

Development of scintillator type X-ray imager with pixel optical separator

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X-ray image detectors have been developed for medical and non-destructive testing applications. This study shows the improvement of the resolution of the scintillator, which is an indirect conversion type X-ray image detector. The emission of the scintillator is diffused and the spatial resolution of detector is reduced. Therefore, the scintillator was optically separated using silicon that hardly transmits visible light in order to suppress the diffusion of the scintillation light. A silicon wafer was used as a collimator in the form of pixels, and each of its holes was filled with scintillator material. The improvement in spatial resolution of this pixel separation scintillator was measured, and the image characteristics for practical use of this pixel-separator were evaluated. From these results, it was expected that the pixel separation scintillator would be put into practical use. CsI doped Thallium was used for the scintillator and was encapsulated in pixel-type silicon by the melting method. The evaluation for image characterization were spatial resolution, graininess, and quantum detection efficiency, which were obtained by calculating Modulation Transfer Function, Noise Power Spectrum, and Detective Quantum Efficiency.

Topics

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