SCALE-UP OF CLC OXYGEN CARRIERS FOR GASEOUS FUELS

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Chemical Looping Combustion, CLC, is one of the most promising processes to capture CO2 at a low cost. It is based on the transfer of the oxygen from air to the fuel by using a solid oxygen carrier that circulates in dual fluidized bed systems. The CO2 capture is inherent to this process, as the air does not get mixed with the fuel. However, the CLC process is still under development waiting for a large scale demonstration experience.

The key issue in the system performance is the oxygen carrier material. The oxygen carrier must fulfil several characteristics such as high reactivity and good fluidization properties, that will rely on their redox system and the support. Therefore, the identification of raw materials, available at multi-tonn scale at a competitive price, is one of requirements for the success of the technology.

Promising impregnated oxygen carriers, based on copper and iron, have been developed to perform well for gaseous fuels (CH4, syngas , LHC..), although they were prepared from not commercially scalable production supports. In this work, the performance of different impregnated materials, prepared with commercial-scale supports, was analyzed during methane combustion in a continuous 500 Wth CLC unit to identify the best material based on reactivity, attrition resistance and sulfur tolerance.

A copper-based material with improved performance than the reference material was identified and therefore proposed as the best oxygen carrier for scale-up CLC technology for gaseous fuels.