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Validation of the oxygen buffering ability of bed materials used for ocac in a large scale cfb boiler

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Validation of the oxygen buffering ability of bed materials used for OCAC in a large scale CFB boiler

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May 23rd, 2016

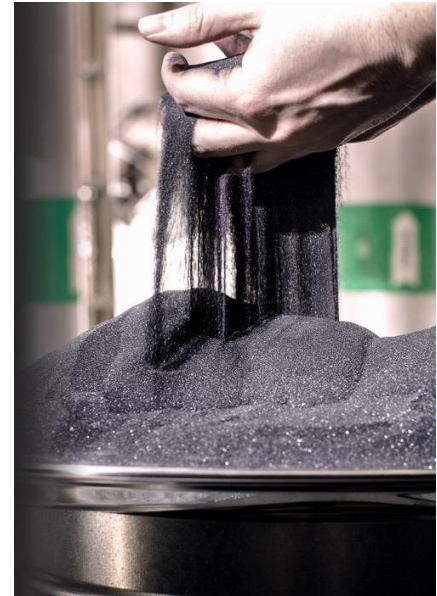
Fluidization XV – Fairmont Le Chateau Montebello
Quebec, Canada

Circulating Fluidized Bed boilers



Background to OCAC

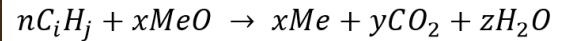
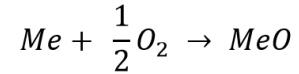
- Spinoff from Chemical Looping Combustion
- Addition of ilmenite as part of bed inventory
- Possibility to provide an increased oxygen distribution



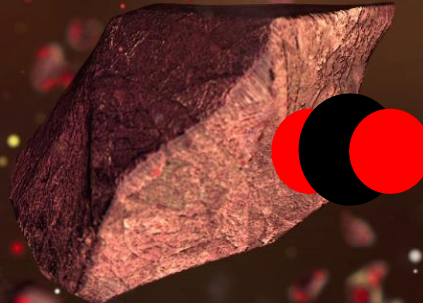
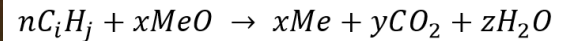
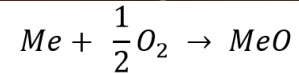
Oxygen Carrier Aided Combustion



Oxygen Carrier Aided Combustion



Oxygen Carrier Aided Combustion



Aim: Validation of the OCAC concept

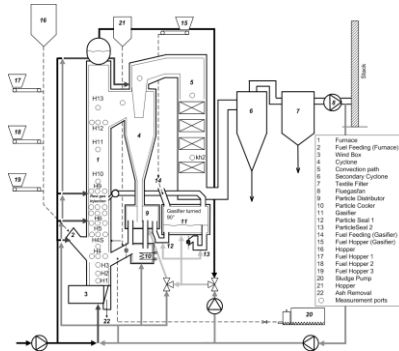
- Earliest investigation with 100% ilmenite in industrial relevant CFB conditions
- Evaluate oxygen buffering ability experimentally
- Validate experiments by identifying conceptual patterns with a dynamic pulse response

Research from lab to commercial scale

Labscale reactor



Chalmers 12MWth
research boiler



E.ON commercial waste boiler 80MWth



Continuous operation
since February 2016

2013

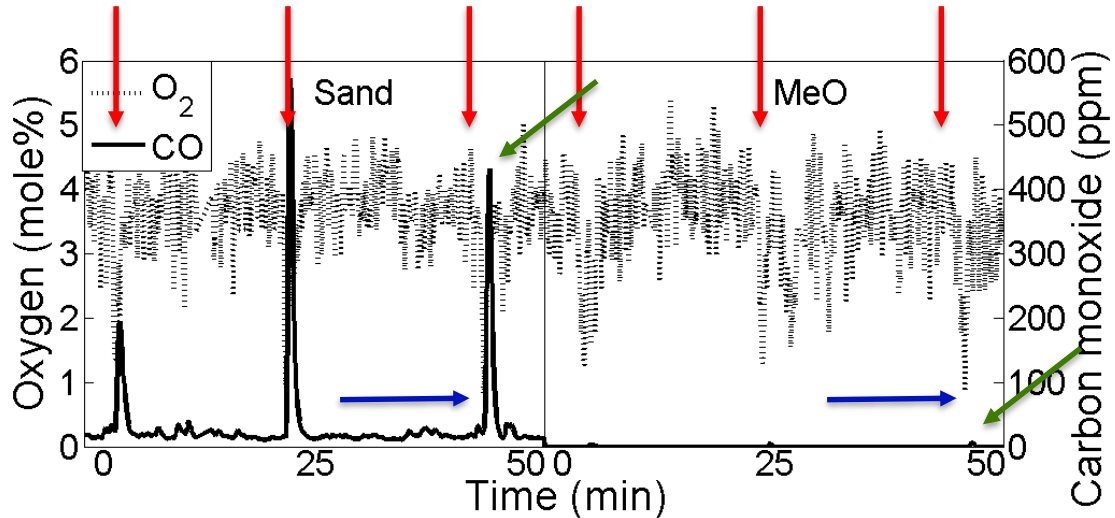
2014

2014 - 2016

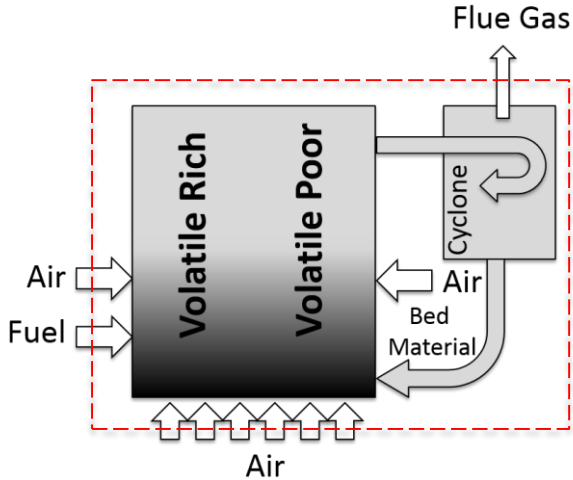


Experimental: Procedure and Results

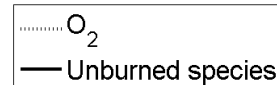
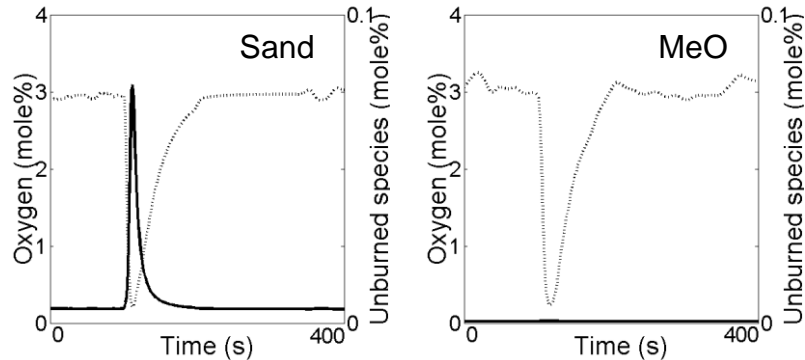
- Reference case with 100% silica sand was compared to operation with 100% ilmenite
- Instantaneous fuel pulse of 8MW on top of the 6MW base load



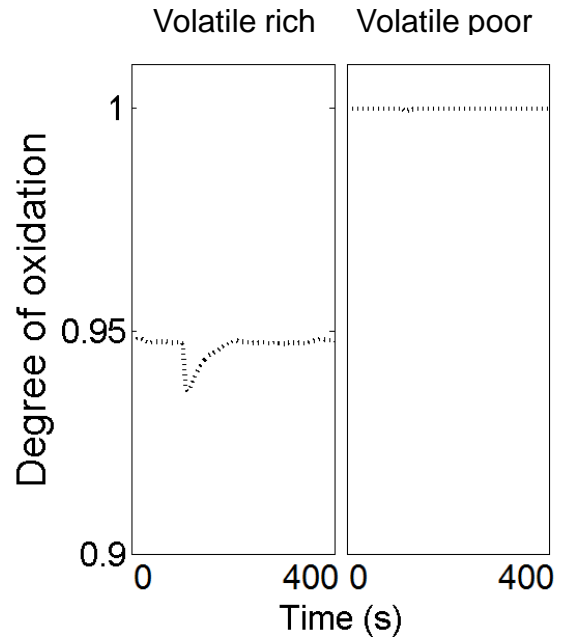
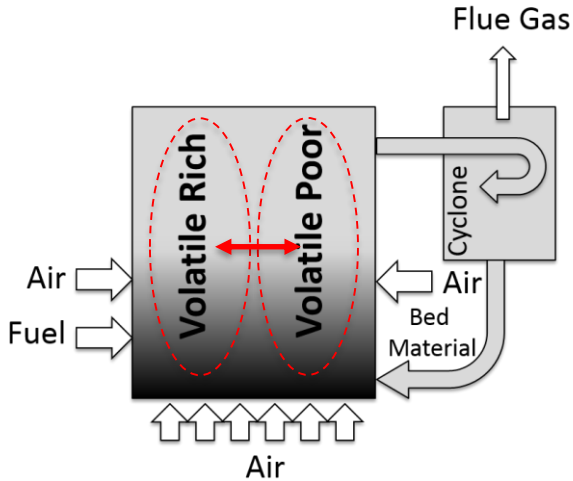
Dynamic pulse response



Flue gas concentrations



Dynamic pulse response



Concluding remarks

- Initial experience with MeO in large scale
- MeO has oxygen buffering properties
- Enhanced utilization of oxygen in time and space



Thank you!



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