



Conducting research for a changing society: This is what drives us at Forschungszentrum Jülich. As a member of the Helmholtz Association, we aim to tackle the grand societal challenges of our time and conduct research into the possibilities of a digitized society, a climate-friendly energy system, and a resource-efficient economy. Work together with around 7,400 employees in one of Europe's biggest research centres and help us to shape change!

At the 'Institute of Energy Materials and Devices - Materials Synthesis and Processing (IMD-2)', we work in a dynamic and international team of over one hundred materials scientists, chemists, physicists, mechanical engineers and technical staff on the development of advanced energy converters and high-performance storage devices (in particular oxide ceramic fuel cells, solid-state batteries, thermal barrier coatings for gas turbines and gas separation membranes). The focus is on inorganic materials processed as functional layers from powders or via the gas phase. For this purpose, we use scalable, industry-relevant processes that ensure rapid transfer of our research results to industry.

**We are offering a**

## **PhD position for the project "RotoSOC"**

### **Your Job:**

The future energy supply based on renewable energy sources such as photovoltaics or wind power, requires storage media that can either store electricity directly or produce usable energy raw materials from the electricity. The basic molecule for this is hydrogen. This can be produced via the electrolysis of water (steam electrolysis) or a mixture of water and carbon dioxide (co-electrolysis). High-temperature electrolyzers (SOE; solid oxide electrolyzers) are one of the electrolyzer technologies. SOEs are based on ceramic cells, which today are produced using typical ceramic technologies such as screen printing or tape casting.

However, if the goals of both the German government and the global climate targets are to be achieved, significantly more electrolyzers will have to be produced each year and thus the production of the cells must be scaled up considerably.

As part of a cross-technology German research project between an industrial partner, a Fraunhofer Institute and Forschungszentrum Jülich, a new way of manufacturing SOEs is to be investigated and established. Derived from the production of solar cells, the new SOEs are to be coated with the functional layers using a rotational coating process in an uninterrupted flow. This type of coating technology would revolutionize the production of SOEs, as the time requirement would be significantly reduced. This would potentially

We look forward to receiving your application until

09.02.2025 via our

**Online-Recruitment-System!**

**Questions about the vacancy?**

Get in touch with us by using **our contact form.**

Please note that for technical reasons we cannot accept applications via email.

[www.fz-juelich.de](http://www.fz-juelich.de)

enable the production of millions of units per year and thus decisively support the upcoming upscaling of high-temperature electrolyzer technology. This is true both in terms of production capacity and costs, as the quantity of components produced per unit of time would be reduced. In the funded project, the industrial partner provides the base substrate to be coated, the Fraunhofer Institute takes care of the rotational coating and the FZ Jülich is responsible for the powder and paste development as well as the in-depth characterization of the rheological paste properties in order to be able to specifically adjust the different layer structures and morphologies. The latter in close coordination with the Fraunhofer Institute for the rapid transfer of the developed pastes into test coatings. If you would like to work in one of the world's most renowned research groups in the field of solid oxide fuel and electrolysis cells, please apply immediately!

Your main tasks include:

- Production and optimization of ceramic suspensions, including characterization and pre-treatment of the powders used, selection of suitable dispersing systems and concentrations
- Processing of ceramic suspensions in tape casting and screen printing processes for the production of cells
- Comparison of the established processes with the new rotational coating process
- Analysis of the influence of rheological parameters such as viscosity, flow point and time-dependent flow behavior on the coating itself and the resulting coating quality
- Analysis of the sintering behavior of the multilayer composite and the effects of the suspension composition on the coatings, their morphology and performance characteristics
- Carrying out post-mortem analyses (PMA) to identify microstructural and chemical changes in the cells during production and, if necessary, after aging

#### **Your Profile:**

- Successfully completed Master's degree in materials science, materials engineering or a comparable field with a very good final grade
- Good knowledge in the field of materials science, solid state chemistry and ideally ceramic process engineering
- Experience in the field of powder synthesis and the manufacture of ceramic components is a great advantage and a pre-requisite
- Knowledge in the field of ceramic ionic conductors and electrochemistry is an advantage
- Very good knowledge of German and English (fluent in speech and writing)
- Enjoy working on complex tasks and learning, as well as an independent way of working and the ability to work in a team

#### **Our Offer:**

We work on the very latest issues that impact our society and are offering you the chance to actively help in shaping the change! We offer ideal conditions for you to complete your doctoral degree:

- A large research campus with green spaces, offering the best possible means for networking with colleagues and pursuing sports alongside work
- Further development of your personal strengths, e.g. through an extensive range of training courses; a structured program of continuing education and networking opportunities specifically for doctoral researchers via JuDocS, the Jülich Center for Doctoral Researchers and Supervisors: <https://www.fz-juelich.de/en/judocs>
- Comprehensive training courses and individual opportunities for personal and professional further development
- Extensive company health management

- Ideal conditions for balancing work and private life, as well as a family-friendly corporate policy
- The option of flexible (location-independent) working, e.g. working from home in coordination with your supervisor and in line with necessary attendance appointments
- 30 days of annual leave (depending on agreed working time arrangements) and provision for days off between public holidays and weekends (e.g. between Christmas and New Year)
- Targeted services for international employees, e.g. through our International Advisory Service

In addition to exciting tasks and a collaborative working atmosphere at Jülich, we have a lot more to offer: <https://go.fzj.de/benefits>

The position is for a fixed term of 3 years, with possible long-term prospects. Pay in line with 75% of pay group 13 of the Collective Agreement for the Public Service (TVöD-Bund) and additionally 60 % of a monthly salary as special payment („Christmas bonus“). Pay higher than the basic pay may be possible. The monthly salaries in euros can be found on page 66 of the PDF download: <https://go.fzj.de/bmi.tvued> Further information on doctoral degrees at Forschungszentrum Jülich including our other locations is available at: [https://www.fz-juelich.de/gp/Careers\\_Docs](https://www.fz-juelich.de/gp/Careers_Docs)

We welcome applications from people with diverse backgrounds, e.g. in terms of age, gender, disability, sexual orientation / identity, and social, ethnic and religious origin. A diverse and inclusive working environment with equal opportunities in which everyone can realize their potential is important to us.