chemical reaction will be supplied only to a small, supplementing portion by Joule heat. This can be guaranteed by an optimized heat integration of the reformer into the total process and by implementing a dynamic energy management.

As the additional degree of freedom of an “intrinsic” heat production is available following advantages versus conventional reformer drafts can be expected:

- Higher yield of hydrogen on lower CO concentration
- Higher system effectiveness
- Easier process engineering, thus leading to minor equipment
- Short acceleration time, good transient behaviour
- Very good heat insertion

In the context of this project a development environment was created offering the possibility to supply a reformer having a thermal output up to 10 KW with media. The test stand enables operating the reformer by gaseous hydrocarbons with variable S/C conditions. For the electrical control of SiC ceramic(s) accurate power electronics were developed and integrated into the test stand. Moreover an automatic process control and data acquisition was carried out thus offering accurate interpretations of test results.

With appropriate results can be assumed that the technology developed in the context of the project has good chances to find its way into the gas cell technology and in addition, into other ranges of the energy and process engineering. Finally the availability of reformers being highly effective and compact as well as simply machined and durable will also be crucial for the development whether the fuel cell technology will rank adequately corresponding to its potential regarding power efficiency.