

# Rapid Detection of Explosives

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## TECHNOLOGY DESCRIPTION

UC San Diego researchers have developed a simple, fast, and inexpensive sensor to detect trace amounts of explosives. A silicon polymer has been made into a "nanowire," 2000 times thinner than a human hair, that detects compounds such as picric acid, nitrobenzene (NB), dinitrotoluene (DNT) and trinitrotoluene (TNT) in air or seawater, or on surfaces.

The sensor uses a thin film of photoluminescent polysilole that can also be sprayed on solid surfaces such as filter paper. Wherever the polymer comes into contact with molecules of explosive material, the fluorescent signal is quenched. This polysilole is stable in air, water, acids, common organic solvents and seawater-containing bioorganisms.

TNT vapor in air is detected to 4 ppb (parts per billion) within 10 minutes; in sea water 50 ppb TNT and 6 ppb Picric Acid can be detected.

Picric Acid is a substance commonly used in letter bombs.

A hand or object that has been in contact with even tiny amounts of TNT may be readily imaged by pressing it to a piece of paper, spraying the paper with a 0.1 M toluene solution of the polymer, and observing the paper with the naked eye under a black light.

## STATE OF DEVELOPMENT

This technology has myriad applications in forensic science, law enforcement and the military. In addition, it could be used to map pollution from munitions manufacturing and storage and to locate unexploded land or sea mines to facilitate their removal.

## RELATED MATERIALS

- <http://www-chem.ucsd.edu/Faculty/bios/trogler.html>
- <http://chem-faculty.ucsd.edu/sailor/research>
- See also SD2003-020 and SD2005-268.

## PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	7,482,168	01/27/2009	2000-160

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## OTHER INFORMATION

### CATEGORIZED AS

- **Materials & Chemicals**
  - Nanomaterials
- **Security and Defense**
  - Food and Environment
- **Sensors & Instrumentation**
  - Biosensors
  - Environmental Sensors

### RELATED CASES

2000-160-0