Researchers at the University of South Florida have developed methods for splitting CO\textsubscript{2} into CO by thermochemical processes at much lower temperatures than used in normal solar thermochemical reactions. CO\textsubscript{2} emissions have a multitude of hazardous effects on the environment. In order to combat this, carbon capture and storage processes have been explored and utilized; however, the impact of underground captured CO\textsubscript{2} poses environmental and sustainability concerns.

Looking towards the future, repurposing CO\textsubscript{2} for generating hydrocarbon fuel or its subsequent derivatives allows for lesser dependence on fossil fuel reserves and prepares for a renewable green energy driven society. CO\textsubscript{2} can be split in thermochemical reactions and repurposed as CO, which has a vast market pertaining to hydrocarbon fuel or methanol, though these reactions require >1000°C. There is a need for a sustainable approach to break down CO\textsubscript{2} and decrease the negative environmental impacts.

Our researchers have invented a new CO\textsubscript{2} splitting process which requires a much lower temperature and utilizes sustainable energy. In this process, hydrogen is flowed over heated perovskite oxides (ABO\textsubscript{3}) to create oxygen deficient materials. These oxygen deficient materials are then utilized to convert CO\textsubscript{2} to CO.

Materials created in this novel process can be used as catalysts and for the creation of hydrocarbon fuel or methanol and methanol derivatives synthesis, making this process not only environmentally beneficial, but profitable as well.

**ADVANTAGES:**

- Sustainable processes
- Much lower temperatures for thermochemical splitting reactions
- Production of CO for other utilizations

**Thermochemical Based CO\textsubscript{2} Reduction to CO Strategies at Lower Temperatures as a Sustainable Process**

**Reverse Water Gas Shift-Chemical Looping Process for CO\textsubscript{2} Conversion to CO Over ABO\textsubscript{3} Type Perovskite Oxides**

Tech ID # 16B190