Researchers at the University of South Florida have developed a catalyst and process that achieves efficient conversion of carbon dioxide gas (CO$_2$) to carbon monoxide (CO).

Global environmental concerns have led to a major shift of research focus and investment to renewable energy generation. However, the need for fossil fuels remains on the rise due to the demand for transportation fuels and electricity generation which results in vast emissions of carbon dioxide, a major greenhouse gas. There is a growing body of research into carbon capture and storage (CCS), which is aimed to mitigate this CO$_2$ emission problem. It has been shown that captured CO$_2$ can be converted to CO, which can be used to create valuable hydrocarbon fuels. The large majority of emitted CO$_2$ is still not recycled though, as current CO$_2$ to CO conversion processes are not ideal and require high temperatures, often above 1000°C. In order develop viable technologies that recycle carbon dioxide into hydrocarbons, there is a need for processes that afford a higher conversion of CO$_2$ to CO at lower temperatures.

USF inventors have developed a more efficient process and catalyst for converting waste CO$_2$ to CO, called reverse water gas shift chemical looping (RWGS-CL). This process is capable of converting carbon dioxide to CO at a low temperature of 600°C with unprecedented rates using a LSF-silica composite catalyst developed by the researchers. Mixed metal oxides used in the catalyst achieve a 100% selective generation of CO from CO$_2$. Due to the high conversion of CO$_2$ to CO and the relative low operating temperature, the RWGS-CL process is a cutting edge CO$_2$ recycle technology that will contribute to the creation of feasible processes for conversion of CO$_2$ emissions into usable fuels.

ADVANTAGES:
- Higher rate of conversion than previously achieved
- Low temperature (600°C)
- 100% catalyst selectivity

Efficient Conversion of Waste CO$_2$ to CO Brings Us Closer to a Complete CO$_2$ to Fuel Recycle Process

The RWGS-CL Process - The Catalyst is Partially Reduced and CO$_2$ is Converted to CO Over the Reduced Catalyst

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