

POST-DOC POSITION: NITROGEN FIXATION IN HIGH-PRESSURE MICROWAVE PLASMA

We seek a post-doctoral researcher to investigate nitrogen fixation using microwave plasma technology in air at elevated pressures. The researcher will evaluate reactor performance using gas analysis techniques (e.g. FTIR) and map composition and temperature using laser scattering diagnostics.

PROJECT DESCRIPTION

Nitrogen fixation to produce fertilisers using the Haber-Bosch process is responsible for between 3 – 5% of global natural gas consumption and 1.2% of CO₂ emissions. Before Haber-Bosch, electrically driven nitrogen fixation from air was performed using plasma-arc furnaces at high temperatures in the Birkeland-Eyde process. In this project, we return to investigate plasma driven nitrogen fixation, but with a modern approach – using electrodeless microwave discharges at super-atmospheric pressure. Here, we will evaluate the performance of microwave plasma reactors for NO formation from N₂ – O₂ mixtures at pressures up to 10 bar. In-situ laser diagnostics (e.g. Raman scattering) will be used to map temperature and gas composition throughout the plasma reactor, allowing insight into reaction mechanisms and kinetics within the reactor. With this insight, we expect to be able to optimise reactor performance and realise breakthroughs in electrically driven nitrogen fixation. The successful applicant will be responsible for designing and implementing the plasma and laser diagnostic experiment. This project is part of a collaboration with an industrial partner.

JOB DESCRIPTION

The successful candidate is expected to perform laboratory experiments to evaluate processes occurring in plasma discharges. Experiments will be performed in our new laboratory, located at Chemelot, 20 km North of Maastricht. You will work independently to collect, analyse, and evaluate experimental data. You will join a small team working on similar (i.e. plasma and spectroscopy) experiments. We expect that you will regularly discuss, share, and present your work with fellow team members, colleagues, collaborative partners, and wider audiences at international conferences. We expect that you will write scientific reports for industrial partners and a number of high-quality scientific articles for reputable journals.

REQUIREMENTS

- We seek strong applicants who have a PhD degree in plasma science, chemistry, physics, chemical engineering, or other similar engineering or science disciplines
- Prior knowledge of plasma chemistry, optical spectroscopy, laser diagnostics, nitrogen chemistry, or photonics is preferred but not essential
- Experience with some form of analytical or scientific programming language is beneficial, e.g. Python, R, LabVIEW, Matlab, Mathematica, etc.
- You have fluency in both written and spoken English
- You are able to work both independently and as part of a team

CONDITIONS OF EMPLOYMENT

- We offer a rewarding career at a young university in the heart of Europe, with a distinct global perspective and a strong focus on innovative research and education;

- The terms of employment of Maastricht University are set out in the Collective Labour Agreement of Dutch Universities (CAO), supplement with local UM provisions. For more information on terms of employment, please visit our website www.maastrichtuniversity.nl > Support > UM employees;
- The salary is competitive, and will be set in scale 11 of the collective labour agreement of the Dutch Universities (expected minimum € 3.821 and maximum € 5.230) for a full-time job (38 hours/week), depending on qualifications and work experience. In addition, there is an 8% holiday and 8.3% year-end allowance.
- We offer an attractive package of fringe benefits such as reduction on collective health insurance, substantial leave arrangements, optional model for designing a personalised benefits package and application for attractive fiscal arrangements for employees from abroad.

CONTRACT TYPE

We offer a full-time employment contract as a Postdoc. The employment contract will be for a period of two years.

EMPLOYER

ACADEMIC STAFF

Located in the heart of Europe, UM is the most international university in the Netherlands with half of our students and one third of academic staff coming from abroad. In total, UM has around 18.000 students and 4,300 employees and represents 100 different nationalities. Maastricht University is a stimulating environment where research and teaching are complementary, where innovation is our focus and where talent can flourish. Research is characterised by a multidisciplinary, thematic, and collaborative approach, and with education, forms the core of UM.

Not convinced/Eager to learn more? Take our virtual [campus tour](#) to get a sense of our university culture, the city of Maastricht, and your potential working environment.

Faculty of Science and Engineering

The Faculty of Science and Engineering (FSE) is home to several outstanding departments and institutions covering education and research in Science, Technology, Engineering and Mathematics (STEM) as well as the liberal arts and sciences.

DEPARTMENT

We are part of the newly created Circular Engineering Department in the Faculty of Science and Engineering at Maastricht University. Our research group is uniquely situated in the heart of the Dutch chemical industry at the Brightlands Chemelot campus, 20 km north of Maastricht. Our strong links with industry give excellent opportunity to build collaborations and partnerships, giving good prospects for a future career in industry. Our group has a strong expertise in plasma science, with each of our respective members having an established international reputation for high quality scientific output in the fields of plasma chemistry, plasma modelling, spectroscopy, and laser diagnostics. We have excellent international connections with esteemed laboratories, and we therefore expect the applicant will have the opportunity to work abroad during their PhD.

ADDITIONAL INFORMATION

More information on this vacancy can be obtained from Tom Butterworth:
t.butterworth@maastrichtuniversity.nl

Or Gerard van Rooij:
g.vanrooij@maastrichtuniversity.nl

DIVERSITY STATEMENT

Maastricht University is an international organization, embracing a diverse student and staff population. We strongly believe that diversity is our advantage and creating an inclusive working climate in which students and staff feel a valued member of the UM community is therefore a top strategic priority. UM values [diversity](#) within its community and encourages you to apply.