Tiny Neutron Detector Has HUGE Potential

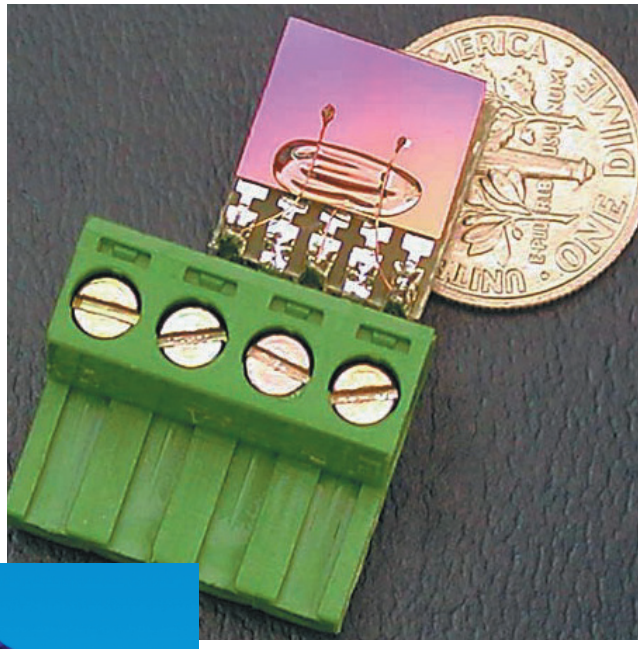
A highly sensitive, hand-held neutron detection device developed by University of Nebraska–Lincoln researchers could be used for locating hidden nuclear materials, monitoring nuclear weapons storage and other national security applications.

Researchers at the University of Nebraska-Lincoln (UNL) have developed new semiconductors that can be used to build solid- state neutron detectors – devices that are used for detecting fissionable materials that could be used to make nuclear weapons or dirty bombs or in monitoring nuclear weapons and radioactive waste. The new devices are potentially cheaper, faster and better than anything else currently available, and are ideally suited to homeland security needs. "This is a huge leap in neutron detection technology," said Peter Dowben, the UNL physicist who first fabricated a boron carbide semiconductor.

The unique **P**ortable **E**rgonomic **R**eal-time **S**olid-state **N**eutron **A**ctive-**L**ayer ***(PERSoNAL)* Detector** builds on previous successes of a group of materials researchers, based at UNL, who developed a new class of solid-state neutron detectors. The heart of the ***PERSoNAL* Detector** is the semiconducting boron carbide discovered by the group of professors, which consists of chemical engineer Jennifer Brand, chemist Neil Boag, electrical engineer Sina Balkir, mechanical engineer Brian Robertson, and physicists Dowben, Shireen Adenwalla, and Bernard Doudin, under the direction of ergonomist and systems engineer, Susan Hallbeck.

Model Hand-Held Radiation Detector: Ergonomic, lightweight & user-friendly.

The boron carbide chip is about the size of a Lego® block, and is more efficient, lighter and tougher than existing neutron detection devices, which are generally large, expensive, fragile, and power-hungry. Because the chips are so small and tough, they could, for example, be incorporated into a small, handheld device for detecting uranium, plutonium or weapons containing these materials being smuggled across borders. "It is not only the revolutionary solid-state technology that makes our detector unique. We package it so that people can have the real-time information literally at their fingertips," said Hallbeck.



Solid-State Neutron Detector: Small, gamma-blind & rugged.

All this adds up to a device which is safe, reliable, and inexpensive. The lightweight and low-powered detector is a stand-alone device, and does not require the low-level radiation generators used in some "active" systems. This means no occupational radiation exposure for the operator, and no false positive readings. "Cost for specific ***PERSoNAL* Detectors** will vary with packaging and application, but in their simplest form, they could even be disposable, and inexpensive enough to attach to shipping containers entering the country," said Brand.

"This is a story of how the state's investment in research can lead to technology that benefits Nebraskans and the nation," said Prem Paul, Vice Chancellor for Research at UNL.

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