

## PhD Student (f/m/d) Mitigating bubble effects for efficient electrolysis

Institute of Aerodynamics and Chair of Fluid Mechanics, RWTH Aachen, Germany

Are you fascinated by physics and interested in conducting experiments to better understand real world problems? Are you ambitious and dynamic? Do you strive for excellence? At the Institute of Aerodynamics and Chair of Fluid Mechanics (AIA), we conduct research across a broad range of fluid mechanics topics, with a strong emphasis on understanding fundamental fluid physics through experiments, simulations, and theory. We are looking for a PhD student to carry out state-of-the-art research on bubble dynamics in electrolysis. As our society is trying to reduce its carbon footprint, the inherently intermittent nature of many renewable energy sources such as wind and solar power render efficient energy storage solutions indispensable. A promising option is to convert electrical power into hydrogen through electrolysis of water. Yet, current electrolysis cells suffer from low efficiency, which is largely due to flow and transport phenomena, in particular the nucleation of bubbles on the electrode surfaces (Fig. 1, left). The fundamental understanding of the role of the bubbles in electrolysis is still limited. The objective of this project is to address this challenge by exploring strategies for performance enhancement, with a particular focus on passive product-gas removal before bubble nucleation. To achieve this, the project will employ state-of-the-art optical characterization techniques in combination with custom-designed gas-diffusion electrodes, also known as bubble-free or breathable electrodes. Using well-defined and highly controlled electrode geometries (Fig. 1, right), the research aims to systematically investigate the fundamental limits of bubble-free operation and to establish design principles for maximizing gas-removal efficiency and overall electrode performance. The PhD-project is part of a larger research funded by NWO through a VIDI grant, which combines experimental and numerical work and also involves industrial partners in the Netherlands and Germany.

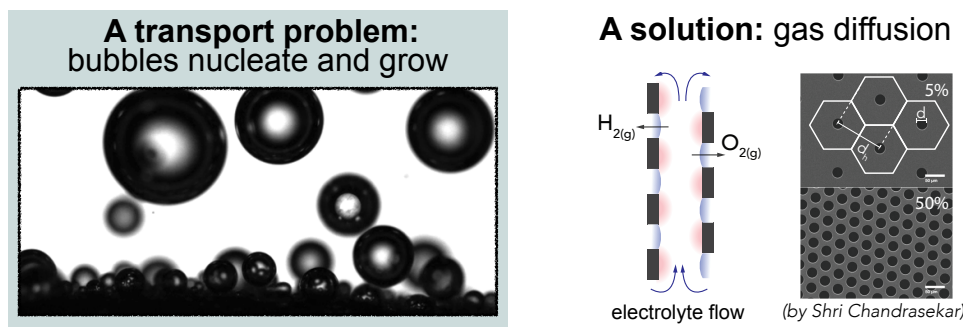


Figure 1: Bubble formation during electrolysis (left) and concept of gas diffusion electrodes (right).

### Your profile

You have a Masters degree (or equivalent) in applied physics, chemical or mechanical engineering, or in a closely related discipline. You have strong communication skills, including fluency in written and spoken English. You are enthusiastic and highly motivated to do a PhD. Prior hands-on experimental experience is considered an advantage, especially in cleanroom-based fabrication, optical and electrochemical measurements, or experimental fluid dynamics and multiphase flows.

### What we offer

We want you to play a key role in an ambitious project in an inspiring and stimulating international work environment.

- We provide excellent mentorship and a stimulating, modern research environment.
- You will be embedded in a dynamic research group with colleagues working on similar topics.
- The appointment is on a full-time basis with a planned duration of four years and is intended to lead to the award of a doctoral degree upon successful completion of the research project and doctoral thesis.
- The salary is based on the German public service salary scale (TV-L) at pay grade EG 13.
- Position is available immediately and will remain open until filled.
- We strive for diversity and fairness in hiring.

## How to apply

Potential applicants are encouraged to apply to Prof. Dr. Dominik Krug ([jobs@aia.rwth-aachen.de](mailto:jobs@aia.rwth-aachen.de)) and should include the following documents:

- A motivation letter describing why you want to apply for this position.
- Description of your research interests.
- A detailed CV.
- Academic transcripts from your Bachelor's and Master's degrees.
- Contact details of at least two references willing to provide a letter of recommendation on your behalf.

The interview process will include a scientific presentation. You can find information on the personal data we collect from applicants in accordance with Articles 13 and 14 of the European Union's General Data Protection Regulation (GDPR) [here](#).