

# NANOPHOTONIC PEROVSKITE SCINTILLATOR FOR TIME-OF-FLIGHT GAMMA-RAY DETECTION

Tech ID: 32998 / UC Case 2023-057-0

## PATENT STATUS

Country	Type	Number	Dated	Case
Patent Cooperation Treaty	Published Application	WO/2024/173868	08/22/2024	2023-057

## BRIEF DESCRIPTION

Positron emission tomography (PET) is a powerful tool both in biomedical research and clinical patient care, particularly in the diagnosis of cancer, search for metastases, cancer treatment monitoring, diagnosis of diffuse diseases causing dementia, or metabolic blood flow imaging. However, the poor efficiency of current PET detectors (1-2%) requires large radiotracer doses and integration times, driving both cost and patient exposure per scan. High detector capital cost also renders PET scanners prohibitively expensive. Finally, while time-of-flight PET can enhance the spatial resolution of PET by measuring temporal correlation of detected gamma photons, the modality is limited by the latency of current gamma radiation detectors (timing resolutions of ~200-500 ps). Overall, the expense and inefficiency of available gamma radiation detectors hinder the full technological capabilities of PET and its affordable use in patient care.

To address these problems, researchers at UC Berkeley have developed a new gamma radiation detector architecture with the potential for an order of magnitude improvement in both time resolution (down to 10 ps) and efficiency. The design uses novel perovskite nanomaterials and well-established nanotechnology manufacturing methods to produce a detector at a fraction of the cost of current offerings. Together, the high efficiency and timing resolution of the nanophotonic detector design should drastically improve the spatial resolution (including by time-of-flight measurements) of PET scanners and dose-suitability for elderly patients. Benefits in affordability are multiple, lowering detector cost and as well as required radiotracer dose.

## SUGGESTED USES

- » Detectors for positron emission tomography (PET)
- » High-speed & high-resolution gamma radiation detection
- » Time-of flight PET

## ADVANTAGES

- » Potential timing resolution down to 10 picoseconds (order-of-magnitude improvement over existing detectors), suitable for time-of-flight measurements

## CONTACT

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## INVENTORS

- » Utzat, Hendrik

## OTHER INFORMATION

### KEYWORDS

PET, Cancer, Imaging, Gamma ray detection

### CATEGORIZED AS

- » **Optics and Photonics**
  - » All Optics and Photonics
- » **Medical**
  - » Diagnostics
  - » Disease: Cancer
  - » Imaging
  - » Research Tools
- » **Nanotechnology**
  - » Materials
  - » Other
- » **Veterinary**
  - » Diagnostics

### RELATED CASES

2023-057-0

- » Higher efficiency allowing for a multifold reduction of tracer radionuclides in PET, substantially reducing cost and exposure for vulnerable/elderly patients
- » Cost-effective, uses well-established nanotechnology manufacturing methods

## RELATED MATERIALS

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## ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [Spectral Fluctuation Raman Spectroscopy \(SFRS\)](#)



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