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gas-leverage-turbine-combining-brayton-and-orc-cycles-by-infinity-turbine

Infinity Turbine LLC

Gas Leverage Turbine Combining Brayton and ORC Cycles

This webpage QR code

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Gas leverage turbine using first principles for phase change dynamics for continuous production of gamma sulfur and continuous on-demand gas flow battery technology.

PDF Version of the webpage (first pages)

Gas Leverage Turbine

The Gas Leverage Turbine (GLT) is a product which has been in development for some time. It is a hybrid between the Brayton Cycle and Organic Rankine Cycle.

The unique part of this turbine is that it can be closed-loop using CO2 as the working fluid taking advantage of sonochemistry (cavitation) as a process enhancer for the production of battery materials (such as gamma sulfur) as well as a gas flow battery.

This amazing device can also be used simultaneously as a heat pump, which only leverages its use in range extending for electric cars.

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Infinity Turbine Gas Leverage Turbine Devices

Since 2004 Infinity has been working with and developing CO2 devices including expanders and cavitation mechanisms.

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Gas Leverage Turbine Process Manufacturing

The Gas Leverage Turbine can use different (liquid) working fluids, which include CO2 and water. Both of which can be phase changed via cavitation.
In process manufacturing sonofication and spinning disc reactor can enhance reactivity and shorten processing time for continuous manufacturing.

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Gas Leverage Turbine Gas Flow Battery

The Gas Leverage Turbine can be used as a gas flow battery using zeolites as the energy storage media.
Some zeolites have the interesting ability to store and release heat when in contact with liquid (in this case water or CO2).
To store heat, simply heat the zeolite.
To release heat, simply add liquid (water or CO2).
The released heat can be used to drive a expander (turbine) which may drive a generator, electrostatic generator, shaft drive, or combination of all of the above.

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Gas Leverage Turbine Propulsion

The Gas Leverage Turbine can be used as a propulsion device using zeolites as the energy storage media.
Some zeolites have the interesting ability to store and release heat when in contact with liquid (in this case water or CO2).
To store heat, simply heat the zeolite.
To release heat, simply add liquid (water or CO2).
The released heat can be used to drive a expander (turbine) which may drive a generator, electrostatic generator, shaft drive, or combination of all of the above.
For drones and electric flight applications, the shaft drive may power a rotor (standard fan or vortex rotor), or provide electrostatic energy for plasma and beam applications.
Plasma drive development is underway in many areas including propulsion as well as anti-icing for wings and surfaces.
Electrostatic beam applications may be able to provide wireless transmission of energy for drones which will provide extended times aloft for loitering without need to replenish fuel onboard.
The unique atmosphere conditions where it gets colder as you get higher in altitude, lend itself to a air-to liquid condenser. At 30,000 ft the temperature is generally -48F (-44.5C).

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Monoclinic Gamma-phase Sulfur Production

Another interesting application for the gas leverage turbine is the continuous production of battery components, in this case gamma sulfur.

Abstract: Here, we stabilize a rare monoclinic γ-sulfur phase within carbon nanofibers that enables successful operation of Lithium-Sulfur (Li-S) batteries in carbonate electrolyte for 4000 cycles. Carbonates are known to adversely react with the intermediate polysulfides and shut down Li-S batteries in first discharge. Through electrochemical characterization and post-mortem spectroscopy/ microscopy studies on cycled cells, we demonstrate an altered redox mechanism in our cells that reversibly converts monoclinic sulfur to Li2S without the formation of intermediate polysulfides for the entire range of 4000 cycles. To the best of our knowledge, this is the first study to report the synthesis of stable γ-sulfur and its application in Li-S batteries. We hope that this striking discovery of solid-to-solid reaction will trigger new fundamental and applied research in carbonate electrolyte Li-S batteries.

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Zeolites for Airborne Power Unit

One interesting application of the gas leverage turbine is airborne electric aviation (including drones). For this application, heat transfer Zeolites can produce large amounts of heat when water is applied (exited as steam) for a closed-loop CO2 based turbine generator which can provide electricity to motors to provide propulsion.

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Industry Leader in CO2 Phase Change Dynamics

Since 2015 Infinity has been developing and building materials extraction systems based on phase change dynamics of carbon dioxide. One interesting discovery was the production of large amounts of static (DC) electricity while expanding pressurized CO2 over a hybrid plastic which acted as a in-situ electrostatic precipitator (commonly referred to as Tribo effect).

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NASA Redox Storage System Development

The Gas Leverage Turbine can also be used for gas flow battery technology.

Legacy Redox Flow Battery has its origins with NASA:

The Redox Storage System Technology Project was jointly supported by the U.S. Department of Energy and NASA. The objectives of the project were to develop the Redox flow battery concept and to probe its technical and economic viability. The iron and chromium redox couples were selected as the reactants. Membranes and electrodes were developed for the original mode of operating at 25 C with the reactants separated by an ion-exchange membrane. Analytical capabilities and system-level operating concepts were developed and verified in a 1-kW, 13-kWh preprototype system. A subsequent change was made in operating mode, going to 65 C and using mixed reactants. New membranes and a new electrode catalyst were developed, resulting in single cell operation as high as 80 mA/sq cm with energy efficiencies greater than 80 percent. Studies indicate a likely system cost of about $75/kWh. Standard Oil of Ohio (Sohio) has undertaken further development of the Redox system. An exclusive patent license was obtained from NASA by Sohio. Transfer of Redox technology to Sohio is supported by the NASA Technology Utilization Office.

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