



GINERLABS

Anything is Possible With
Electrochemistry

- Silent Running, Long Range, Large UUVs Without a Snorkel
- Aircraft That Can Stay at High Altitude for Months at a Time
- Extended Range, Rapid Redeployment UAV
- Improved Treatment and Detection for Lung Cancer
- A Cure for Diabetes
- Reduction in Drug and Substance Abuse

Discover

What's Possible at
Giner Labs

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about

Giner, Inc., founded in 1973 is a privately held for-profit business performing applied research and development in electrochemistry for use in Proton Exchange Membrane (PEM) Fuel Cells, PEM Electrolyzers, biomedical sensors and devices, and lithium ion batteries. Giner, Inc. currently employs 60 people, including 14 with Ph.D. degrees in the physical sciences or engineering. Our staff has over 500 years of combined experience in electrochemistry and are inventors on 47 patents.

Today Giner is organized into three companies; Giner ELX, Giner Life Sciences and Giner Labs; with Giner Labs serving as the development and commercialization engine. The core competencies and capabilities of Giner Labs are presented below.



AEROSPACE and DEFENSE

For more than 40 years. Giner has been a world-renowned center of excellence for the development and advancement of electrolyzers, fuel cells and related materials, and holds more than 40 patents in these areas. We continue to push the frontiers of this technology in part due to grants and contracts from the DOE, DOD and NASA; as well as development contracts from commercial enterprises.



ELECTROLYZERS FOR LIFE SUPPORT

Our state of the art electrolyzers are the most efficient available, with low mass and small footprints. They are used to provide life-supporting oxygen on the US Navy Submarine Fleet, and are scheduled for installation on the International Space Station.

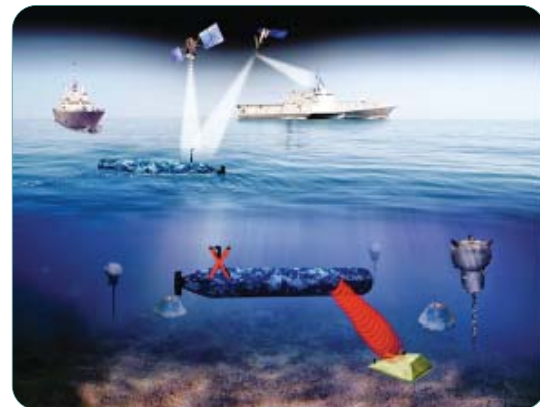


In addition to electrolyzers for aerospace and defense applications, Giner ELX was formed in 2017 for large scale electrolyzers used in the grid level storage of renewable energy, and to provide green, on site production of hydrogen for refueling stations.



FUEL CELLS FOR UUVs AND UAVs

All Giner fuel cells feature a dead ended design. This eliminates the need for external water management components such as pumps, resulting in compact, lightweight systems that enable large UUVs to run silent, and stay at mission depths without the need to surface for 30 hours or more.



These same designs also provide extended mission range for UAVs.

REGENERATIVE FUEL CELLS FOR HIGH ALTITUDE AIRCRAFT AND PSEUDO SATELLITES

Combining our state of the art electrolyzers with our unique fuel cell designs yield highly efficient, compact and lightweight regenerative systems. These are ideally suited for high altitude, long endurance aircraft and pseudo satellites, and have been selected for use by internet service providers and defense agencies.



LIFE SCIENCES and MEDICAL DIAGNOSTICS

LIFE SCIENCES

In addition to large scale electrolyzers, Giner has also mastered the extreme small end of the scale, with an electrolyzer that is smaller than a penny. Developed under NIH funding, this electrolyzer is small enough to fit into a small capsule containing insulin producing cells, thus forming the basis for a Bio-artificial pancreas. This technology also led to the formation of Giner Life Sciences.



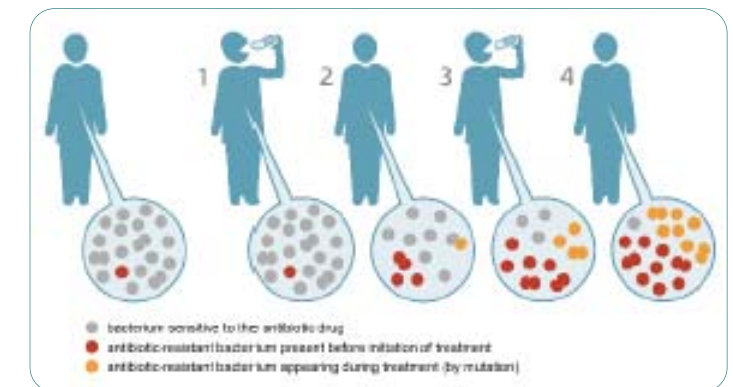
DIAGNOSTICS

Applying its expertise in electrochemistry to unique and extremely sensitive electrochemical sensors, Giner is developing diagnostics under NIH funding for some of the most intractable diseases impacting human life.

ANTIBIOTIC RESISTANT BACTERIA IN THE GUT MICROBIOME

There are 2 million infections each year attributable to Multiple Disease Resistant Organisms (MDROs), resulting in 23,000 deaths. Many of these infections can be attributed to imbalances in the Gut Flora caused by MDROs. In addition, these imbalances have also been associated with several disease states including Cancer, Obesity, Type II Diabetes and various gastrointestinal disorders such as IBD.

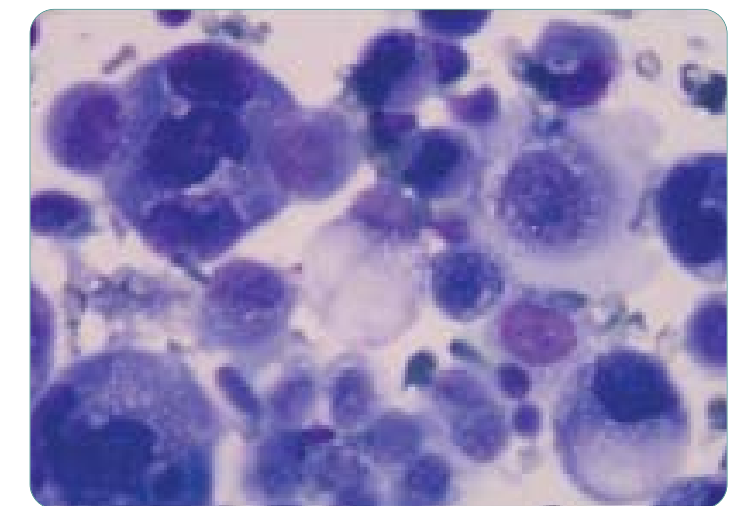
Suspected imbalances in the gut microbiome can be diagnosed by expensive and time consuming tests such as PCR or cell culture, with the patient receiving a shotgun of antibiotics in the interim, which complicates the spread of antibiotic resistance. Under funding from the CDC, an economical and rapid assay that identifies MDROs in 12 samples in less than 4 hours.



ctDNA AND NON-SMALL CELL LUNG CANCER

The most serious is Non-Small Cell Lung Cancer, or NSCLC, which claims almost 2 million lives worldwide. NSCLC is notoriously difficult to diagnose and treat, with patients often not presenting themselves until later stages of the disease.

Fortunately, tumors periodically shed minute amounts of their DNA into the bloodstream known as circulating tumor DNA, or ctDNA. Under NIH funding, Giner is developing a rapid, economical and highly sensitive ctDNA assay that promises to improve clinical outcomes.



ALCOHOL and DRUG ABUSE

Alcohol, Drug and Substance abuse annually drains \$440B from the US Economy, and places a significant burden on the criminal justice system. Giner labs has developed unique and highly effective electrochemical sensors to aid in reducing these burdens.

CONTINUOUS TRANSDERMAL ALCOHOL SENSOR

Developed under NIAA funding, this electrochemical sensor allows for the continuous monitoring of subject alcohol levels through the skin, while fuel cell based sensors only provide monitoring at 30-minute intervals. Continuous alcohol levels are remotely monitored through anklets and bracelets used in the criminal justice system., Giner Labs sold this technology to a major provider of alcohol monitoring solutions in May 2018.

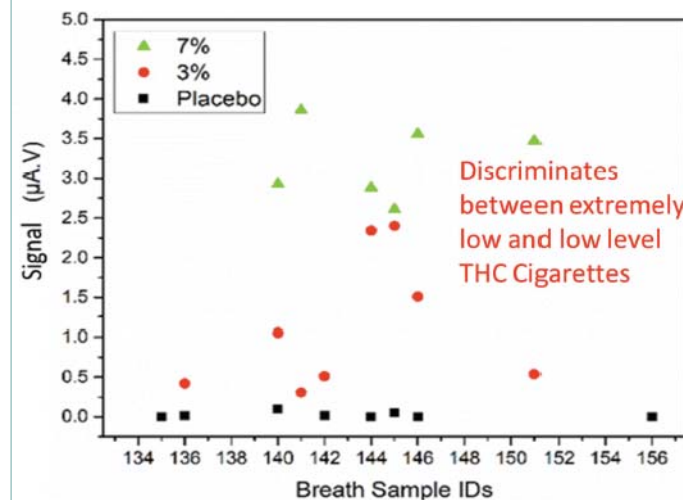


CANNABIS

With the rapidly increasing legalization of marijuana, there is a growing body of evidence which suggests that the incidence of drivers operating under the influence of marijuana is rising.

There is no reliable and economical roadside test that can be administered at the roadside by law enforcement officials to test drivers, leaving them to rely on blood samples which require a warrant. Often by the time one is obtained levels may no longer be indicative of recent consumption and impairment.

Giner Labs Breath THC Device Tested on Human Subjects at Brown University Center for Addiction Studies



Operating under funding from the NIH and the DOT, Giner Labs is developing separate saliva and breath based devices using a novel electrochemical sensor. In preliminary subject testing, the devices have proven to be highly accurate and reproducible, and are faster and much more cost effective than commercially available devices. These devices can also be used in drug abuse treatment programs where 30% of new entrants have a cannabis use disorder.

HIGH ENERGY LITHIUM BATTERIES

LITHIUM SULFUR BATTERIES

Due to dramatically lower cost and much higher energy density, Lithium Sulfur Batteries, LSBs, have long been considered by many to be the holy grail of lithium battery technology. LSBs would almost immediately address the cost and weight issues that limit the sale of EVs, and would be a boon to OEMs in the ever cost competitive portable consumer electronics market. Reduced cost and weight are also of great interest in aerospace applications. However, LSBs suffer from extremely short cycle life caused by the shuttling of polysulfides from the cathode to the anode. Through unique separator compositions and protective electrode formulations being developed through DOE, NASA and DOD funded research, Giner has several programs underway that show great promise in extending the cycle life of LSB to commercial reality.



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