

PhD-Researcher Position within the SE²A Research Cluster

**Air-cooled Low Temperature Polymer Electrolyte Membrane Fuel Cell
Systems for Passenger Airplanes**

Temporary Position, Salary Level EG 13 TV-L, 100%

Background:

The Cluster of Excellence *SE²A* - Sustainable and Energy Efficient Aviation is a DFG-funded interdisciplinary research center investigating technologies for a sustainable and eco-friendly air transport system. Scientists from engineering, economics, chemistry and biology are working on the reduction of drag, emissions and noise, life-cycle concepts for airframes, improvements in air traffic management and new technologies for energy storage and conversion. Technische Universität Braunschweig, the German Aerospace Center (DLR), Leibniz University Hannover (LUH), the Braunschweig University of Art (HBK) and the National Metrology Institute of Germany (PTB) have joined forces in this extraordinary scientific undertaking. The overall project is structured into the three core research areas “Assessment of the Air Transport System”, “Flight Physics and Vehicle Systems” and “Energy Storage & Conversion”. (www.tu-braunschweig.de/se2a)

Employment:

The position is located at the Institute of Energy and Process Systems Engineering (www.tu-braunschweig.de/ines/) in Braunschweig. The entry date is as soon as possible, and the duration is initially limited to two years and will be extended to the full length of 3.0 years after an internal midterm evaluation. The position is part-time suitable, but should be occupied 100%.

The payment is made according to task assignment and fulfillment of personal requirements to salary group EG 13 TV-L. International applicants may have to successfully complete a visa process before hiring can take place. Applications from international scientists are also welcome.

The TU Braunschweig aims to increase the share of women in academic positions. Applications from female candidates are welcome. Where candidates have equal qualifications, preference will be given to female applicants. Candidates with handicaps will be preferred if equally qualified. Please enclose a proof.

Task:

In this project, air-cooled self-humidified Low Temperature Polymer Electrolyte Membrane (LT-PEM) fuel cell systems will be designed and optimized for supplying propulsion power aboard an *SE²A* aircraft. Among their specifications, the specific power is of the first priority to address. As a kick-off, this project will start with a thermodynamic pre-assessment of a baseline fuel cell system for the aviation purpose. After setting up this baseline design, studies will shift to deeper integrations of these fuel cells into the airframe. Alternative designs for higher gains, such as energy and mass multiplexing between aboard climates, evaporative cooling etc., will be conducted and evaluated. Onboard hydrogen storage will be

addressed as well. As a possible further stretch of the project, studies will shift to the fuel cell internal mesoscopic designs. A 30% gain has been reported through simple airflow manipulation. However, its mechanism behind still remain unresolved. This project will hopefully interpret the mechanism by computational fluid dynamics (CFD) modelling as well.

For carrying out the project timely, short stays abroad may also be expected.

Who we are looking for:

- A motivated candidate newly gained the master degree in thermodynamics or fluid dynamics or energy technologies.
- Solid knowledge and relevant project experiences on Nafion® PEM fuel cells.
- Proven skills on MatLab, Simulink and a CFD tool (e.g., Ansys Fluent, Ansys CFX, or COMSOL).
- Excellent/certificated communication skills in English, written and orally.
- Experience in scientific writing and publishing is respected.
- Knowledge in programming languages, control theory and hardware, and aircraft design is advantageous.

Application Process:

Applications should be sent by e-mail to Dr. Xin Gao (xin.gao@tu-braunschweig.de), and must contain the following documents.

- Motivation Letter, with your understandings of a PhD study
- Curriculum Vitae including complete address, phone number, email address, educational background, language skills, and work experience
- Copies of bachelor and master diploma and transcript of grades in original language and in English or German translation
- A brief of the master thesis, copy of the master thesis is preferred
- Contact information for at least two references
- Additional Documents must be provided on request

All documents should be in PDF format, preferably in a single file.

The deadline for application is **February 29, 2020**.

Personal data and documents relating to the application process will be stored electronically.

Please note that application costs cannot be refunded.