



Tomasz Wiltowski

Novel Concept For Hydrogen And CO₂ Separation From Syngas

The Technology

A novel process has been developed for the separation of hydrogen from coal gasification-based syngas components. The process is flexible so it can be used within the gasifier to separate hydrogen, or as a separate unit process.

The basic idea of the research was to design and apply solids to be used in a fixed-bed reactor that will increase the hydrogen yield as well as capture greenhouse gases in its matrix through reaction. The spent solids are regenerated thermoneutrally while releasing sequestration-ready CO₂.

These solids have been designed so that they have the maximum selectivity for the beneficial reactions while maintaining their structure and activity through the reaction-regeneration cycles. Iron (created by reduction of hematite with syngas) is the Boudouard catalyst and CaO is the CO₂ removal material. Synthesized CaO has been found to provide better capacity and reaction rates as compared to commercially available CaO. In addition, these specially synthesized CaO-based sorbents show lower deactivation over multiple cycles.



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