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Scintillation Crystal Detection Arrays for Radiation Imaging Devices

A Stanford researcher has developed two advanced approaches for the positron sensitive high-energy photon sensor technology for Positron Emission Tomography (PET). In the first approach, the radiation imaging device comprises layers of very thin position sensitive scintillation detectors that provide high scintillation light collection efficiency independent of interaction location, directly measured the interaction depth of the photons within thick detection volume, and 3D positional, energy, and temporal information for each interaction in multi-interaction photon events. The benefit of this improved device is that it simultaneously facilitates high spatial resolution, high 511 keV photon absorption efficiency, high scintillation light collection efficiency, and accurate photon interaction depth measurement without compromising performance parameters important for PET.

Applications

- Nuclear Medicine--PET, SPECT
- Molecular Imaging
- Photo Imaging
- Spectroscopy
- Astrophysics
- Security Screening
- Radiation Detection/Imaging
- Homeland Defense
- Mineral Exploration

Advantages

- Uniform and ultra-high spatial resolution

- Enhance high photon detection efficiency
- High signal-to-noise ratio
- Excellent energy resolution for high image contrast and quantitative accuracy of image data
- Compatible with other imaging modalities for multi-modality platforms

Publications

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- Habte F, Foudray AMK, Olcott PD, Levin CS (2007) "Effects of System Geometry and Other Physical Factors on Photon Sensitivity of High Resolution Positron Emission Tomography". *Physics in Medicine and Biology*, 52 pp. 3753-3772.
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- Pratx G, Levin CS (2009) "Bayesian reconstruction of photon interaction sequences for high-resolution PET detectors". *Physics in Medicine and Biology*, 54, pp. 5073-5094.
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Patents

- Published Application: 20040124360

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