

Postdoctoral Researcher: Electrochemical CO2 Reduction

Job Description:

This posting is for a 2-year postdoc position in the field of electrochemical CO₂ reduction. The focus of the research will be on the development of catalyst structures and systems for the electrochemical conversion of CO₂ to multi-carbon products, with an emphasis on the practical application of the technology. This project will primarily take place at TU Delft, and will involve collaboration with a variety of global companies as well as other leading universities in the field.

Specifically, we are looking to design novel catalyst structures and cell configurations which optimize the conversion of CO₂ to products such as ethylene and ethanol. The work will utilize catalysts within gas-diffusion layers and membrane electrode assemblies that are capable of suppressing unwanted products and promoting products of interest. To better understand the observed electrochemical performance, the work will utilize characterization tools such as HRSEM and AFM of the electrocatalysts. Electrochemical testing will take place using fuel cell/electrolyzer type reactors using gas chromatographs for gas product analysis and HPLC and NMR for liquid product analysis. Parameters such as electrical potential, temperature, reactant flow rate, humidity and others will be used as tools to influence catalytic behaviour.

The work will also potentially require building and reactor modifications, thus piping, thermocouples, mass flow meters, etc. may need to be installed and interfaced to allow for on-line control. This means that a large amount of hands on work and a wide variety of technical knowledge relating to electrolysis design, fundamental catalysis understanding, materials characteristics and product analysis will be needed to allow for accurate testing of the catalysts. As such, background experience in any of these is an asset. Researchers with previous experience in fuel cell, water electrolysis or CO₂ reduction are strongly encouraged to apply.

The position will be in the lab of Assistant Professor Thomas Burdyny in the Department of Chemical Engineering as part of a larger consortium. The work will also contribute to TU Delft's e-Refinery programme on electrochemical synthesis that includes >20 principal investigators across the campus. Electrosynthesis is a promising approach to electrify the manufacturing of fuels, chemicals and materials and to contribute to large-scale energy storage. Given the Dutch strategic position in the international chemical, renewable energy and transport sectors, the e-Refinery programme at TU Delft aims to develop systems to convert electricity into molecular bonds, by bundling and leveraging its activities in the associated research and education fields. The Delft e-Refinery programme covers and connects all system layers, from the molecular scale to the industrial system scale. It involves faculty members at four faculties and a multitude of PhD candidates and postdocs. The e-Refinery programme features a diverse and up-to-date research infrastructure across campus, with electrochemical labs, material labs, equipment and devices labs, power labs and a system simulation suite.

Qualifications:

The successful candidate will be well-motivated, hardworking, open minded and willing and able to work as part of a team. The candidate should have a PhD degree in Chemical Engineering, Physics, Chemistry, Mechanical Engineering, Material Science or a similar field or will expect to have that degree within the immediate future. The preferred candidate has experimental experience working with electrochemical reactions. Experience with analytical tools such as gas chromatography, NMR, and HPLC would be very helpful.

Information about the Department and University:

TU Delft is a leading technical university globally recognized for the excellence of its research, education, innovation and scientific advice. Our Chemical Engineering department recently ranked as #10 in the world in the QS rankings. We offer a rewarding and challenging job in an international environment. We strive for academic excellence in an environment characterized by collegial respect and academic freedom.

For more information about this position and to submit applications, please contact Thomas Burdyny, e-mail: t.e.burdyny@tudelft.nl.

To apply, please include:

- 1) A one-page motivation letter

- 2) A detailed CV
- 3) Grade Transcripts and PhD diploma
- 4) Contact information of at least two references to [name + e-mail]

Clearly indicate the desired position and vacancy number in the subject of your email. Put everything in one PDF-file. Although the position will remain open until filled, applicants are strongly encouraged to submit their applications before November 30th, 2019. The intended start of the project is January 1st, 2020.

Please indicate in your letter whether your CV could be reviewed to fill other similar positions within the TU Delft.