



Southern Illinois University System

Applications

- Vapor analysis
- Explosives location
- Landmine detection
- Defense and military technology
- Police/K9 bomb detection technology

Inventor(s)

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Dr. Moore is a Professor of Materials Science and Engineering at the University of Illinois at Urbana-Champaign. He is also the Director of the Beckman Institute for Advanced Science and Technology.

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Explosives Detection via Fluorescent Organic Nanofibrils

In recent years, the increase in worldwide terrorist threats has led to the need for efficient sensors and detection technologies to identify explosives and other dangerous or volatile materials. Some of the most sensitive current technologies rely on fluorescence quenching based chemical detection. However, many of the materials and films used have sub-optimal molecular geometry and performance, paving the way for improvements in the field.

Invention

Researchers from SIU and the University of Illinois have developed small thread-like fibers called nanofibrils that can be used for explosives detection with a high level of sensitivity. The nanofibrils are each composed of arranged arylene-ethylene macrocycle molecules, and a grouping of nanofibrils can be arranged together into a thin film for incorporation into a sensor. Under normal conditions, the nanofibrils will fluoresce, but upon exposure to vapor containing explosives residue or other volatile organic compounds, the fluorescence will be significantly decreased or quenched. Paired with a housing and electronics package, these nanofibril thin films form the basis for a detection sensor. The shaping and molecular arrangement of the nanofibrils can be manipulated to create various film backbones and geometries, making the technology highly adaptable for different applications or sensor packages. Furthermore, the nanofibrils of the invention are able to detect explosive levels below 10 ppm, and may be able to detect at single molecule levels.

Key Advantages

- Increased sensitivity compared to current technologies
- Able to detect TNT and other volatile and dangerous compounds
- Adaptable nanofibril geometries can be altered for multiple applications and sensor housing needs
- Ultra-fine nanofibril thin films have increased performance characteristics and are able to detect at threshold levels below 10 ppm

Status

U.S. Patent #8,153,065 was issued for this technology on April 10, 2012. The technology is available for license.

Other opportunities related to this technology, included but not limited to sponsored and/or collaborative research, may be available. Please reach out to the designated contact identified at left for more information.