



2010 R&D 100 Award Winner

A SCINTILLATING RADIATION DETECTION MATERIAL

Strontium iodide doped with europium is a new scintillator radiation detection material that can be easily grown, resists cracking, and has no radioactive constituents. The material would provide for smaller, faster, and more accurate sensors that could improve the nation's ability to unambiguously identify radiation from illicit sources.

Improving on the Competition

Detectors made of high-purity germanium, a semiconductor, have long offered the best energy resolution, allowing precise identification of the gamma rays emitted by plutonium and uranium. However, they require special cooling, making them costly and heavy to use. Scintillators are an alternative to semiconductors. The precision of a scintillator material's response defines its ability to distinguish between gamma rays that have similar energies. After a lengthy process of scouring the literature and synthesizing and evaluating potential materials, the material development team determined strontium iodide doped with europium as the material having overall the most useful set of properties.

Putting the Winner to Use

The scintillator can be easily incorporated into the handheld radiation detectors being produced by many companies and can also potentially serve a wide range of applications that use gamma-ray spectroscopy to identify radioisotopes. Isotope identifiers are common tools for professionals in medicine, police and fire services, and mining operations.



(top left) A crystal of strontium iodide doped with europium for gamma-ray detection is an R&D 100 Award winner. (top right) The crystal is encapsulated when used in a radiation detection device and (bottom) glows blue when exposed to ultraviolet light.



Transformational and Applied Research Directorate (TARD) within DNDO/DHS: (from left) Leon Feinstein, Anu Bowman, Alan Janos, Joel Rynes, Mark Wrobel.



Livermore development team for the strontium iodide scintillator: (from left) Steve Payne, Nerine Cherepy, Owen Drury, Alex Drobshoff, Cheng Saw, Ben Sturm, Thomas Hurst, Scott Fisher, and Peter Thelin.



Oak Ridge National Laboratory: (from left) Joanne Ramey, Jim Kolopus, and Lynn Boatner.



Fisk University: (from left) Pijush Bhattacharya, Eugene Tupitsyn, M. Christopher Brown II, The Honorable Hazel R. O'Leary, Arnold Burger, Yunlong Cui, and Vladimir Buliga. (Not shown: Utpal Roy and Michael Groza.)



Radiation Monitoring Devices, Inc.: (from left) William Higgins, Tom Hazlett, Huicong Hong, Joshua Tower, Kanai Shah, Sharmistha Mukhopadhyay, Alexei Churilov, Urmila Shirwadkar, Jarek Glodo, Craig Hines, Edgar van Loef, Rastgo Hawrami, John Vaghini, and Viktor Biteman.