

Bulk Polymer Composites

Tech ID: 23216 / UC Case 2012-334-0

SUMMARY

UCLA engineers have developed a method of synthesizing bulk polymer composites suitable for efficient scintillation of high energy radiation.

BACKGROUND

Detecting high energy radiation is important to public health, security, nuclear medicine, and astronomical research. The energy-absorbing materials used in detectors fall into two general categories. The first is highly sensitive, making it useful for safety assessment, but requires expensive and bulky ancillary cooling systems which also compromise portability. Other commonly used materials are much more economical to synthesize and operate, and are compact, but sacrifice much in the way of signal sensitivity.

There is thus a need for a method to synthesize new materials that combine the best of these two groups; high sensitivity with good energy resolution and low fabrication cost. A composite material containing an inorganic high-Z compound and a polymer would fulfill all of these criteria.

INNOVATION

UCLA engineers have developed a method of synthesizing novel composite polymers suitable for detection of radiation, including beta rays, positrons, gamma rays, x-rays, and neutron particles. Formed via bulk polymerization, these composites are made into several-mm-thick monoliths from high Z components embedded in all-organic matrix. The all-organic matrix exhibits as much as 45,000/MeV light yield- more than 2 times that of the current champion organic scintillators, and a gamma (662 keV) photoelectric peak with 10% resolution in the composite scintillator. Moreover, the synthetic chemistry for their production utilizes inexpensive materials.

APPLICATIONS

- ▶ Synthesize highly-sensitive organic scintillators for products:
 - ▶ Gamma cameras used in nuclear medical imaging
 - ▶ Positron emission tomography instruments for medical imaging
 - ▶ Large area vehicle portal monitor applications that use gamma-ray and X-ray detection
 - ▶ Instrumentation for baggage check using X-ray Z-determination techniques.
- ▶ Synthesize composites scintillators
 - ▶ Portable survey meters to detect potentially hazardous radiation
 - ▶ Instrumentation for high energy particle physics research
 - ▶ Cargo inspection systems that use neutron detection.

ADVANTAGES

- ▶ Synthesis uses inexpensive materials
- ▶ Synthesized composites possess a scintillation light yield up to 4 times higher than commercial plastic scintillators
- ▶ Composites produces photoelectric peak for high energy gamma rays.

STATE OF DEVELOPMENT

The researchers have demonstrated the synthetic methods to be practical, and the resultant composites exhibit all of the favorable characteristics listed above. A provisional patent application has been filed for the synthesis and applications of the polymers. Currently, Dr. Pei

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INVENTORS

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OTHER INFORMATION

KEYWORDS

Scintillator, gamma rays, bulk polymer, composites, cleantech

CATEGORIZED AS

- ▶ **Materials & Chemicals**
 - ▶ Composites
 - ▶ Polymers
- ▶ **Security and Defense**
 - ▶ Other
- ▶ **Sensors & Instrumentation**
 - ▶ Analytical
 - ▶ Environmental Sensors
 - ▶ Scientific/Research

RELATED CASES

2012-334-0

and co-workers are seeking commercial partners to develop product samples.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,708,529	07/18/2017	2012-334

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [Electrocaloric Cooling With Electrostatic Actuation](#)
- ▶ [Nanowire-Polymer Composite Electrodes](#)
- ▶ [An Actuator Device Driven By Electrostatic Forces](#)
- ▶ [A Phase-Changing Polymer Film for Broadband Smart Windows Applications](#)

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