# TECHNISCHE UNIVERSITÄT DRESDEN

# HZDR

**Fakultät Maschinenwesen** Inst. Verfahrenstechnik u. Umwelttechnik, Prof. Transportprozesse an Grenzflächen

Prof. Dr. rer. nat. et Ing. habil.
Kerstin Eckert

| Contact: | Dipl.-Ing. Lukas Krause | Dr. Xuegeng Yang |
|---|---|---|
| Telephone: | 0351 463-33074 | 0351 463-32982 |
| | | 0351 260-3863 |
| E-Mail: | l.krause@hzdr.de | xuegeng.yang@tu-dresden.de |
| | lukas.krause@tu-dresden.de | x.yang@hzdr.de |

## Experimental investigation of H$_2$-bubble dynamics in salt water
*Beleg/Master/Diploma thesis*

As a storage option for surplus renewable energy, hydrogen as a chemical energy carrier has high potential due to its emission-free, electrolytic production. However, current water electrolysis technologies have low tolerance to impurities and use high purity water to protect sensitive components such as the electrocatalysts. With the development of more robust electrodes, there is increasing opportunity to use the vast amounts of saltwater available worldwide as an electrolyte to store surplus energy generated in marine environments close to the source.

To improve the efficiency of the electrolysis process, the dynamics of the gas bubbles generated on the electrocatalysts surface can be modified, since bubbles adhering to the electrodes block possible nucleation centres as well as the current flow.
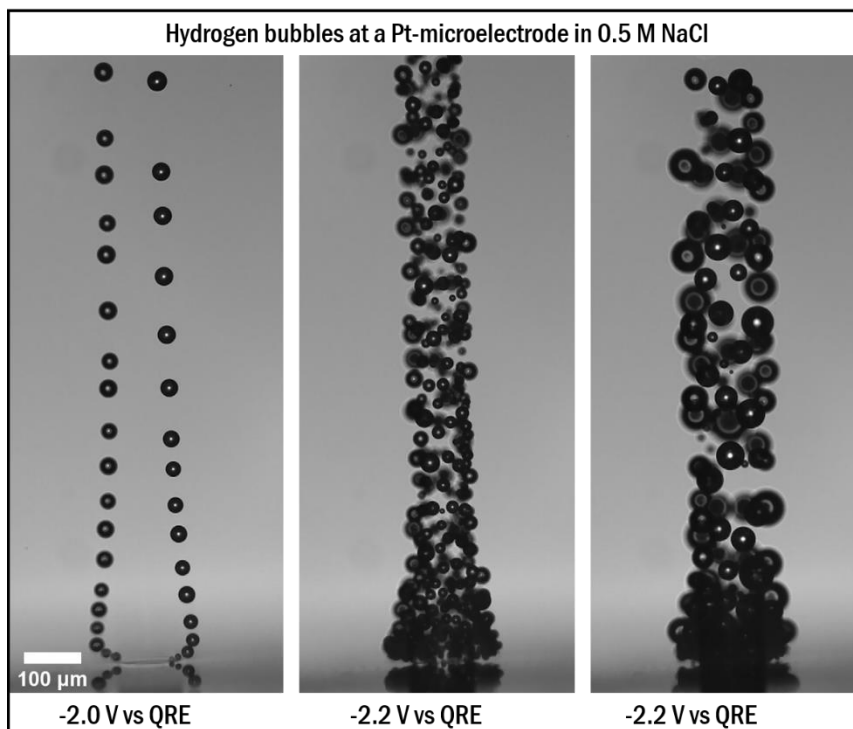


Hydrogen bubbles at a Pt-microelectrode in 0.5 M NaCl

-2.0 V vs QRE    -2.2 V vs QRE    -2.2 V vs QRE

The aim of the work is the optical investigation of the bubble behavior at different electrodes in salt water. For this purpose, existing high-speed cameras as well as image processing algorithms can be used, compared and further improved.

**Work:**
- Literature research on salt water electrolysis as well as image processing
- Experimental investigation of bubble dynamics in salt water at different electrodes
- Analysis using image analysis techniques
- Comparison of different algorithms

**Requirements:**
- Study in process engineering (or comparative field of study)
- Interest in experimental work
- Programming skills

**Conditions:**
- Duration: min. 6 months
- Possible start: 01.09.2022
- Workplace: TU Dresden