Supercritical CO2 Turbine Test Cart by Cavgenx and Infinity Turbine

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https://cavgenx.com/supercritical-co2-turbine-test-cart-by-cavgenx-and-infinity-turbine.html

Discover the huge potential of the high energy density of supercritical CO2 with this test cart developed by Cavgenx a division of Infinity Turbine LLC

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CO2 and Waste Heat to Power

3 D Printed CO2 Turbine Generator.

Using Supercritical CO2 to Kiln Dry Wood

Conventional kiln drying of wood operates by the evaporation of water at elevated temperature. In the initial stage of drying, mobile water in the wood cell lumen evaporates. More slowly, water bound in the wood cell walls evaporates, requiring the breaking of hydrogen bonds between water molecules and cellulose and hemicellulose polymers in the cell wall. An alternative for wood kiln drying is a patented process for green wood dewatering through the molecular interaction of supercritical carbon dioxide with water of wood cell sap. When the system pressure is reduced to below the critical point, phase change from supercritical fluid to gas occurs with a consequent large change in CO2 volume. This results in the efficient, rapid, mechanical expulsion of liquid sap from wood.

A potential advantage of applying the green wood dewatering process described above to produce wood material with moisture content at the fibre saturation point and with no resulting distortion, shrinkage, or discolouration is to use the dry wood output from this process as either a finished product in itself (as in the example of eucalypt wood), or as an intermediate towards wood modification or biocide treatment where, as for the triazoles, the modifying agent or biocide is soluble in supercritical carbon dioxide.

The ability to carry out two key steps in the manufacture of dry, durable wood materials and products at a single site, in one factory where the equipment and machinery could be used for both drying and molecular-modifying steps, would potentially eliminate the multiple handling of wood at intermediate conventional processing steps.

Trimethyl borate and some boratranes (tricyclic borate esters) are also soluble in supercritical carbon dioxide, making these potential compounds for the modification of dewatered wood using supercritical carbon dioxide as the biocide delivery solvent for the manufacture of biologically durable, quality wood products.

Dewatering green sapwood derived from plantation-grown radiata pine and several other softwood and hardwood timber species, using carbon dioxide cycled between the supercritical fluid and gas phase, has proven to be an efficient process for rapidly reducing wood moisture content from as much as 200 percent (based on dry weight) to 40 percent (or below, depending on the anatomical structure of the wood). Dewatering has the added benefit of zero volatile emission compared to kiln drying, with all of the sap chemicals being captured in the exudate, which in turn provides a source of numerous chemicals with potential high value to be obtained from them. While the dewatering process has merit for producing dry timber as an industrial product per se, a significant benefit for wood product manufacture may be the ability to sequentially dewater green wood and then undertake wood material modification. For example, biocide molecules dissolved in supercritical carbon dioxide could be introduced in situ, to impart wood product bio-durability without the need to physically handle the wood material.

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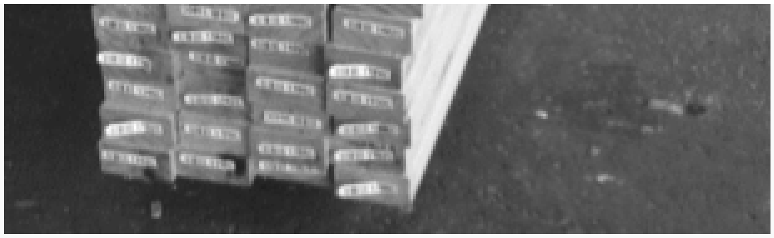

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Supercritical CO2 10L Extractor System

Supercritical CO2 Extractor 10L system for botanical oil extraction.

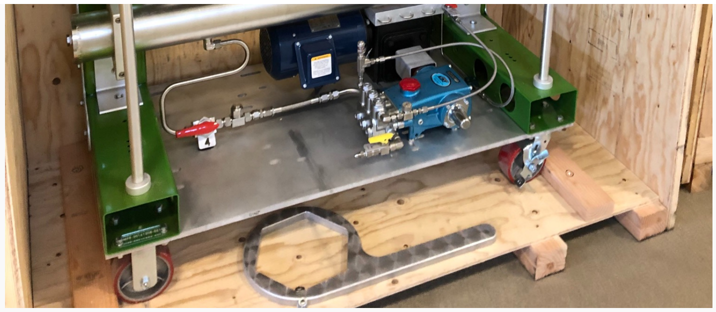
This system is built like a tank. Powder coated caster beams with 5 inch heavy duty casters for easy movement.

This system is compact and will fit through any standard door, hallway, or elevator.

System operation is manually set parameters, with automatic feedback PID to maintain temperature and pressure. Set it and watch the extraction.

System is designed for maximum 2,000 psi operation. Most processors use 1,400 psi or less.

Terpene extraction can be done running cold prior to turning on the heat for FSO extraction. This system is great for beer hop extraction, lavender, vanilla, pinene, and other valuable terp extractions.



Introducing the IT Micro CO2 Rankine Cycle Demonstrator

Phase Change Generator. Electrostatics Generator Using Tribo-Tube:

Testing and Development Platform

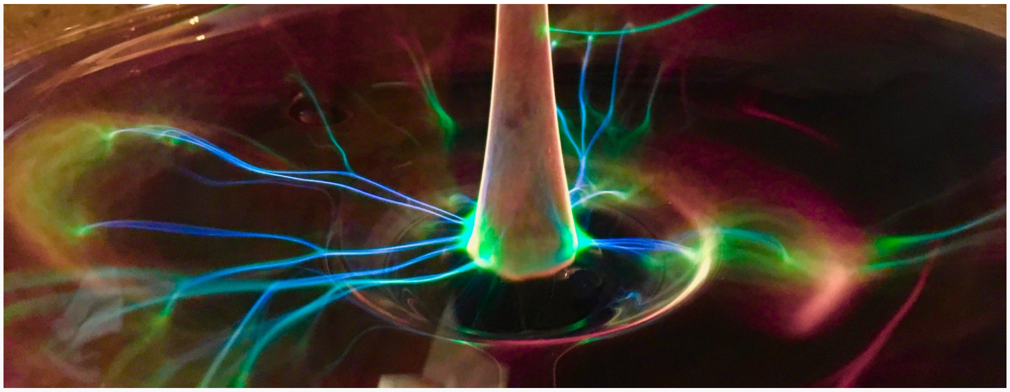
Available as a prototype testing platform, Infinity has developed a micro-sized CO_2 system which demonstrates CO_2 Rankine Cycle (phase change flow cycle). The high pressure filter housing (off-the-shelf) used as the expander vessel, can also be used with TriboGen, or a combination of a turbine (not included since we don't have millions to develop it) and static electricity harvesting system.

Our hybrid food-grade plastic elements can also be used, for electrostatic precipitation (ESP), if you have particulates entrained in the gas flow. This is to demonstrate the potential of the CO_2 Rankine Cycle as a point-of-use distributed power generation technology using low grade heat via CO_2.

Static Electricity Using CO2 With No Moving Parts

TriboElectric Effect:

Nikola Tesla worked with static electricity and wireless transmission in 1899 from the top of Pikes Peak to his lab in Colorado Springs, Colorado. Fast forward to 2016. Infinity was working with Supercritical CO_2 systems, when they discovered an interesting effect which was static electricity when CO_2 passed over certain materials. That discovery became a commercial product called the TriboTube, which is a electrostatic precipitator that assists in removing oil and particulates from CO_2 gas. Now Infinity is developing a solid state power generator, utilizing CO_2.



Introducing the Infinity Turbine Supercritical CO2 Phase Change Demonstrator

Phase Change Generator • Electrostatics Generator Using Tribo-Tube • Ion Generator • SWET

Now Available for Educational and Inventors

Testing and Development Platform

Price: Call or email for pricing.

Available as a prototype testing platform, Infinity has developed a micro-sized Supercritical CO_2 Rankine Cycle (phase change flow cycle). The high pressure filter housing (off-the-shelf) used as the expander vessel, can also be used with various catalysts (Lithium), plastics (TriboGen), or a combination of a turbine and static electricity harvesting system. Our hybrid food-grade plastic elements can also be used for electrostatic precipitation (ESP), if you have particulates entrained in the gas flow. This is to demonstrate the potential of the Supercritical CO_2 Rankine Cycle as a point-of-use distributed power generation technology using low grade heat via CO_2. This includes waste heat from computer server farms, solar thermal, etc.

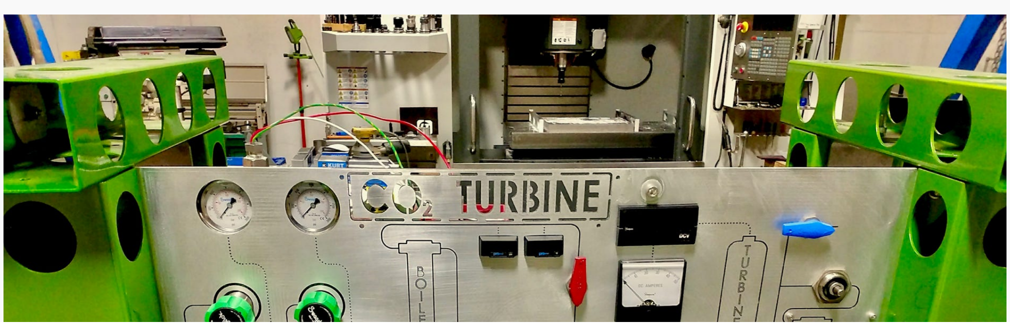
This unit can use heat as low as 89F to phase change liquid CO_2 to vapor, then pressure drop to generate large voltages and ions over a hybrid plastic.

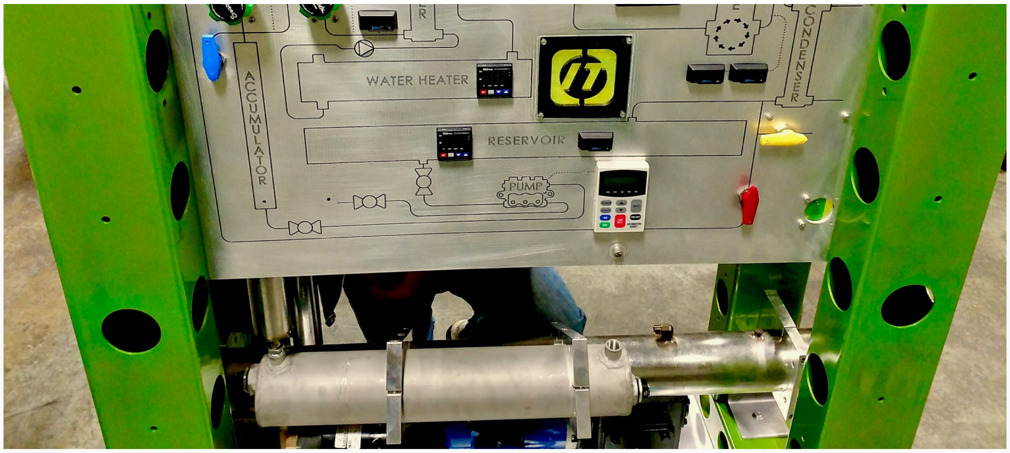
Recent developments in solid state wind generators see:

A solid-state wind-energy transformer

A Solid-state Wind-Energy Transformer (SWET), uses coronal discharge to create negative air ions, which the wind carries away from the SWET. The SWET harnesses the wind-induced currents and voltages to produce electrical power.

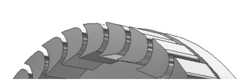
The generation of airflows by ionic currents, electrohydrodynamics, is well studied and has numerous applications,1 even including airplane flight.2 The reverse process, using airflows to create ionic currents, has received much less attention. Until now, no one has generated net electrical power with wind-driven ionic currents. The barrier for producing electrical power by this process is the high mobility of air ions: the mobility problem. Electric fields pull the ions through the neutral air, creating drift currents that tend to short-out the voltages generated by the wind-driven currents. This mobility problem can be overcome if the apparatus is designed such that the electric fields are sufficiently weak so that the wind largely controls the ion motion.





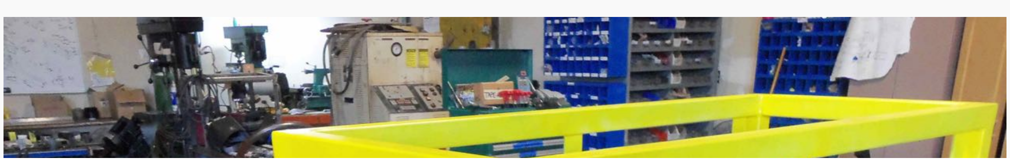
IT Mini CO2 Turbine Expander

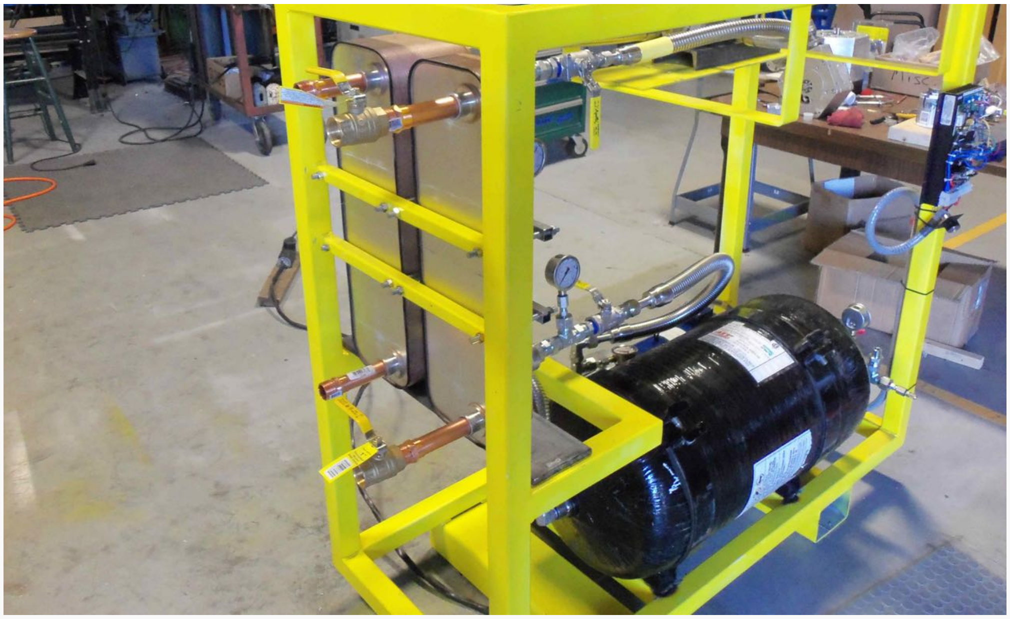
The expander is designed for higher pressure flow.



CO2:

Infinity Turbine LLC already develops ORC green energy systems and is developing CO_2 energy modules (in high temperatures can be over 40 percent efficient in the Brayton Cycle). Infinity is seeking funding to further this development. Until we get funding, we’ll continue to develop the CO_2 Rankine cycle.

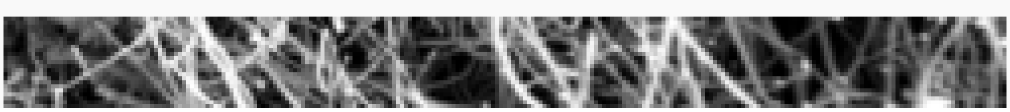


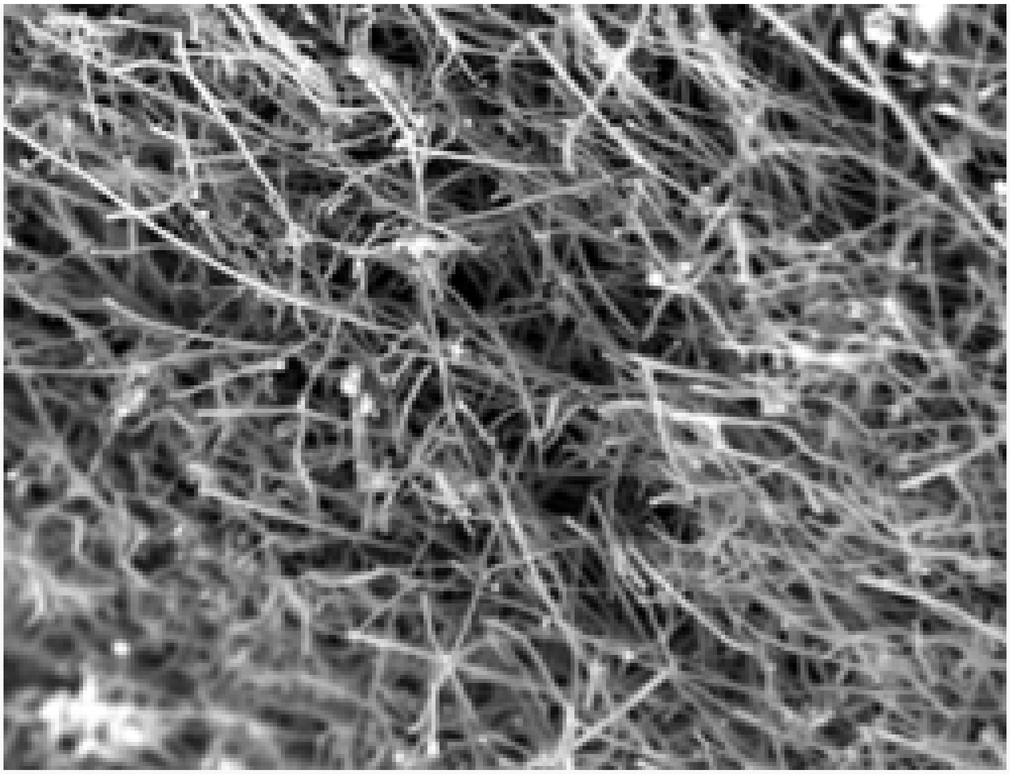


One-Pot Synthesis of Carbon Nanofibers from CO_2

Carbon nanofibers, CNFs, due to their superior strength, conductivity, flexibility, and durability have great potential as a material resource but still have limited use due to the cost intensive complexities of their synthesis. Herein, we report the high- yield and scalable electrolytic conversion of atmospheric CO_2 dissolved in molten carbonates into CNFs. It is demonstrated that the conversion of $CO_2 \rightarrow C_{CNF} + O_2$ can be driven by efficient solar, as well as conventional, energy at inexpensive steel or nickel electrodes. The structure is tuned by controlling the electrolysis conditions, such as the addition of trace transition metals to act as CNF nucleation sites, the addition of zinc as an initiator and the control of current density. A less expensive source of CNFs will facilitate its adoption as a societal resource, and using carbon dioxide as a reactant to generate a value added product such as CNFs provides impetus to consume this greenhouse gas to mitigate climate change.

KEYWORDS: Carbon nanofibers, carbon composites, carbon capture, climate change, solar energy

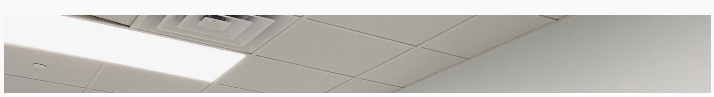


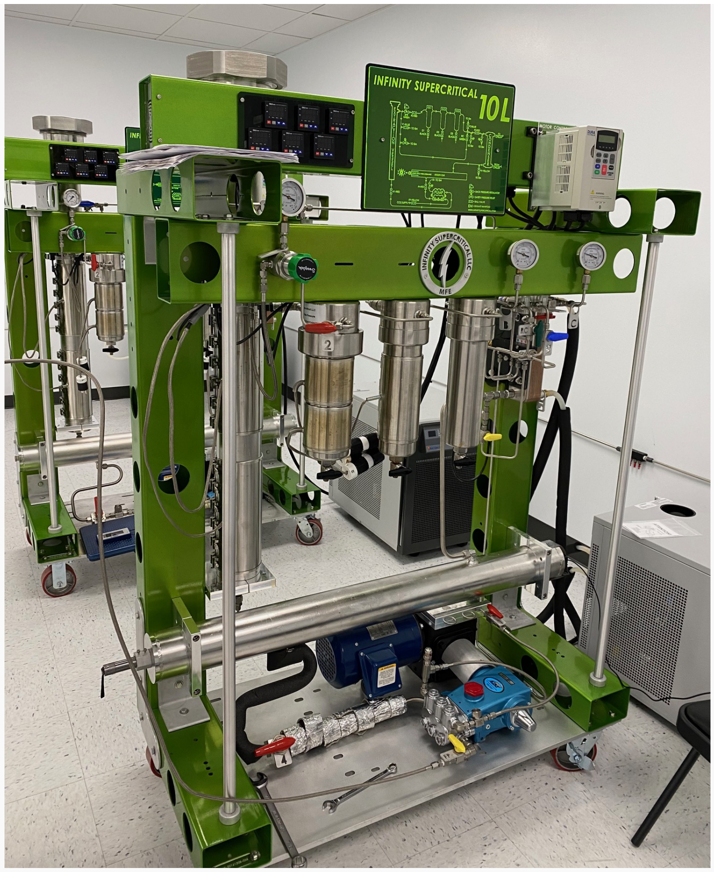


Quiet Pump Technology for Supercritical CO2

Our systems do not use noisy and heat generating air or CO2 compression systems. Other systems require a separate air compressor to run, and a chiller to cool down the compressor.

Our systems use phase change dynamics, which use solid state thermoelectric devices to bring CO2 to supercritical. This results in energy cost savings, and less operator (noise) fatigue. Our systems run silent.

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