ULTRAVIOLET LASER DEVICE AND DETECTION TECHNIQUE FOR ENHANCED CHEMICAL ANALYSIS

ULTRAVIOLET LASER FOR IMPROVED ANALYSIS OF SOLID SUBSTANCES AND RAPID DETECTION OF COMPOUNDS, INCLUDING EXPLOSIVE AND HAZARDOUS COMPOUNDS AND BIOLOGICALS

Key Features:

- ➢ Time and cost reduction: sample pre-treatment is avoided due to use of the laser at a reduced energy setting (as much as 70% less) to achieve sample desorption
- ➢ Enhances accuracy of analytical instruments such as gas chromatograph
- ➢ Decreases dispersion of a sample by reducing size ($0.1 – 7$ cm^2) of the sample cell
- ➢ Robust technique for organic molecular analysis based on solid materials (e.g. black shale, rice bran, explosives trapped in a swipe matrix, coal, tissues such as brain, liver, and kidney)

Commercial Applications:

- ➢ Military, security, and law enforcement sectors
- ➢ Environmental science (e.g. soil contamination)
- ➢ Molecular analysis

Project Summary:

Arkansas State University is developing and seeking to license a device and method for detection and analysis of a component of interest in a solid sample. The innovation may make use of a Gas Chromatography-Mass Spectrometry (GC-MS) or Gas Chromatography-Nitrogen Chemiluminescence Detection (GC-NCD), or both.

The device comprises an ultraviolet laser for desorption of a compound, a small sample cell, and an analytical instrument. Unlike prior systems the novel technology employs the laser at a reduced energy setting for removal of the sample from the solid substrate instead of ablation. By varying specific parameters such as energy level, pulse frequency, bursts, and spot size, the innovation is efficient for rapid analysis of a solid sample containing a compound of interest.

Furthermore, the invention utilizes a sample cell of considerably smaller size, in the range of 5 cm^3, than the cells typically used in analogous ablation equipment, which are in the range of 250 cm^3. The smaller sample cell reduces sample drift and dispersion and improves measurement accuracy by GC-MS. Overall, the device provides a rapid and reliable technique for analyzing solid samples and detection of components of interest.

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Potential Markets Overview:	➢ The global **explosives detection** market is expected to reach $830 million in 2013. The threat of explosives to governments, private companies and the public will continue driving the explosives detection market (*Visiongain.com*). ➢ The global market for **environmental sensing and monitoring technologies** was worth $9.1 billion in 2008 and is expected to reach $13 billion in 2014, for a compound annual growth rate (CAGR) of 5.2% (*Sensors 2009, Volume 9, Issue 12, pp. 10447-10512*).
Patent Status:	Patented.
Commercialization Status:	Available to be licensed.

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