In order to be able to achieve national or transnational climate protection goals, energy systems based on CO2-neutral energy supply are required. An important alternative to fossil fuels is green hydrogen (produced in a CO2-neutral way). A promising technology for the production of green hydrogen is high-temperature electrolysis with solid oxide cells (SOECs) using electricity from renewable sources. However, there are still a number of challenges to be overcome before SOECs can become commercially established. These include the durability of the SOEC stacks and the individual components, as well as the time and, above all, cost efficiency of their production. IEK-1 is devoting particular attention to materials and their processing technologies in order to develop such cells for specific applications with adapted chemistry and microstructure.

We offer a

**Master thesis - Simplified solid oxide electrolysis cell manufacturing**

**Your Job:**
The advertised master’s thesis is being carried out as part of a project funded by the MatKat Foundation and deals with the direct integration of an alternative fuel electrode material into an innovative, cost- and time-saving manufacturing chain of electrolysis cells. The cells are manufactured using the screen printing process. Following the application of the individual layers, the respective shrinkage kinetics of the layer composites are analysed in a thermo-optical measuring stand. After successful production and sintering of the electrolysis cells, they are finally characterised electrochemically. The aim of the novel manufacturing chain is to carry out co-sintering of the alternative fuel electrode together with the carrier substrate as well as the electrolyte, thereby significantly shortening the usual development chain. In addition, the degradation of the alternative fuel electrode and the resulting power loss of the cell over the operating time will be investigated and compared with values of cells with a commonly used fuel electrode made of nickel + yttria stabilised zirconia (YSZ).
Your tasks essentially include

- Powder synthesis
- Production of ceramic pastes for screen printing
- Production of electrolysis cells using screen printing processes
- Investigation of the shrinkage kinetics of the layered composites in a thermo-optical measuring stand
- Co-sintering of the screen-printed electrolysis cells
- Writing the thesis in German or English

Your Profile:

- Master program in the field of e.g. materials science, applied physics, inorganic chemistry, mechanical engineering or similar.
- Knowledge of materials synthesis and laboratory work is desirable
- High degree of initiative and enjoyment of independent work
- Strong communication and teamwork skills
- Good knowledge of English (written and spoken)

Our Offer:

We work on cutting-edge innovative topics and offer you the opportunity to actively shape change! We offer you:

- Collaboration in a project funded by the MatKat Foundation with future-oriented topics
- A highly motivated, interdisciplinary working environment at Forschungszentrum Jülich, one of the largest research institutions in Europe
- Excellent scientific equipment and the latest technologies
- Professional support from your supervisors and the research fellows
- A position as a student assistant
- Independent preparation and execution of the assigned tasks The position is initially for a fixed term of 6 months.

Forschungszentrum Jülich promotes equal opportunities and diversity in its employment relations.
We also welcome applications from disabled persons.