

# Transform CO<sub>2</sub> to Food: 3 Postdoc Positions in Biological and Chemical Engineering

The Department of Biological and Chemical Engineering, Aarhus University, invites applications for three postdoctoral positions offering an exciting opportunity to contribute to a new interdisciplinary research project on production of proteins for food based on a feedstock of CO<sub>2</sub> and energy. The positions are based at AU Viborg and/or at AU main campus and are expected to begin on 1 September 2025, or as soon as possible thereafter.

The project explores two parallel technological routes for converting captured carbon dioxide into microbial biomass: One fully biological, and the other a hybrid chemical–biological pathway. The advertised positions will support these efforts through research on advanced carbon capture methods, process modelling and optimization, and biological CO<sub>2</sub> valorization in bioreactors. The work will be carried out within an active team operating at the intersection of experimental engineering and system-level process design

## Expected start date and duration of employment

The positions are full-time and expected to begin on 1 October 2025, or as soon as possible.

The expected duration is up to 2 years, with the initial contract offered for 12–18 months, depending on the applicant's profile and project alignment.

## Job description

We are seeking highly motivated postdoctoral researchers to join the interdisciplinary research project on CO<sub>2</sub> to food, which aims to develop innovative technologies for converting captured carbon dioxide into microbial biomass. The project encompasses both chemical and biological conversion routes, with contributions from several research groups at Aarhus University.

The successful candidates will become part of a collaborative and international environment within the Department of Biological and Chemical Engineering (BCE) at Aarhus University. Positions 1 and 3 are mainly based at **AU Viborg**, home to **BCE's mid-TRL experimental facilities**, which support the development and testing of sustainable technologies on pilot scale. Position 2 is based at AU main campus. Depending on the position, the work will involve a combination of experimental research, process simulation, reactor operation, and system-level optimization.

We are currently advertising the following three postdoc positions:

## Position 1. Postdoc in Carbon Capture System Design, Operation, and Test

We are looking for a postdoctoral researcher to lead the design, commissioning, and operation of a flexible carbon capture unit for integration into emerging CO<sub>2</sub>-to-food pathways. This role combines applied research and pilot-scale engineering, focusing on evaluating the quality of CO<sub>2</sub> from various sources and its suitability for downstream conversion processes.

The aim is to develop a pilot-scale CO<sub>2</sub> separation system capable of handling a range of input gas streams, including biogas, flue gas, and fermentation off-gas. The postdoc will contribute to the development and validation of robust separation strategies that deliver process-grade CO<sub>2</sub> for utilization in biological or chemical upgrading steps. The carbon capture pilot is envisioned to include pre-treatment and post-treatment steps, enabling flexibility and optimization of the carbon capture process for its practical application. The position is based at AU Viborg and will be embedded within an interdisciplinary team of researchers and engineers working at the mid-TRL level.

## Tasks:

- Participate in the design and detailed engineering phases of the pilot system, including development and review of PFDs, P&IDs, and related documentation.
- Contribute to safety and risk assessment activities, such as HAZID and HAZOP workshops.
- Participate in Factory Acceptance Testing (FAT) and Site Acceptance Testing

**Application Deadline:**  
07 August 2025

**Faculty:**  
Faculty of Technical  
Sciences

**Institute/Faculty:**  
Department of  
Biological and  
Chemical Engineering

**Academic contact  
person:**  
Behzad Partoon  
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u.dk  
+4522521659

**Vacant positions:**  
3

**Hours per week:**  
37

**Number of months:**  
12

**Expected date of  
accession:**  
01/10/2025

(SAT) of key equipment.

- Support commissioning, operation and testing of the carbon capture unit (including gas pre-treatment and post-treatment), ensuring safe and efficient performance across a range of gas compositions.
- Analyze the composition and quality of gases before and after CO<sub>2</sub> separation.
- Assess the compatibility of separated CO<sub>2</sub> with downstream biological and chemical processes.
- Conduct R&D on the complete treatment and separation process to evaluate the effects of impurities in input gas, methods of input gas pretreatment, and output gas post-treatment, operational modes, and gas variability on final CO<sub>2</sub> purity and process stability.
- Collaborate with process modelers and experimentalists to align capture conditions with system design and operation parameters as well as downstream requirements.
- Maintain detailed records of experimental data, process conditions, and system modifications to support scale-up and system integration.
- Publish scientific articles based on data collected during the research, development, and innovation of the carbon capture process stream. Present research findings at conferences.
- Conduct R&D to evaluate the effects of impurities, operational modes, and gas variability on CO<sub>2</sub> purity and process stability.
- Collaborate with process modelers and experimentalists to align capture conditions with downstream requirements.
- Maintain detailed records of experimental data, process conditions, and system modifications to support scale-up and system integration.

## **Position 2: Postdoc in Process Modeling, Integration, and Techno-Economic Analysis of CO<sub>2</sub>-to-Food Pathways**

We are seeking a postdoctoral researcher (or research assistant, depending on qualifications) to contribute to the modeling, integration, and techno-economic assessment of novel process chains for sustainable protein production from CO<sub>2</sub> and renewable energy sources.

This position aims to develop and optimize an integrated chemical–biological process chain, incorporating CO<sub>2</sub> capture and purification, co-electrolysis, methanol synthesis, acetate production, and off-gas recycling from fermentation. A central focus is to ensure high system-level efficiency by maximizing carbon and energy utilization across the process.

The work will be conducted in close collaboration with experimental partners and will contribute to the development of future demonstration-scale systems. The postdoc will support Aarhus University's broader research strategy on sustainable process systems and Power-to-X technologies.

### **Tasks:**

- Develop process models of unit operations (e.g., electrolysis, methanol synthesis, acetate production) using software such as Aspen Plus.
- Integrate these units into full process chains and simulate performance under varying operating conditions and CO<sub>2</sub> feedstock scenarios (e.g., biogas, flue gas, fermentation off-gas).
- Assess oxygen removal strategies for off-gas reuse and system compatibility.
- Analyze system behavior under intermittent renewable energy inputs and explore mitigation strategies (e.g., storage, buffering).
- Collaborate with experimental teams to incorporate pilot data into simulations.

- Conduct techno-economic evaluations and identify optimization opportunities.

### **Position 3: Postdoc position on integrating a two-stage fermentation process with an abiotic electrodialysis unit at the pilot scale**

We are seeking a motivated postdoctoral researcher to join the project team, focusing on electrochemistry, to integrate and optimize a two-stage fermentation pilot plant. The overall objective of this work package is to further develop, test, design, and operate abiotic electrodialysis cells that can be integrated with a pilot-plant CO<sub>2</sub> to Food bioprocessing unit at Aarhus University. An initial bench-scale study is necessary to further optimize an existing electrodialysis system before designing a 50x scale-up unit. This larger system will be operated to integrate the two biological stages of an existing pilot plant, which consists of two 100-L gas fermenters.

#### **Tasks:**

- Operate and optimize a bench-scale electrolysis unit.
- Connect this unit to bench-scale fermenters.
- Develop a scaled-up version of the best performing electrodialysis unit configuration.
- Perform all the necessary electrochemical measurements and other analysis.
- Closely collaborate with electrodialysis manufacturers to procure the unit and the power source.
- Collaborate closely with experimental partners to integrate the electrodialysis unit at the pilot scale.
- Perform all the analysis to evaluate the function of the electrodialysis unit.

#### **Your profile**

We are looking for candidates with strong academic backgrounds and a passion for sustainable process development. The positions require the ability to work both independently and collaboratively in multidisciplinary teams. Candidates are expected to demonstrate strong problem-solving skills, scientific integrity, and a proactive attitude toward research, engineering, and knowledge sharing.

Please indicate clearly in your application which position(s) you are applying for.

### **Position 1 – Postdoc in Carbon Capture System Design, Operation, and Test**

The ideal candidate should have all or several of the following academic and personal qualifications:

- A PhD in chemical engineering, process engineering design, separations science and technology, energy engineering, or a related field (for postdoc).
- Hands-on experience with the design, construction, and operation of pilot-scale equipment, particularly for gas separation or carbon capture.
- Experience with flue gas/biogas pretreatment technologies and practical methods of CO<sub>2</sub> separation and purification.
- Familiarity with process flow diagrams (PFD), piping and instrumentation diagrams (P&ID), and participation in engineering design activities.
- Experience contributing to safety and risk assessments, such as HAZID and HAZOP.
- Involvement in Factory Acceptance Testing (FAT) and Site Acceptance Testing (SAT) processes is a strong advantage.
- Understanding of CO<sub>2</sub> quality parameters, their measurement and characterization, and the implications for downstream processes.
- Ability to troubleshoot problems and optimize experimental setups under real-world conditions.
- Experience working in interdisciplinary teams with both R&D and engineering

tasks.

- Documented ability to disseminate scientific and technical findings through publications or technical reports.
- Experience or familiarity with process simulation tools e.g., ASPEN, is an advantage
- Motivation to work in a fast-paced, applied research environment focused on sustainability.
- Fluency in English (written and spoken) and strong documentation skills.

### **Position 2 – Postdoc in Process Modeling, Integration, and Techno-Economic Analysis of CO<sub>2</sub>-to-Food Pathways**

The ideal candidate should have all or several of the following academic and personal qualifications:

- A PhD in chemical engineering, process systems engineering, energy engineering, or a related field (for postdoc); a master's degree is required for research assistant level.
- Strong knowledge of process modeling and integration principles, including mass and energy balances and reaction engineering.
- Proficiency in Aspen Plus or similar process simulation tools.
- Experience with techno-economic assessments (TEA) of complex chemical or biological systems.
- Familiarity with CO<sub>2</sub> capture and utilization technologies, Power-to-X systems, or bioprocess integration is highly desirable.
- Experience in steady-state or dynamic simulation under varying operational scenarios; programming skills are considered a plus.
- Ability to work independently and generate creative solutions within the project framework.
- Documented experience in publishing scientific results in peer-reviewed journals.
- Enthusiasm for interdisciplinary collaboration and advancing green technologies.
- Excellent communication skills and fluency in English (written and spoken).

### **Position 3. Postdoc position on integrating a two-stage fermentation process with an abiotic electrodialysis unit at the pilot scale**

The ideal candidate should have all or several of the following qualifications and specific competences:

- PhD in (electro)chemistry, chemical engineering, process systems engineering, environmental engineering, or a related field (for postdoc)
- Strong knowledge of electrochemical analysis.
- Experience in operating electrochemical systems.
- The ideal candidate would have worked with electrodialysis systems already at the larger scale.
- Deep knowledge of different configuration choices for electrochemical systems.
- Knowledge of materials for electrodes and membranes.
- The ability to work independently and to generate new ideas and creative approaches.
- Documented ability to have scientific results of high quality published in peer-reviewed journals
- Is passionate about science and engineering, and working in a team dedicated to

green technologies.

- Fluency in English – written and oral

### Who we are

The Department of Biological and Chemical Engineering was established on January 1, 2021, in connection with Aarhus University's reorganization of the engineering area. The department employs around 175 people and is responsible for research and education within the department's scientific areas. We educate both Bachelors and Masters of Science in Engineering and around 825 students are enrolled in our study programs. Furthermore, we also offer an ambitious PhD program. Our PhD students have high academic ambitions and deliver high-quality results for both the private and the public sectors.

At the Department of Biological and Chemical Engineering, focus is on living systems, the biology of organisms, efficient production, and transformation of chemicals, materials and energy. We translate knowledge within biotechnology, food technology, environmental technology, chemical engineering, industrial biotechnology, medical biotechnology and electrochemical engineering, and more into new technologies and value-creating solutions that can also be used in the business community.

Many of our research and development activities are based on companies' specific innovation needs or specialist application areas. Close collaboration with the public sector and private businesses ensures that the knowledge and technology generated in the department's research environments has a clear anchoring in reality and benefits the surrounding society. We also provide research-based public sector consultancy and advice on technology in agriculture and food.

### What we offer

At the Department of Biological and Chemical Engineering, Aarhus University, we offer a dynamic and supportive environment for researchers who are passionate about sustainable technologies and interdisciplinary collaboration. Specifically, we provide:

- Access to well-developed research infrastructure, including pilot-scale experimental facilities and state-of-the-art laboratories, software and databases.
- An interdisciplinary research environment spanning chemical engineering, process systems, biotechnology, and Power-to-X technologies.
- Opportunities to collaborate closely with national and international academic partners, as well as industrial stakeholders involved in research activities within CO<sub>2</sub> to protein.
- A research culture that encourages open dialogue, innovation, and critical thinking across fields.
- A collegial and inclusive workplace with networking activities, knowledge sharing, and a commitment to team development.
- A strong focus on professionalism, equality, and work-life balance, ensuring a healthy and productive working environment.

You will become part of a growing research initiative with real-world impact and visibility, and have the chance to contribute to shaping next-generation sustainable technologies.

### Place of work and area of employment

The positions include the following permanent workplace addresses:

- **Position 1:** Burrehøjvej 43, 8830 Tjele (AU Viborg)
- **Position 2:** Hangøvej 2, 8200 Aarhus N (AU Hangøvej)
- **Position 3:** Blichers Allé 20, Building L38, 8830 Tjele (AU Viborg)

The area of employment is **Aarhus University with affiliated institutions**. Attendance at each workplace will be agreed with your immediate supervisor.

Transport to AU Viborg campus will be provided from Aarhus using department vehicles following the existing carpooling practice.

### Contact information

For general inquiries about the CO<sub>2</sub> to Food postdoc positions, please contact:  
Thomas Lundgaard ([thomas.lundgaard@bce.au.dk](mailto:thomas.lundgaard@bce.au.dk)) or Associate Professor Behzad Partoon ([behzad.partoon@bce.au.dk](mailto:behzad.partoon@bce.au.dk))

If you would like more information about the specific research focus or daily tasks of each position, you are welcome to contact the relevant academic lead:

Position 1 – Carbon Capture System Design and Operation  
Associate Professor John William Phair ([jwph@bce.au.dk](mailto:jwph@bce.au.dk))

Position 2 – Process Modelling and Techno-Economic Analysis  
Associate Professor Konstantinos Anastasakis ([kanastasakis@bce.au.dk](mailto:kanastasakis@bce.au.dk))

Position 3 – Biological CO<sub>2</sub> Conversion  
Professor Largus (Lars) Angenent ([L.angenent@uni-tuebingen.de](mailto:L.angenent@uni-tuebingen.de))

### **Deadline**

Applications must be received no later than 7 August 2025.

### **Application procedure**

Shortlisting is used. This means that after the deadline for applications – and with the assistance from the assessment committee chairman, and the appointment committee if necessary, – the head of department selects the candidates to be evaluated. All applicants will be notified whether or not their applications have been sent to an expert assessment committee for evaluation. The selected applicants will be informed about the composition of the committee, and each applicant is given the opportunity to comment on the part of the assessment that concerns him/her self. Once the recruitment process is completed a final letter of rejection is sent to the deselected applicants.

### **Letter of reference**

If you want a referee to upload a letter of reference on your behalf, please state the referee's contact information when you submit your application. We strongly recommend that you make an agreement with the person in question before you enter the referee's contact information, and that you ensure that the referee has enough time to write the letter of reference before the application deadline. Unfortunately, it is not possible to ensure that letters of reference received after the application deadline will be taken into consideration.

If you wish to add a referee **after** you have submitted your application, you must send this person's details (name, job title, place of work, and email address) as well as the name of the position you have applied for to: [HR.Nattech@au.dk](mailto:HR.Nattech@au.dk)

### **Formalities and salary range**

Technical Sciences refers to the [Ministerial Order on the Appointment of Academic Staff at Danish Universities under the Danish Ministry of Science, Technology and Innovation](#).

The application must be in English and include a curriculum vitae, degree certificate, a complete list of publications, a statement of future research plans and information about research activities, teaching portfolio and verified information on previous teaching experience (if any). Guidelines for applicants can be found [here](#).

Appointment shall be in accordance with the collective labour agreement between the Danish Ministry of Taxation and the Danish Confederation of Professional Associations. Further information on qualification requirements and job content may be found in the [Memorandum on Job Structure for Academic Staff at Danish Universities](#).

Salary depends on seniority as agreed between the Danish Ministry of Taxation and the Confederation of Professional Associations.

Aarhus University's ambition is to be an attractive and inspiring workplace for all and to foster a culture in which each individual has opportunities to thrive, achieve and develop. We view equality and diversity as assets, and we welcome all applicants.

Research activities will be evaluated in relation to actual research time. Thus, we encourage applicants to specify periods of leave without research activities, in order to be able to subtract these periods from the span of the scientific career during the evaluation of scientific productivity.

Aarhus University offers a broad variety of services for international researchers and accompanying families, including relocation service and career counselling to expat partners. Read more [here](#). Please find more information about entering and working in Denmark [here](#).

Aarhus University also offers a Junior Researcher Development Programme targeted at career development for postdocs at AU. You can read more about it [here](#).

*The application must be submitted via Aarhus University's recruitment system, which can be accessed under the job advertisement on Aarhus University's website.*

### **Aarhus University**

*Aarhus University is an academically diverse and research-intensive university with a strong commitment to high-quality research and education and the development of society nationally and globally. The university offers an inspiring research and teaching environment to its 38,000 students (FTEs) and 8,300 employees, and has an annual revenues of EUR 935 million. Learn more at [www.international.au.dk/](http://www.international.au.dk/)*