Scintillation materials and devices for high-resolution, high-sensitivity, ionizing radiation detectors

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Value Proposition

Many industries require radiation detection; everything from agriculture to oncology to manufacturing. The proposed Nano-scintillator Fiber Optic Dosimeter (NS-FOD) offers accurate radiation detective in an inexpensive and durable detector. The detector offers a versatile platform with the potential for use in many applications, such as monitoring tissue dosing and human exposures.

Technology

Current scintillators display many inconvenient characteristics, such as requiring large spatial dimensions, a dependence on cryogenic cooling, high limits of detection, or sensing elements that are hygroscopic. The proposed NS-FOD is a novel technology that can provide real-time, in-vivo radiation dosimetry in the clinic without sacrificing sensitivity or accuracy. The nano-scintillator exhibits a linear luminescent emission response to stimulating electromagnetic radiation (<100nm) and a sensor then detects the emitted light. The light data is then processed and compared to the calibrated data dose/energy data to determine radiation dose information. These detectors have applications in Positron Emission Tomography (PET), CT imaging, homeland security inspections, and personal detectors.

Advantages

- Accurate real-time dosimeter data
- High-resolution and high-sensitivity
- Durability
- Pinpoint dimensions
- Reduced costs, or any combination of those

Publications

- Stanton, Ian N., et al. "Europium-and lithium-doped yttrium oxide nanocrystals that provide a linear emissive response with X-ray radiation exposure." Nanoscale 6.10 (2014): 5284-5288.
- Belley, Matthew D., et al. "Fiber-optic detector for real time dosimetry of a micro-planar x-ray beam." Medical physics 42.4 (2015): 1966-1972.

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Patents

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