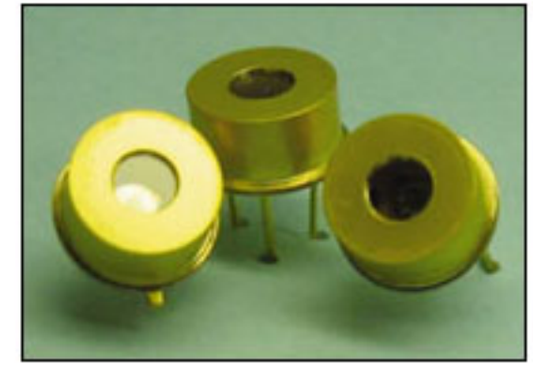
Diamond UV sensor used in fire detection system

The world's first fire detection system utilising a diamond ultraviolet (UV) photosensor has been successfully developed in Japan. The system was the result of a joint project undertaken by the Super Diamond Group, Advanced Materials Laboratory of the National Institute for Materials Science (NIMS) and the electronic equipment development venture company ANTEC Corporation.

In Japan at present, 90% of fire-related fatalities occur in residential fires, and more than 50% of these involve persons of 65 years of age or more. Because the main cause of these deaths is delay in escaping, early detection of fires is now an extremely important safety requirement. This has been highlighted by a recent revision to Japan's Fire Service Law (effective June 2006), which legally mandates installation of fire alarms in all newly-constructed residences. The development of new fire detection and alarm systems that respond to fires more quickly has therefore become an extremely important research topic.

Whereas conventional sensors work by detecting heat and smoke in the early stages of a fire, this new UV detection-type fire sensor uses a completely new technology which enables quicker discovery of fires before the heat and smoke have built up to dangerous levels.

The new system consists of a sensor section and an alarm section, and utilises ANTEC's signal processing and wireless communications technologies, which are unaffected by sunlight. The UV photosensor employs a CVD diamond window developed specially by NIMS.



In addition to having a quicker response time than conventional sensors, the new system has advantages in terms of power consumption and size.

The diamond UV sensor requires only one 9 V dry cell battery for operation and has a long service life characteristic of the low power consumption typical of diamond UV photosensors. By comparison, conventional fire detection systems employ vacuum tube-type photoelectric cells which have high power consumption since a high voltage larger than 300 V is required to operate the device. Moreover, these devices are large in size and easily damaged by impact. In contrast, the new diamond UV sensor device is compact (9 x 5 mm), and has good impact resistance.

In anticipation of the adoption of these new fire detectors, NIMS/ANTEC will concentrate further work on the improvement in the sensitivity of the diamond UV photosensor and the study of mass-production technology aimed at practical applications.