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Affordable Hydrogen Production from an Efficient Solar Reactor (20110019, Dr. Jane Davidson)

Technology No. 20110019

IP Status: Issued US Patent; **Application #:** 14/359,802

Solar Thermochemical Reactor Produces Syngas

A thermochemical reactor has been developed to produce syngas, a mixture of hydrogen and carbon monoxide from concentrated solar energy, water, and carbon dioxide. The solar reactor efficiently produces affordable hydrogen that can be used directly as fuel. The reactor features dual zones for the simultaneous reduction and oxidation through the continuous cycling of metal oxide to split water and carbon dioxide. The physical contact area between the reduction and oxidation zones is minimized to reduce heat and mass transfer. Using a solar reactor reduces the dependence on petroleum and other fossil fuels, as well as the emission of greenhouse gases. Current solar thermochemical approaches are greatly restricted by the efficiency of the reactor, which is less than one percent. This solar thermochemical reactor has the potential to provide a rapid and efficient method to produce fuels with 10X greater efficiency than current methods.

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Hydrogen Production from Solar Energy Sources

The solar thermochemical reactor represents a major advance in technology that provides a revolutionary and transformational approach using abundant solar resources to produce hydrogen. The thermochemical reaction produces hydrogen using concentrated solar energy as the main energy source, and water and carbon dioxide as the feedstock. This reaction recycles carbon dioxide to carbon monoxide, which is a component of syngas. The solar reactor uses concentric cylinders for effective heat recuperation, while simultaneously conducting the reduction and oxidation reactions.

BENEFITS OF SOLAR REACTOR TO PRODUCE HYDROGEN

- Reduces Dependence on Fossil Fuels--solar energy is the main energy source.
- Reduces Emission of Greenhouse Gases--solar energy drives the reaction.
- Improved Efficiency--10X greater efficiency than current solar thermochemical approaches.

Phase of Development Concept has been proposed and reactor is currently being designed.

Researchers

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