FB 11 Materialwissenschaft FG Funktionale Materialien Prof. Dr. Oliver Gutfleisch oliver.gutfleisch@tu-darmstadt.de Peter-Grünberg-Str. 16 64287 Darmstadt www.mawi.tu-darmstadt.de/fm





Offer for HiWi

Title: Investigations on magnetic enhancement of electrocatalytic water oxidation

Industrially profitable water splitting is one of the great challenges in the development of a viable and sustainable hydrogen economy. Alkaline electrolysers using Earth-abundant catalysts remain the most economically viable route to electrolytic hydrogen, but improved efficiency is desirable. Recently, the application of a magnetic field was described as a potential way to improve water-splitting catalysis [1,2].

In this work, the student will conduct mainly electrochemical measurements (e.g. cyclic voltammetry and Linear sweep voltammetry) on different ferro- and paramagnetic samples. The aim is to investigate the influence of an applied magnetic field on the electrochemical water splitting. The surface of the samples will be investigated with SEM (Scanning Electron Microscopy).

[1] Garcés-Pineda, *et al.* Direct magnetic enhancement of electrocatalytic water oxidation in alkaline media. *Nat Energy* 4, 519–525 (2019). <u>https://doi.org/10.1038/s41560-019-0404-4</u>

[2] C. A. Mesa, *et al.* Experimental evidences of the direct influence of external magnetic fields on the mechanism of the electrocatalytic oxygen evolution reaction. APL Energy 1 March 2024; 2 (1): 016106. https://doi.org/10.1063/5.0179761



Expertise to be gained:

- Learning about electrochemical water splitting
- Properties of homogeneous and inhomogeneous magnetic fields
- ➢ Microstructural analysis → Scanning Electron Microscopy (SEM)

Supervisor: Dr. Julia Lyubina, Dr. Kilian Schäfer

Contact: Dr. Sagar Ghorai, sagar.ghorai@tu-darmstadt.de

Documents required for application:

- 1. Current CV,
- 2. Up-to-date transcripts of Bachelor and Master semesters,
- 3. Motivation letter.

