

Doctoral (PhD) Chemical looping combustion

Ecole/Institution/Société:

University de São Paulo , Brazil / Brazil

Discipline:

Chemical Engineering

Type d'emploi::

Full-time

Date de publication:

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Personne à contacter:

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Job Categories

- Graduate Student
- Academic Fields
- Mechanical Engineering
- Engineering Mechanics
- Engineering - Other

Project title

COMPARATIVE STUDY OF DIFFERENT TEMPERATURE MEASUREMENT TECHNIQUES APPLIED TO CHEMICAL LOOPING COMBUSTION

Abstract

Within the most promising carbon capture technologies, the chemical looping combustion (CLC) stands out -. Following this technology, CO₂ capture is intrinsic to the combustion process in which the contact between fuel and oxidizer is circumvented by the usage of oxygen carriers (OC).

Nevertheless, the commercial feasibility of such a technology requires that processes are conducted at moderate to high pressure values -. To attend this demand, packed bed reactors have been demonstrated to be a feasible constructive option A common aspect to the broad variety of the already published studies refers to the performance of low pressure experiments without a specific assessment of gas and OC temperatures.

The lack of temperature information of both phases during a reaction evolution is a bottle neck for modeling improvements and to obtain a more comprehensive understanding about the underlying physics.

Therefore, the main purpose of this research proposal is to investigate different temperature

measurement techniques with the aim to contribute with a better description of the temperature evolution of both participating phases in packed bed CLC reactors. Focus will also be given to operational strategies to control the temperature of the flue gas and the solid bed. For that, the realization of experimental measurements is indispensable. In a first stage, efforts will be

concentrated in a quasi-one-dimensional CLC reactor similar to that originally proposed in and further studied in .

This will be extended in order to allow the realization of measurements of pressures higher than 2.5 bar. Here, different operating strategies will be evaluated. In a second stage, measurements will be conducted in a laboratory scale packed bed reactor with optical access. In this burner, the different temperature measurement techniques will be evaluated.

It is important to highlight that as the quasi-one-dimensional burner will present small dimensions, it will be used as a initial test bench for the subsequent analysis in the multidimensional one. Proposed tasks are not only strictly connected with the Work Fronts 1, 2, and 6, but also with the first goal of the Work Stream A of the research project "Chemical Looping Combustion (CLC) and Oxy-fuel combustion with NG and Biogas".

The candidate will collaborate with researchers from the project 67 "Chemical Looping

Combustion (CLC) and Oxy-fuel combustion with NG and Biogas" of the FAPESP-Shell Research Centre for Gas Innovation of POLI-USP at the University of São Paulo. Summary of the program and projects can be found at the RCGI website (<http://www.rcgi.poli.usp.br/>).

Description

The applicant will contribute in line with the main objectives of the project:

- Development and construction of reference burners for model validation
- Investigation of the usage of biomass based fuels in CLC

Requirements to fill the position

This project would be well-suited to a highly motivated candidate requiring experience in mechanical design, instrumentation, and experimental analysis.

- The PhD candidate should be hold a bachelor in Engineering. It is wanted that the candidate holds a [M.Sc.](#) degree, which should have been obtained within the last five years.

INFORMATION ABOUT SCHOLARSHIP:

This PhD scholarship is funded by FUSP. The scholarship will cover a standard maintenance stipend of R\$ 3.726,30 per month.

MORE INFORMATION:

<https://www.rcgi.poli.usp.br/opportunities/Position: PhD Scholarship REF: 21PhD141>

Contact

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