

## **Solutions for a changing planet**

**InnovaTek creates and develops products for environmental safety and sustainable power.**

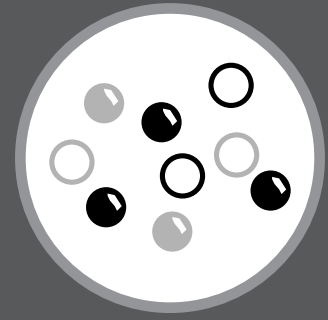
Using proprietary technologies including catalysts, micro-structured components, and micro-channel

reactors, InnovaTek's novel designs support products that are small, lightweight, and extremely efficient for military and commercial applications.

InnovaTek is a convergence of scientists, engineers and business professionals who are also humanitarians, dedicated to discovering better solutions for the world we live in. **But we don't just search for solutions — we create them** by converting unique ideas into workable chemistry and hardware, applying cutting edge science such as micro- and nano-technologies in the development of our products. Because when it comes to energy and environmental problems, staying the course is not the best answer. And at InnovaTek, we want to deliver the best possible solution. For the people. For the planet.

**OUR OBJECTIVE IS SIMPLE:  
TO HELP SUSTAIN OUR NATURAL  
RESOURCES AND ENHANCE OUR  
QUALITY OF LIFE.**





# Environmental Safety

InnovaTek develops and customizes technologies that help protect air quality and reduce exposure to toxic substances.

To address air quality concerns, we invented and developed technologies to reduce emissions and to monitor the air. Our air samplers offer safety for the air we breathe—especially in emergency response, terrorism, and military situations. Our air sampler products monitor the air for bio-particles such as anthrax and other airborne pathogens that can cause illness or death if inhaled, and our micro chemical processing technologies provide energy and renewable fuels without high emissions.

## AIR SAMPLERS AND DETECTORS

InnovaTek's air sampling technologies use micro mechanical and micro fluidic technologies capable of separating and trapping airborne fibers, viruses, bacteria, molds and spores, and chemical vapors. When coupled with a detector, the device warns against chemical or biohazards and cautions when treatment or cleanup is needed. These products are designed for the military, homeland defense operations, first response teams, the agriculture industry, food processing, disease prevention, and worker and public safety segments.



## MICRO CHEMICAL PROCESSING

InnovaTekkies® are developing products that use micro-channel reactors and micro structured components for process intensification in the efficient and safe processing of chemicals. These components possess extremely high surface-to-volume ratios and exhibit enhanced heat and mass transfer rates with low pressure operating conditions. The small process channels can be designed to eliminate mass-transfer resistance and support fast intrinsic kinetics thereby reducing the formation of unwanted by-products. The technology provides ideal solutions for applications requiring uniform reaction conditions, inherent safety, improved process control, and compact size.



When coupled with a detector, the BioGuardian warns about the presence of airborne chemicals and biohazards, such as anthrax, and alerts when treatment or cleanup is needed.

## **BIOGUARDIAN® AIR SAMPLER**

The BioGuardian® air sampler is a unique high volume device developed by InnovaTek under US Department of Defense funding for biodetection applications. Based on a patented cyclone design, it reliably captures microscopic (1-10 micrometers) airborne biohazards including bacteria, viruses, molds, spores, and chemical vapors.

### **ADVANTAGES**

Breakthrough features include air flow rates of up to 1000 liters per minute – the most powerful samplers on the market – and a novel pre-separator that removes large interfering particles from the air stream. A re-circulating design provides the ability to concentrate the captured particles in a small volume of liquid over sampling runs from 20 seconds to 12 hours. The system's unique design using parallel mini-cyclones results in significantly lower power requirements than other air samplers.

### **MARKETS AND CUSTOMERS**

- Homeland Security
- Defense
- Public Health
- Agricultural Management

### **INFORMATION**

[www.tekkie.com/bioguardian.htm](http://www.tekkie.com/bioguardian.htm)





# Sustainable Power

InnovaTek develops and customizes technologies that support clean, efficient and portable energy sources.

## ENERGY-EFFICIENT TECHNOLOGIES

InnovaTek creates patented technologies based on advanced catalysts and micro-structured components that provide cost-effective, environmentally-friendly solutions for customers requiring sustainable power. The Company is developing fuel processing technology that will support the market for renewable fuels and for the production of hydrogen. We supply a key enabling technology for fuel cells that overcomes an important technological challenge – a source of hydrogen from infrastructure and renewable fuels.

We are committed to the advancement of fuel cell technology because of the environmental benefits and the advantages in portable and distributed power generation.

InnovaTek's expertise in catalyst, membrane, and micro systems technology gives us a competitive advantage in portable power applications.

## RENEWABLE FUEL AND HYDROGEN

InnovaTek is developing technology that efficiently converts waste oils and renewable vegetable oils to biodiesel. In addition, our fuel processing technology

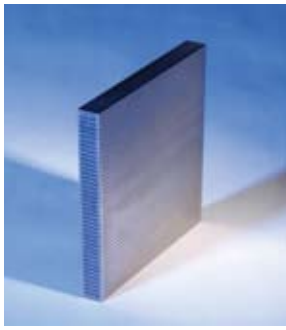


uses multiple types of renewable feedstock oils (e.g. virgin vegetable oil, biodiesel) to produce hydrogen in a cost effective manufacturing process.

By replacing petroleum-based fuels with renewable non-toxic biofuels and hydrogen our nation will be more secure through reduced reliance on foreign sources of energy and safer from the impacts of greenhouse gases and pollutants associated with petroleum-based products.

We are focused on assuring that this technology is accepted for widespread commercial use by making it robust, easy to operate, and competitive with petroleum products in terms of cost and reliability.





InnovaTek's  
proprietary  
cross-flow  
micro-channel  
reactor

## THE INNOVAGEN® FUEL PROCESSOR

The proprietary technology of the InnovaGen® fuel processor catalytically converts fuels to generate hydrogen. It incorporates our patented sulfur-tolerant catalyst to reform renewable and petroleum-based fuels and then purifies the product using an advanced membrane to produce clean hydrogen. This technology is designed to be used with both solid oxide and PEM fuel cells for portable, auxiliary, residential and vehicle power. The device may also be used as a stand-alone system for hydrogen production from biodiesel, vegetable oil, ethanol, gasoline, diesel, natural gas, or propane.

### SYSTEM FEATURES

- X-Tek™ micro channel reactor & heat exchanger technology
- InnovaJet™ fuel injector/atomizer (patent pending)
- iTek™ sulfur-tolerant steam reforming catalyst (patented)
- InnovaPure™ hydrogen-permeable membrane provides H<sub>2</sub> purification for PEM fuel cells

### CUSTOMER TESTING

The fuel flexible InnovaGen prototype is currently available for testing with strategic partners. The InnovaGen is capable of reforming liquid or gaseous fuels and generating hydrogen-rich reformat for a solid oxide fuel cell, or pure hydrogen for a PEM fuel cell.

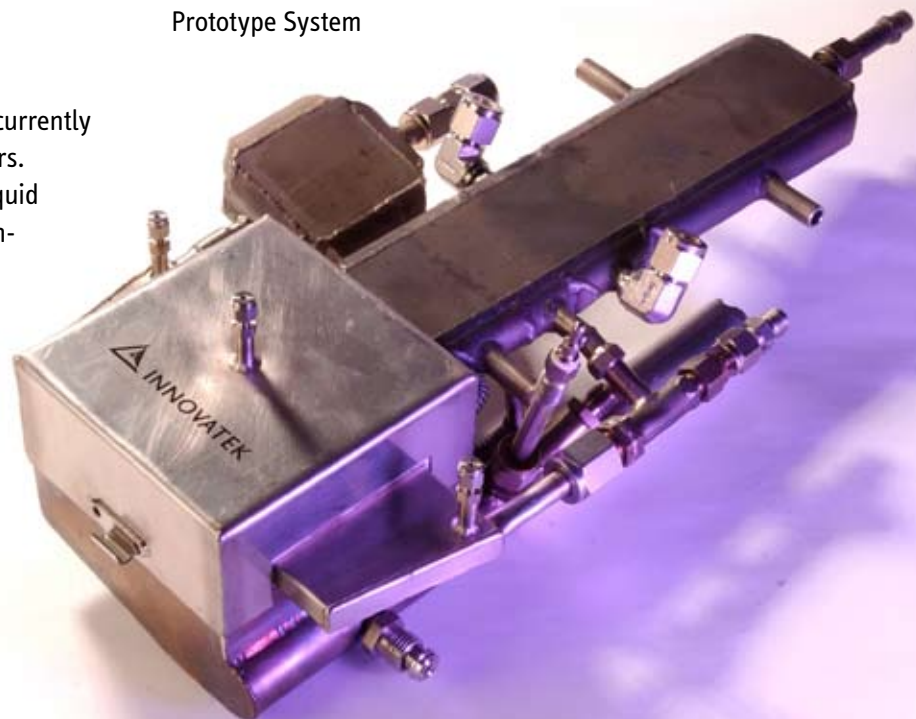
### ADVANTAGES

- Reforms multiple fuel types without coke formation for 0.5-5 kW PEM or solid oxide fuel cells.
- Membrane option provides pure H<sub>2</sub> output for PEM fuel cell enabling higher power densities and no potential for electrode poisoning.
- Micro-technology improves system efficiency and reduces size through optimized thermal management, chemical kinetics, and fluid dynamics.
- Flexible reforming options include steam reforming, auto thermal reforming, or CPOx

### INFORMATION

[www.tekkie.com/innovagen.htm](http://www.tekkie.com/innovagen.htm)

InnovaGen®5  
Prototype System





# Research & Development

InnovaTek explores innovative ideas for unique solutions.

InnovaTekkies® are dedicated to conducting comprehensive scientific research to deliver outstanding solutions for our customer's needs. The Company's team of skilled professionals has developed unique proven technology, patented and unpatented, that serves as the basis for its marketable products and services. We employ our core micro, mechanical, chemical, bio-, and fluidic technologies to develop new products that solve problems for our customers. We build prototype, pilot-scale and full-scale products, as well as conduct engineering analyses for our customer's applications.

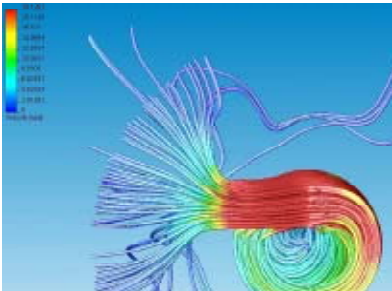
InnovaTek's excellent facilities and equipment, located in the Tri-Cities Science and Technology Park, in Richland, Washington, are well suited for modeling and design, fabrication, testing, analysis, and diagnosis.





### CASE STUDY >1

A customer who provides products to the health care industry wanted to develop products for real time analysis of airborne bacteria in hospitals. They needed to be able to rapidly detect even very low levels of organisms. We designed a high capacity air sampler and concentrator that would rapidly sample the air and concentrate bacteria into a small volume of liquid for detection.



### CASE STUDY >2

InnovaTek was asked by a client to evaluate the air path and geometry of an aerosol sampling procedure to determine whether particles might be lost within the sampling pathway. We estimated pressure drop and used computational fluid dynamics and aerosol physics to evaluate flow paths. The customer had an answer within 24 hours.



### CASE STUDY >3

A defense customer needed a fuel reformer that produced hydrogen from an energy dense liquid hydrocarbon to prove the feasibility of a fuel cell system to provide silent power for long duration stealth missions. We built a custom prototype and sent an engineer to help conduct a demonstration that produced excellent results in two days, in time for the client to present at an international conference.

## PROJECT EXAMPLES

- Developed a silent, field deployable, battery recharger that operates on JP-8 for the Marine Corps.
- Patented a novel sulfur-tolerant steam reforming catalyst for the Army to use in portable power supplies.
- Developed a fuel cell electrical power propulsion system with low oxygen consumption for unmanned underwater vehicles.
- Produced an electrostatic fiber classifier for a Swiss company studying the effects of particulates on human health.
- Produced an air sampler for use in studying disease transmission in Asia.

## INFORMATION

[www.tekkie.com/research.htm](http://www.tekkie.com/research.htm)

# Core Competencies

InnovaTek has built a strong set of competencies in fundamental technologies that are key to its innovation – fluid dynamics, heat transfer, material stress analysis, precision design and fabrication, materials engineering, catalysis, biochemistry and numerical simulation.

**preliminary and detailed investigations** that lead to the **design and development** of the new product with an eye on performance balanced by cost. **Testing and validation** then take place to verify performance and establish manufacturability. The **commercialization** step leads to full production and market launch.

We use our core competencies to develop superior products that deliver real and unique benefits to the user. InnovaTek's development process starts with **ideation**, the creative process of finding potential solutions to customers needs. Ideas are assessed in



**Powerful Partnerships:** InnovaTek welcomes new research and development opportunities, strategic partners, and exceptional employees. We especially emphasize the development of strategic partnerships for technology commercialization. For example through its leveraged collaboration with partners involved in the California Hydrogen Highway, InnovaTek's technology will be made available for demonstration and evaluation by national leaders in renewable energy programs and regional community development.

**INFORMATION**

For more specific information on InnovaTek products, technologies, and services visit our web site at [www.tekkie.com](http://www.tekkie.com)



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