Nanocrystalline Glass Ceramic Scintillators (#5509)

A method for controlling the size of nanocrystals in glass ceramic scintillators

Georgia Tech Researchers have developed a patented method for controlling the size of embedded metal-halide nanocrystals in glass ceramic scintillators for gamma-ray spectroscopy. During preparation, the size of the nanocrystals is controlled by various heat treatment conditions. When used in a scintillator, the part of the detection device that is luminescent, these nanoparticles can convert nuclear radiation into a detectable form. The high transparency of the mechanism allows for higher efficiency and resolution of nuclear radiation detection. Additionally, electronics can be introduced to the mechanism so that data from the light detector can be measured and evaluated.

Benefits/Advantages

- **Cheaper –** Can be easily fabricated on a large scale
- **Efficient –** High luminescence efficiency and light output
- **Compact –** Greater portability
- **Durable –** Higher mechanical strength, chemical durability, and thermal stability
- **Enhanced –** Non-scattering and transparent for all visible wavelengths

Potential Commercial Applications

This technology has potential in a variety of fields using gamma-ray detection and/or x-ray and neutron radiographic imaging including:

- Homeland security and disaster response
- Oil/well logging
- Medical and industrial neutron radiographic imaging
- Detectors for revealing material structure

Background/Context for This Invention

Single and inorganic crystal detectors have been sought after for use in gamma-ray detection because of their well-defined preparations and uniform light generation and transmission properties. While these detectors are ideal for gamma-ray detection they are not suitable for nuclear radiation detection. For this reason, solid-state detectors desirable because they far exceed the resolution of single and inorganic crystals; however, they are limited by the size of the nanocrystals. Thus, there is a need for a method to control the size of nanocrystals for gamma-ray and nuclear radiation detectors.

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More Information

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Publications

For more information about this technology, please visit:
https://licensing.research.gatech.edu/technology/nanocrystalline-glass-ceramic-scintillators

Images:

The automated sequential delivery of multiple fluids. A varying number of delay gates imprinted in the branches are shown in the figure.

COVID-19 and flu saliva test on paper: (A) The automatic sequential delivery of multiple reagents required for virus test; (B) Water pouring into the device triggers the virus assay, allowing the presence of SARS-CoV-2 and influenza A & B viruses to be visually identified by the color changes in the corresponding detection spot