



## **DLR – DAAD Fellowships**

### **Fellowship No. 545**

<b>Research Area :</b>	Energy
<b>Research Topic:</b>	<b>Proton Conducting Electrochemical Cells for energy systems applications</b>
<b>DLR Institute:</b>	Institute of Engineering Thermodynamics, DLR Stuttgart
<b>Position:</b>	Postdoctoral Fellow
<b>Openings:</b>	1

#### **Job Specification:**

Production of green hydrogen at an adequate level of purity is an important step towards decarbonisation of the chemical industry. Operating typically between 400°C and 600°C, Proton Conducting Electrochemical Cells (PCEC) based on implementing proton conducting ceramic materials are particularly promising for such applications.

In the long term, PCEC open up incomparable perspectives for the production and processing of green chemicals, while enabling direct electro-synthesis of commodity chemicals with a high added value such as ethylene, ammonia and other aromatic compounds. Despite their promises, development of PCEC is still behind the development of conventional high temperature Solid Oxide Cells (SOC). Especially, the benefits of PCEC from the point of view of the chemical engineering are not yet fully quantified and clearly established. Your task will consist in:

- the design, the building and the performance of model experiments for the investigation of electrochemical membrane reactors in different use case scenario. The primary focus is hydrogen pumping. Electrolysis is also a major topic of interest. Other electrosynthesis processes with PCEC are of interest for future development and can be included in the scope of experimentations. Investigate characteristics of electrode materials (Thermal Expansion, Thermochemical stability) and built model cells.
- the performance of a thermodynamic assessment, modelling and sizing of the ceramic membrane reactor for the different use case scenario in support of the development of the PCEC based membrane reactor and future process engineering.

- It will be aimed at the identification and quantification of the physical phenomena that govern the performance and the efficiency of PCEC in the different use case scenario in order to suggest key development directions to improve their performance and to identify the most advantageous application fields.

**Required Qualification:** Doctorate degree from an accredited university, with knowledge in chemical engineering or applied electrochemistry. A previous experience with ceramic membrane reactors is requested.

**Advantageous Skills:** Previous experience with proton conducting ceramics is highly advantageous, knowledge on ceramic processing for the building of model cells is advantageous. Knowledge in process engineering are welcome.

**English competence:** See requirements on [www.daad.de/dlr](http://www.daad.de/dlr)

**Earliest Start Date:** August 2022

**Application Deadline:** Until position filled

**Further Information:** <http://www.dlr.de>  
<http://www.daad.de/dlr>