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FLUORESCENCE SENSORS FOR RAPID DETECTION OF GAMMA-RAY RADIATION

HARDWARE, CIRCUITS, & SENSORS

Optical mode sensor for low-level detection of gamma radiation, which can be used to monitor radioactive materials.

TECHNOLOGY TYPE

Instrumentation
Radiation

STAGE OF DEVELOPMENT

Proof of concept demonstrated through initial testing of bench prototype.

IP PROTECTION

Nationalized PCT Issued in the United States

Compounds, Sensors, Methods, and Systems for Detecting Gamma Radiation
US9452989B2

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TECHNOLOGY SUMMARY

Gamma radiation is widely used in nuclear relevant security, medical radiological therapy, and scientific research. When administered in high doses, however, it increases cancer risk and causes tissue damage. Additionally, greater awareness of the threat of nuclear and radiological terrorism increases the need for instant detection of gamma radiation. Scientists and engineers have developed radiation detectors to measure the radiation dose. The accuracy of these devices is, unfortunately, limited by low sensitivity as well as energy and angular dependence.

The described optical sensor provides a cost-effective, easy-to-operate, and highly-sensitive gamma radiation detector. The sensor uses a novel molecule that emits blue fluorescence, which dissolves in halogenated solvents. The molecule experiences a reduction in emittance after contact with gamma rays. The acid interaction enables instant detection of gamma radiation down to the .01 Gy level.

FEATURES AND BENEFITS

- Increases sensitivity by three orders of magnitude compared to current state-of-the-art (.01 Gy compared to 10 Gy).
- Enables rapid, cost-effective sensing.
- Demonstrates potential for use in military and homeland security, medical treatment, and research.

RECENT PUBLICATIONS

Han, J., Salter, B.J., Zang, L. et. al. (2014). Low dose detection of gamma radiation via solvent assisted fluorescence quenching. *Journal of the American Chemical Society.* 136(13): 5090-5096. doi: 10.1021/ja500262n

INVENTOR PROFILE

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