467_24_CASE_PTG_RE2

Job Reference

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Position

Research Engineer/Researcher - High-fidelity electro-chemical simulations for Solid Oxide Electrolyzer Cells (SOECs) (RE2/R2)

Data de tancament

Dilluns, 16 Setembre, 2024
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Job title: Research Engineer/Researcher - High-fidelity electro-chemical simulations for Solid Oxide Electrolyzer Cells (SOECs) (RE2/R2)

About BSC

The Barcelona Supercomputing Center - Centro Nacional de Supercomputación (BSC-CNS) is the leading supercomputing center in Spain. It houses MareNostrum, one of the most powerful supercomputers in Europe, was a founding and hosting member of the former European HPC infrastructure PRACE (Partnership for Advanced Computing in Europe), and is now hosting entity for EuroHPC JU, the Joint Undertaking that leads large-scale investments and HPC provision in Europe. The mission of BSC is to research, develop and manage information technologies in order to facilitate scientific progress. BSC combines HPC service provision and R&D into both computer and computational science (life, earth and engineering sciences) under one roof, and currently has over 1000 staff from 60 countries.

Look at the BSC experience:
[BSC-CNS YouTube Channel](#)
[Let's stay connected with BSC Folks!](#)

We are particularly interested for this role in the strengths and lived experiences of women and underrepresented groups to help us avoid perpetuating biases and oversights in science and IT research. In instances of equal merit, the incorporation of the under-represented sex will be favoured.

We promote Equity, Diversity and Inclusion, fostering an environment where each and every one of us is appreciated for who we are, regardless of our differences.

If you consider that you do not meet all the requirements, we encourage you to continue applying for the job offer. We value diversity of experiences and skills, and you could bring unique perspectives to our team.

Context And Mission

The urgent need for decarbonization has brought about a shift towards hydrogen and hydrogen-enriched fuels as a solution for the future cleaner, and low-carbon energy systems. However, meeting the EU targets for reduced emissions and carbon dependency poses new challenges for energy-intensive industrial processes like steel manufacturing or power generation. Power-to-X (P2X) technologies are being developed to produce "green hydrogen" from renewable electricity, which can then be used to improve these processes and reduce their carbon footprint and dependence on fossil fuels. In fact, given the still low energy density of batteries, green hydrogen is currently the only feasible alternative to decarbonize industries where this parameter is critical, such as as commercial aviation. Hydrogen-based technologies are a crucial component of the energy transition and require digital tools and advanced software to speed up their deployment in the market.

Green hydrogen, which is generated from water and renewable electricity in an electrolyzer, can be stored and distributed for use in power generation or electrochemical systems like fuel cells. Among the most efficient hydrogen production systems, Solid Oxide Electrolizer Cells (SOECs) operating at high temperatures have shown high potential to generate hydrogen at moderate and large scales. These cutting-edge technologies involve numerous physical and chemical phenomena occurring at various scales, ranging from thermo-mechanical-fluidic at the cm-scale to electrochemistry at the nanoscale. The multi-physics and multi-scale nature of these devices makes them extremely challenging from a simulation standpoint, but the outputs of the simulations are highly valuable for predicting and designing real-world operating systems.

This postdoc positions offers a chance to work on predicting the electro-thermo-mechanical behavior of SOEC technology with a focus on developing a computational framework describing the coupled system. The research will involve understanding the electro-chemistry, and thermo-mechanical properties of SOECs and developing a model to accurately predict the voltage, degradation, and thermal stresses under service conditions for the critical cell components. The developed framework will be integrated into Alya, an HPC-multiphysics code, coupling it with the fluid solver. The successful candidate will work with a team of experienced researchers to further advance the SOECs field and contribute to sustainable energy technologies development. The model developed by the candidate will be verified and validated against the experimental data gathered from the prototype cells provided by the cutting-edge equipment of project

partners. The outcome of this project involves the candidate working on developing infrastructure for generating Digital Twins that use Artificial Intelligence (AI) and physics-based reduced-order models to process data from the full description of the SOEC system.

Key Duties

- Developing an electro-chemical solver coupled to the Navier-Stokes equations.
- Coupling electro-chemistry with a thermo-mechanical model.
- Predict the overall SOEC performance along with the critical components.
- Interact with the different partners of the projects to carry our collaborative research
- Contribute to scientific publications and reporting to different National and EU projects the researcher will be involved in.

Requirements

- Education
    - The candidate should hold a master's degree or PhD degree with strong background in computational mechanics.

- Essential Knowledge and Professional Experience
    - Knowledge of electrochemistry, heat transfer and fluid mechanics are expected
    - Knowledge of solid mechanics and thermodynamics are expected.
    - Knowledge of numerical methods.
    - General knowledge on computer science and programming languages.

- Additional Knowledge and Professional Experience
    - Fluency in English is essential.

- Competences
    - Strong analytical skills.
    - Ability to work independently and within a team.
    - Good communication and team-work skills to work in a multidisciplinary team.

Conditions

- The position will be located at BSC within the CASE Department
- We offer a full-time contract (37.5h/week), a good working environment, a highly stimulating environment with state-of-the-art infrastructure, flexible working hours, extensive training plan, restaurant tickets, private health insurance, support to the relocation procedures
- Duration: Open-ended contract due to technical and scientific activities linked to the project and budget duration
- Holidays: 23 paid vacation days plus 24th and 31st of December per our collective agreement
- Salary: we offer a competitive salary commensurate with the qualifications and experience of the candidate and according to the cost of living in Barcelona
- Starting date: 16/09/2024

Applications procedure and process

All applications must be made through BSC website and contain:

- A full CV in English including contact details
- A Cover Letter with a statement of interest in English, including two contacts for further references - Applications without this document will not be considered

In accordance with the OTM-R principles, a gender-balanced recruitment panel is formed for every vacancy at the beginning of the process. After reviewing the content of the applications, the panel will start the interviews, with at least one technical and one administrative interview. A profile questionnaire as well as a technical exercise may be required during the process.

The panel will make a final decision and all candidates who had contacts with them will receive a feedback with details on the acceptance or rejection of their profile.

At BSC we are seeking continuous improvement in our recruitment processes, for any suggestions or feedback/complaints about our Recruitment Processes, please contact recruitment [at] bsc [dot] es.

For more information follow this link

Deadline

The vacancy will remain open until a suitable candidate has been hired. Applications will be regularly reviewed and potential candidates will be contacted.

OTM-R principles for selection processes

BSC-CNS is committed to the principles of the Code of Conduct for the Recruitment of Researchers of the European Commission and the Open, Transparent and Merit-based Recruitment principles (OTM-R). This is applied for any potential candidate in all our processes, for example by creating gender-balanced recruitment panels and recognizing career breaks etc.
BSC-CNS is an equal opportunity employer committed to diversity and inclusion. We are pleased to consider all qualified applicants for employment without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age, disability or any other basis protected by applicable state or local law.
For more information follow this link
Barcelona Supercomputing Center - Centro Nacional de Supercomputación

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