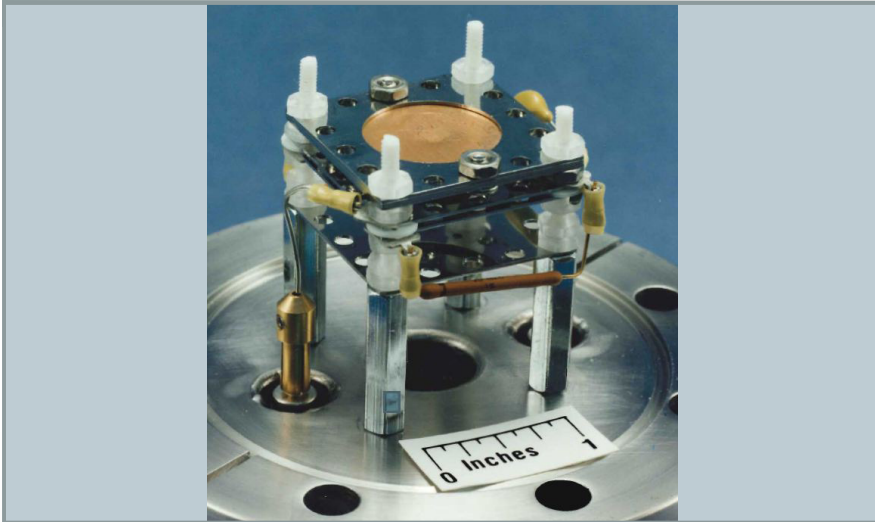


Neutron Detection Using an Embedded Sol-Gel Neutron Absorber

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Technology Summary

ORNL researchers invented a method for neutron detection that can play an important role in international safeguards and U.S. security. The technology, based on sol-gel chemistry, uses metallic oxides embedded in a glass film that fission when bombarded with neutrons, producing a signature event in the film. Using ultraviolet light, fission products of the metallic oxides and electron emissions can be quickly detected.

The invention features a transparent neutron-detecting sol-gel media. The sol-gel is flexibly coated onto rigid elements such as flat quartz plates or glass lenses. The detector is comprised of a microchannel plate, channeltrons, a photomultiplier, or a silicon detector that allows for very rapid, high-rate registering of activity in the sol-gel. When a pulsed neutron source containing deuterium or a combination of deuterium and tritium is applied, an array of detectors can then identify the emitted fissile material.

Advantages

- An adaptable fission signature that can be read in several ways
- Sol-gel process allows a variety of fissionable metallic oxides to be embedded

Potential Applications

- Monitoring areas where plutonium and other fissile materials are being stored
- Enforcement of international safeguards
- Monitoring shipments and ensuring national security

Patent

John M. Hiller, Steven A. Wallace, and Sheng Dai, *Neutron Detector Using Sol-Gel Absorber*, U.S. Patent 5,973,328, issued October 26, 1997.

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