PROJECT NUMBER

22766

Nontoxic, stable X-ray detector materials for rapid, low-dose imaging

Layered BiOI single crystals enable ultra-low-dose, stable X-ray detection with high stopping power and fast, delocalised charge transport.

Current X-ray detector materials cannot simultaneously deliver strong absorption, low noise and efficient charge transport at very low doses rates. Researchers developed novel bismuth oxyiodide (BiOI) single crystals as high-performance materials for detecting very low dose of X-rays, a key capability for safer and more sensitive medical and industrial radiography.

Applications: Low-dose radiography, Precise X-ray imaging, Portable X-ray devices, Industrial non-destructive testing, Security screening systems, X-ray video

Features	Benefits
Low dose detection down to 22 $nGy_{air} \cdot s^{-1}$	Reduced patient and operator radiation exposure; New applications becomes feasible, such as X-ray videos
X-ray absorption (attenuation) enhanced through heavy elements bismuth and iodine, characterised for their strong X-ray stopping power	Reduction of detector thickness and system weight for compact and portable platforms

Features	Benefits
Direct conversion detection from X-rays to electrical signal	High spatial resolution and fast temporal response; Simple system architecture with no need for scintillation step
Low dark current and noise	Clear detection of weak signals; Lower power consumption; Improved image quality
Efficient charge transport via delocalised large polarons instead of self-trapping	Absorbed X-rays reliably turn into usable electrical signals; Improved signal-to-noise ratio
Lead-free chemistry	Regulatory compatibility; Safe manufacturing and disposal

Patented and Available for

- Co-development
- Consulting
- Licensing

To find out more, contact enquiries@innovation.ox.ac.uk and quote the project number.