

Fluidized Bed Reactor System for Chemical Looping Combustion of Gaseous Fuels

Keywords: Cleantech / Zero Emission Energy / Fluidized Bed Technology/
Carbon Capture and Storage / Natural Gas /

An alternative fluidized bed combustion process with inherent CO₂ separation at nearly no energy penalty. The special reactor design guarantees a robust process for clean - zero emission - generation of power, heat and/or steam.

TECHNOLOGY

Capture and subsequent storage of CO₂ emissions from large point sources (Carbon Capture and Storage, CCS) in power and industry is seen as a major contribution to the portfolio of climate change mitigation technologies. Among the discussed technologies, Chemical Looping Combustion is seen as carbon capture technology with very high potential due its high efficiency.

It is an alternative combustion technology where CO₂ is captured inherently during combustion without energy intense gas separation common to other capture processes. Combustion is divided into two different reaction zones in a way that air and fuel are never mixed. A solid oxygen carrier circulates between the two reaction zones and transports oxygen from air to fuel. Air with a reduced concentration of oxygen is discharged from one zone, water vapour and CO₂ from the other one. After condensation, a pure CO₂ stream is obtained for storage or further utilization.



Pilot plant at TU Wien

APPLICATIONS

Potential applications for Chemical Looping Combustion are not only in the power sector for electricity production. A very high potential is seen in industry for production of process heat and steam. Here, a conventional steam cycle can be used. Chemical Looping Combustion can also serve as integrated and highly efficient energy and CO₂ supply technology for innovative carbon utilization processes.

BENEFITS

- Alternative combustion process with inherent CO₂ separation avoiding gas separation
- CO₂ separation with nearly no energy penalty
- Low NO_x tendency since air and fuel are never mixed
- Can be used for electricity, heat and steam generation
- Suitable for power and industry sector

REFERENCE:

M013/2007

IPR:

Patents granted

INVENTORS:

Hermann Hofbauer et al

DEVELOPMENT STATUS:

Readiness Level (TRL) 6, i.e. system validation in relevant environment was successful.

Demonstration in the range of 10 MW fuel power input (natural gas) is seen as next step in development of the technology.

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