Science and Technology

TRANSPORTATION SECURITY & EXPLOSIVES CHARACTERIZATION

ELECTROSTATIC REACTIVITY TESTING DEVICE AND METHOD

A SAFETY TESTING SYSTEM TO DETERMINE MATERIAL REACTIVITY TO ELECTROSTATIC DISCHARGE

Energy stored in static electricity, caused by the buildup of electrons on an object or material, can potentially ignite volatile materials like explosives. To test a material's reaction to static electricity, researchers expose the material to increasing levels of electricity until it detonates. However, inducing detonation is unsafe and repeated exposure to a detonation's ultraviolet light can damage eyesight. Additionally, test results are often inconsistent because they rely on subjective human observation, which can be affected by fatigue or distractions.

To overcome these challenges, researchers at the Transportation Security Laboratory invented the Electrostatic Reactivity Testing Device and Method to determine a material's electrostatic sensitivity without ignition. The solution identifies the energy threshold that triggers a discharge without activating the material. The innovation's optical detection system observes the light intensity from an electrostatic discharge and evaluates if the light intensity would electrically excite the material to its reactive point.

KEY BENEFITS

+ Prevents eye damage from repeated UV exposure
+ Enables uniform testing
+ Allows detonation-free testing

STAGE OF DEVELOPMENT

Conceptual

PARTNERSHIP SOUGHT

License

INVENTORS

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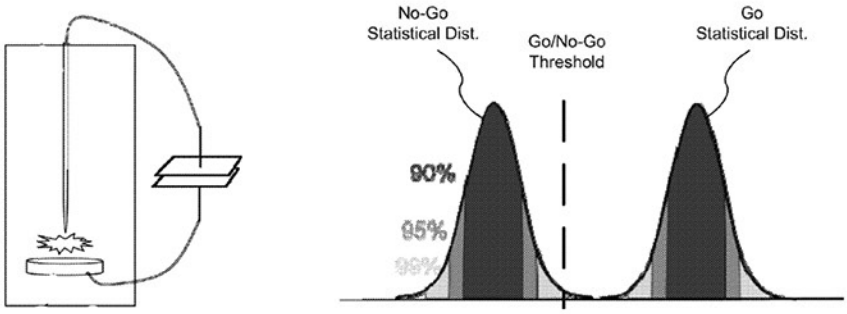
DHS COMPONENT

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

This technology detects whether or not an electrostatic event will result in a reactivity event. Decomposition of a sample is a "Go" event, while no decomposition is a "No-Go" event. To determine the event outcome, varying levels of electrostatic discharge are applied to a sample. This interaction will cause the sample to emit varying light intensities. An optical detector measures the light intensity, and the system's data acquisition and processing center determines the Go or No-Go threshold from a statistical distribution. The Go or No-Go threshold determines the material's electrostatic sensitivity, which can be determined in 15 microseconds.



The diagram on the left illustrates a probe applying electrostatic discharge to an inert sample. The graph on the right illustrates a bimodal bell curve statistical distribution model. The curve on the left shows a No-Go level of electrostatic discharge, and the curve on the right shows the level of electrostatic discharge that would activate the inert sample.

APPLICATIONS

The technology has several potential end users:

+ **Commercial explosive manufacturers**
+ **Commercial explosive distributors**
+ **Explosive testing laboratories**

PATENT INFORMATION

US Patent numbers 9,970,879

CONTACT INFORMATION

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TECHNOLOGY SOLUTION

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