

Under Water Explosive Detector

M- SeaDog

Introduction



The SeaDog underwater explosives system is currently under development for the Office of Naval Research (ONR). This system is an adaptation of Nomadics' explosives vapor sensor developed under a DARPA contract to find landmines. The sensor has been deployed on a number of different platforms including the REMUS autonomous vehicle, crawler robots, and as a diver held system.

It has been shown that explosive devices in the marine environment leak explosive material into the surrounding water. Prevailing currents then carry this material away as a filamentous plume of TNT. These plumes of TNT are potentially exploitable for detection of the explosive material, possibly from unexploded underwater ordnance.

Technology Principle

The Nomadics technology employs novel polymers developed by Professor Timothy Swager at MIT as sensory materials specifically engineered to detect explosives such as TNT. Normally, the polymers fluoresce when excited by light. However, these polymers have receptor sites designed to bind with molecules of certain target analytes. When an analyte binds to the polymer, the fluorescence is quenched. The polymers that Nomadics employs in the Fido sensor are unique in that they have been synthesized to provide an amplifying characteristic. The result is that a binding event of one analyte to the polymer is amplified – effectively turning off a large number of fluorescing sites, which can then be readily detected with appropriate electronics. These special materials are now commonly referred to as amplifying fluorescent polymers (AFPs). The SeaDog explosives detection system, based on the AFP technology, has been shown to be both highly selective and sensitive to TNT explosives that may be generated near underwater-unexploded ordnance. As the TNT passes across the AFP, the TNT binds to the polymer causing a quenching affect monitored by the SeaDog electronics. The system has been deployed many times with no known interferences in the marine environment and has shown detection up to 30 meters from a source.

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Applications

The SeaDog explosive sensor can be used as a:

- ◆ Diver sensor for explosives confirmation
- ◆ Robot deployed sensor for explosive confirmation
- ◆ Autonomous vehicle deployment for real-time plume tracking

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