



Science and Technology

TRANSPORTATION SECURITY & EXPLOSIVES CHARACTERIZATION

VAPOR CONCENTRATOR FOR ION MOBILITY SPECTROMETRY

CONCEPT USING A VAPOR CONCENTRATOR FOR MORE ACCURATE CONTRABAND DETECTION WITH ION MOBILITY SPECTROMETRY (IMS).

Detecting concealed contraband at sensitive locations (such as airports, government buildings, and borders) is important to prevent terrorism and organized crime. Most contraband detection instruments measure vapor profiles to detect explosives, drugs, or other harmful chemicals. However, analysis can be inaccurate if a contraband substance does not emit enough vapor for detection. Too little vapor would require expensive chromatography or mass spectrometry techniques to ensure all analytes are measured properly.

To address these issues, the Transportation Security Laboratory (TSL) envisions a low cost and efficient contraband detection system using IMS. The imagined device contains a filtering system that traps, collects, and transfers vapor from suspected threats into a detection system rapidly. This innovation amplifies the signal and effectively increases the limit of detection. The concentrated release of vapor molecules allows the system to accurately sample high air volumes and identify hard-to-detect contraband and threats.

KEY BENEFITS

- + Detection system with higher sensitivity and increased accuracy
- + Enables use of a lower cost detector such as an IMS
- + Efficient vapor collection
- + Allows for high-volume sampling
- + Flexible design that is compatible with existing air samplers
- + Non-contact sampling and capture of vapor from dangerous contraband

STAGE OF DEVELOPMENT

Proof of Concept

PARTNERSHIP SOUGHT

Licensing or Collaborative Research and Development Agreement (CRADA)

INVENTORS

Barry Smith
John Brady
Jeffrey Barber

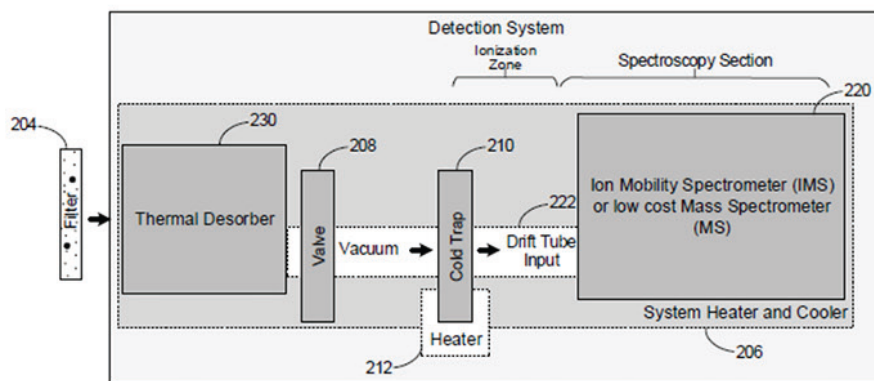
DHS COMPONENT

Science and Technology Directorate

The Technology Transfer and Commercialization Branch (T2C) within the Office of Industry Partnerships (OIP) of the Department of Homeland Security (DHS) Science and Technology Directorate (S&T) serves as the centralized point to manage technology transfer activities throughout DHS and the DHS laboratory network. T2C@hq.dhs.gov

THE TECHNOLOGY

The concentrator system includes a high-volume sample filter, a thermal desorption unit, a cold trap, and a low-cost detection system such as an IMS coupled to the cold trap. High volumes of collected air pass through the filter coupled to a thermal desorber, which is heated to release the analytes collected by the filter. Vacuum air flow pulls the sample onto the cold trap for enhanced collection. Once the analytes are collected, the cold trap is flash heated, expelling the sample in the optimal concentration where it can be measured by the analyzing device (e.g., an IMS detection system).



The detection system includes a thermal desorber and cold trap to collect and concentrate the vapor molecules and a low-cost detection system such as an IMS to detect contraband substances from Figure 3 of US Patent 11,709,149.

APPLICATIONS

The technology has several potential end-users:

- + Cargo processing, checkpoints, and high-capacity security screening
- + Industrial monitoring for gases or chemicals
- + Chemical warfare detection
- + Large HVAC systems

PATENT INFORMATION

US Patent numbers 11,709,149



CONTACT INFORMATION

+ T2C@hq.dhs.gov

FOR MORE INFORMATION ABOUT THE DHS TECHNOLOGY TRANSFER & COMMERCIALIZATION BRANCH:

<https://www.dhs.gov/science-and-technology/technology-transfer-program>



TECHNOLOGY SOLUTION