

*We are one of the youngest universities in Germany and think in terms of possibilities, not limitations. In the heart of the Ruhrregion, we develop ideas of the future at our 11 faculties. We are strong in research and teaching, live diversity, support potential and are highly committed to an educational equality that has earned this name.*

The **University Duisburg-Essen** offers at the **Campus Duisburg** in the Faculty of Engineering, Department of Mechanical and Process Engineering a

**PhD position for the project**  
**„Development of material transport and porosity optimized graded catalyst layers with high platinum utilization for PEM fuel cells by wet grinding technologies”**  
**(Salary: 13 TV-L)**

There is no way around electric mobility for a successful energy turnaround. Parallel to the development of battery-powered vehicles, but in conjunction with the well-known critical raw material extraction (including lithium and cobalt) for battery technology, the use of fuel cells in electromobility, especially in long-distance and freight transport, is unavoidable. A major challenge for the commercialization of polymer electrolyte membrane fuel cells (PEMFC) in the automotive industry is currently the cost-intensive catalyst materials containing precious metals. Their limited long-term activity and stability, which is particularly affected by the corrosion of the carbon carriers and the washing out of the active precious metal nanoparticles, is critical for their sustainable use.

The aim of the present project is to develop, together with the project partners in an interdisciplinary network, catalyst layers graded in terms of Pt loading and porosity for catalyst cathode layers in PEMFC. The grading will be designed for optimal proton, oxygen and water transport. By better utilization of the active centers in such a designed catalyst layer, the need for Pt is reduced and a significant cost saving is achieved. The combination of size-optimized carrier particles (C) and laser-generated active materials (Pt) is a novelty in this context. For the first time, it allows the decoupling of i) targeted size adjustment of the carrier particles, ii) size-selective Pt-NP synthesis without organic ligands and iii) loading of the carriers with the Pt-NP in freely selectable loads (without changing the Pt-NP size).

Within the scope of the activity the opportunity for further scientific qualification (PhD) is offered.

**We offer:**

- A highly creative, interdisciplinary and international environment with room for own ideas and their realization by means of a sustainable, future oriented technology
- New, excellent infrastructure and know-how in the field of disperse systems
- A young, open-minded and highly motivated team

**Requirements:**

- M.Sc. in science or engineering
- Interest in disperse systems and nanoparticle technology
- Ability to conduct independent research, high motivation and reliability
- Team spirit
- Interest to work in an international and interdisciplinary environment

**Tasks**

- Targeted dispersion of carbon particles
- Characterization of complex formulations for PEMFC
- Development of customized, graded and structured cathode catalyst layers for PEMFC

*Other requirements*

<b><u>Availability of position:</u></b>	as soon as possible
<b><u>Duration of contract:</u></b>	3 years
<b><u>Working time:</u></b>	100 percent of a full time position
<b><u>Application deadline::</u></b>	15.11.2020

The University Duisburg-Essen aims at promoting the diversity of its members (see <http://www.uni-due.de/diversity/international.shtml>).

Applications from disabled or equivalents according to § 2 Abs. 3 SGB IX are encouraged.

Women will be preferentially considered when equally qualified according to the state equality law.

**Please send your application (including motivation letter, CV, etc.) quoting the reference number 688-20 within a single pdf-file via email to:**

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