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The German Aerospace Center DLR has a dual mandate as the national research center for aeronautics and space, and as the space agency of the German federal government. Approximately 8000 people work for DLR on a uniquely diverse range of topics spanning the fields of aeronautics, space, energy, transport and security research. The DLR's Institute of Engineering Thermodynamics is working on the utilization of technologies of energy conversion that are efficient and gentle on resources as well as on the accelerated utilization of renewable energies. Within this context the Department of Electrochemical Energy Technology at Stuttgart, Germany, invites applicants from all over the world to work with us.

Master Thesis

"1D+1D modeling of reversible Solid Oxide Cell (rSOC) reactors for steady state and dynamic process analyses of electricity storage systems"

The intermittent nature of renewable energy sources demands energy storage systems to stabilize the grid. Additionally with electricity becoming the prime energy mover, alternative synthesis routes for production of industrially relevant chemicals should be developed using renewable energy source instead of fossil fuels. The Institute of Engineering Thermodynamics at DLR is working on novel solutions based on rSOC reactors. In this concept, excess electricity from renewable sources is stored by converting water and carbon-dioxide to produce storable syngas (mixture of hydrogen and carbon monoxide) which can be further used in other process to produce chemicals. In reverse mode the hydrogen or synthetic hydrocarbon based fuels can be used to produce power within the same rSOC reactor when demand exceeds supply.

Your mission:

Within the scope of your master thesis an existing 1D+1D multi cell rSOC stack model should be improved and validated against available experimental results within Dymola (Modelica) software. Your work should place particular emphasis on implementing a degradation model for steam-electrolysis and a reaction model for carbonaceous gas mixtures in fuel cell and electrolysis mode. The final 1D+1D rSOC stack model must be modular, computationally efficient and compatible for process system modeling. The final results will be published in a reputed peer-reviewed journal.

Your qualifications:

- Self-motivated student with a strong interest in exploring novelty is highly encouraged
- Background in chemical or process systems engineering, electrochemistry, numerical computation is required
- Programming experience or knowledge preferably with Modelica language is required. Proficiency or knowledge of other scientific programming languages is also accepted
- Previous knowledge of Solid Oxide Electrolysis Cell and Solid Oxide Fuel Cell is advantageous
- Fluency in written and spoken English is required

Time frame

6 months. Start date can be discussed.

Your benefits:

Look forward to a fulfilling job with an employer who appreciates your commitment and supports your personal and professional development. Our unique infrastructure offers you a working environment in which you have unparalled scope to develop your creative ideas and accomplish your professional objectives.
Disabled applicants with equivalent qualifications will be given preferential treatment.

Contact:

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