The zNose®, A New Electronic Nose Technology For Homeland Security

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Government sponsored Homeland Security initiatives have clearly defined the need for fast and accurate methods of detecting and identifying potential terrorist threats and there is increasing concern over key vulnerabilities particularly in maritime port security, airports, public buildings, and transportation facilities. The spectrum of conventional and non-conventional terrorist threats to homeland security continues to expand and existing fixed sensors are no longer adequate. Sensors that can quickly adapt and recognize conventional and non-conventional threats are needed.

Electronic Sensor Technology, Inc. (OTCBB: ESNR) has developed and patented a breakthrough electronic nose technology, trademarked zNose®, which is designed to compliment existing security systems and to eliminate the vulnerabilities associated with trace and x-ray detectors. The zNose® technology was recently demonstrated to members of Congress, the House Select Committee on Homeland Security, and the House Committee on Transportation and Infrastructure. Applications for the new technology are focused upon rapid screening of cargo containers, personnel, and surveillance of public buildings, subways, and airports.

Figure 1- zNose™ technology presented to congressional committee members.

Unlike conventional trace detection systems, which can only detect a small number of specific chemical elements, the zNose® is a true electronic nose designed to recognize the unique chemical fingerprint or olfactory signature of any odor, fragrance, or vapor and it can adaptively be trained to recognize the chemical profile of any terrorist threat. The zNose® is unique because it can also create an unlimited number of virtual chemical sensors for trace detection while at the same time recognizing chemical profiles associated with conventional and non-conventional terrorist threats. Homeland security applications include chemical profiling and screening of cargo containers, subways, commercial aircraft, and public buildings.

Screening of Cargo Containers

The U.S. now inspects less than 4 percent of the 6 million shipments that arrive at more than 100 ports, twice the 2 percent before the Sept. 11 attacks in 2001. There is a clear and present danger yet testing every container remains an illusive goal.

Figure 2- Over 6 million cargo containers arrive at US ports every year.

One electronic nose, the zNose®, is already being used by some commercial shippers to test cargo containers for the presence of odoriferous chemicals such as trichlorophenol and trichloroanisole, which can damage or taint sensitive cargo. Chemical profiling cargo containers with an electronic nose offers a fast and cost effective screening method for Homeland Security as well. Virtual sensor arrays and recognizable olfactory images can be used to detect and identify explosives, hazardous substances, drugs of abuse, and provides a cost effective screening tool for shippers and inspectors alike. In support of container security protocols, odor profiles can also be attached to an electronic manifest file and forwarded to authorities at the country of destination for comparison purposes.

Figure 3- Cargo containers and their cargo produce recognizable chemical signatures, which can be used for security screening.

Monitoring Ambient Air in the Government Buildings

Electronic Sensor Technology has developed and patented a breakthrough vapor analysis system, called the zNose™, which is designed to eliminate key vulnerabilities in the homeland security, specifically in public buildings and none is more recognizable than the Capitol building of the United States. In a recent demonstration to congressional members ambient air samples from the Capitol building were sampled and their chemical profile fingerprinted using the company's proprietary Vaporprint™ imaging technology. The zNose® is designed to monitor the ambient air within buildings, to recognize known vapor threats, and to detect suspicious odors, which are not part of the buildings normal vapor signature. By capturing the olfactory image of ambient air from the rotunda of the Capitol building and performing an analysis in 10 seconds (Figure 4), more than twenty different chemical compounds were identified and their concentration measured. By monitoring the air chemistry within buildings and comparing it with the building's normal background signature, new or suspicious vapors can be quickly identified and investigated.

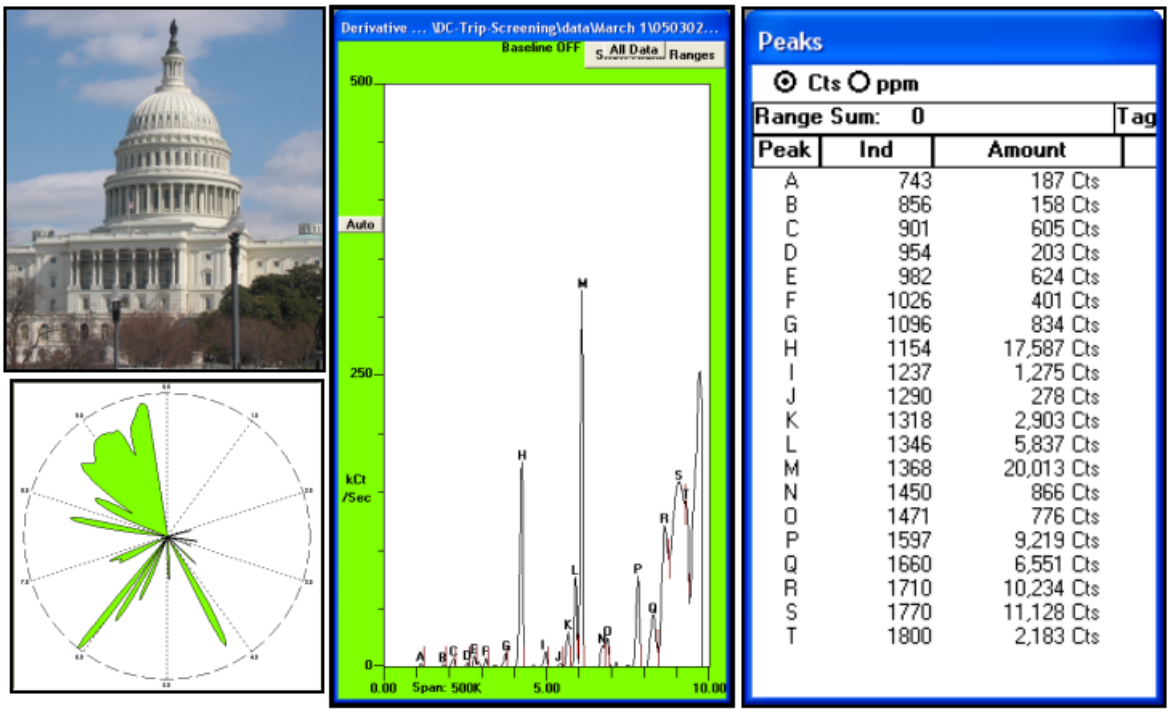

Figure 4- ambient air within the Capitol building can be downloaded by registering on the company's website http://www.znose.com

Monitoring Ambient Air in Subways: the Washington Metro

The Washington Metro is a 103-mile 83-station rapid transit system serving Washington, D.C., and the surrounding areas of Maryland and Virginia. The Metro is one of the largest public works projects ever built, and it is the second-busiest rail transit system in the United States. It regularly carries over 650,000 riders per week. Because much of the system is contained underground with confined spaces it is vulnerable to chemical attack by terrorists.

Figure 6- Metro system consists of a complex web of underground subways vulnerable to chemical attack.

zNose® technology was developed to eliminate vulnerabilities in closed spaces such as subways and public buildings. In a recent demonstration air samples from the Metro were sampled and their chemical profile fingerprinted using the company's proprietary Vaporprint™ imaging technique. By monitoring the air chemistry within the subway and comparing it with the normal background signature, new or suspicious vapors can be quickly identified and investigated. The zNose™ is designed to monitor the ambient air within subways, to recognize known vapor threats, and to detect suspicious odors, which are not part of the subways normal vapor signature.

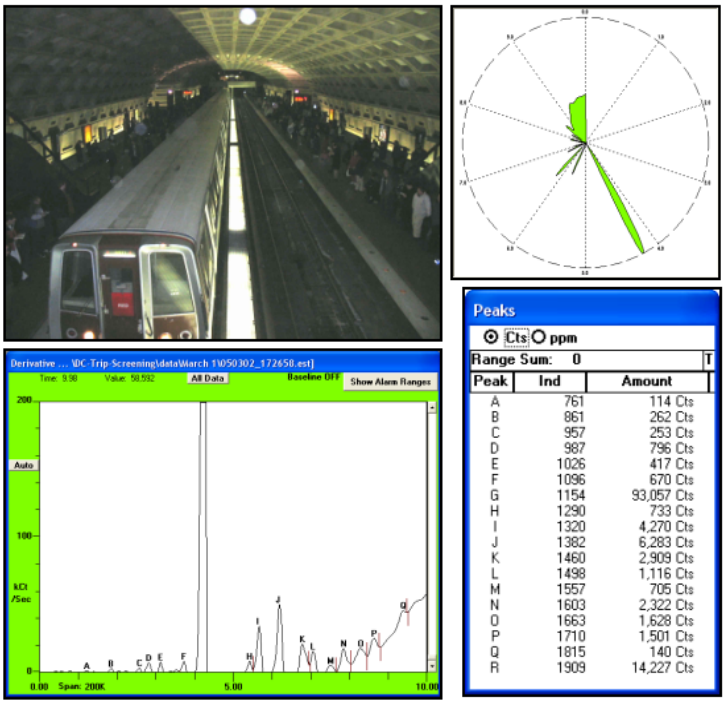

Figure 5- Chemical profile of ambient air within the metro subway

Profiling Ambient Air in Commercial Airlines

Commercial aircraft are an important part of the nations transportation system and of vital importance to homeland security. Traveling in an aircraft every passenger is exposed to a wide range of volatile organic compounds. As a result each aircraft produces a distinctive olfactory signature. In a recent demonstration ambient air from within a commercial airliner was sampled and its chemical profile fingerprinted using the zNose® to produce a Vaporprint™ image. In this case the unique chemical signature of the aircraft contained 26 distinct chemical compounds, which were indexed and entered into a database of known odors. The zNose™ is designed to monitor the ambient air chemistry within aircraft, to recognize odors from known threats, and to detect suspicious odors, which are not part of the airplane's normal vapor signature.

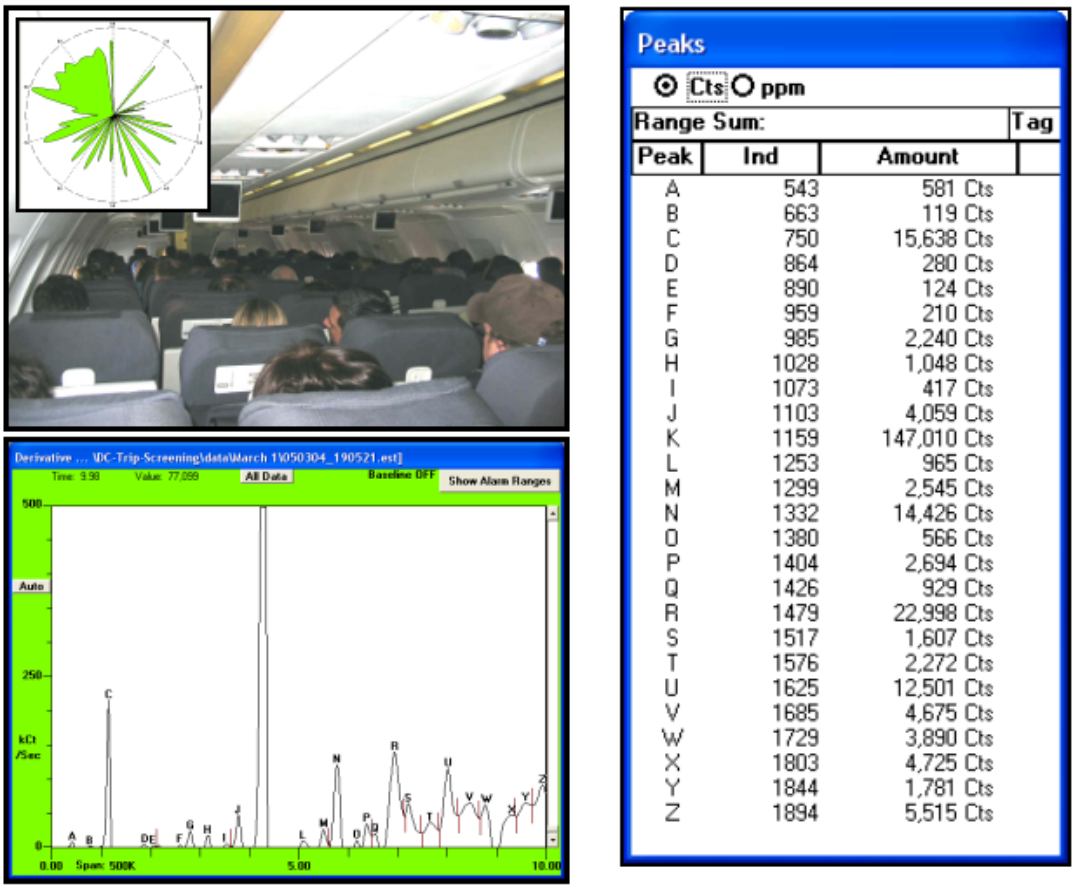

Figure 7- Chemical profile of ambient air within a commercial aircraft

Summary

Electronic Sensor Technology, Inc. (OTCBB: ESNR) has developed and patented a breakthrough electronic nose technology, trademarked zNose®, which compliments existing security systems and eliminates the vulnerabilities associated with current trace and x-ray detection systems. The zNose® is a true electronic nose designed to recognize olfactory signatures and can be trained to recognize the chemical profile of conventional or non-conventional threats. Homeland security applications include chemical profiling and screening of cargo containers, subways, commercial aircraft, and public buildings.

Cargo and port security are key components of the nation's homeland security strategy. More than seven million cargo containers arrive at U.S. seaports annually, and there is a need for screening methods, which will be quick and cost-effective. The nature of the threat is such that there are an almost unlimited number of possible target chemicals so it is imperative that sensor technology be highly adaptive.

Electronic noses can play a major role in preventing catastrophic terrorism or, if attacks do occur, in minimizing their impacts. Adaptive virtual sensor arrays have the potential to thwart terrorist activities in the planning stage, before or during attempted attacks, and to help identify suspicious cargo. They may also be useful in forensic analysis to identify perpetrators after an attack. Sensors can also provide sensitive and rapid warning for the protection of fixed sites (subways, airports, government buildings, financial centers, high-value industries). For example, virtual chemical sensors for ventilation systems capable of detecting deviations from normal conditions and monitoring for chemical and biological agents could be coupled to rapid-shutdown procedures.

For more information about Electronic Sensor Technology and the zNose® visit the company website http://www.znose.com or email to: info@estcal.com.

Figure 8- Model 4200 zNose®