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X-ray imaging using semiconductor X-ray image detectors

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Imaging using X-rays is currently used in a wide range of fields such as medical, industry and security.The most common type of detector in use today is the indirect conversion method.In the indirect conversion method, X-rays are converted into visible light by a material called a scintillator. In the indirect conversion method, X-rays are converted into visible light by a substance called a scintillator. After being converted into visible light, it is converted into electrical signals. However, the indirect conversion method has inherent problems such as the diffusion of light in the scintillator. Semiconductor X-ray image detectors, on the other hand, are direct-conversion detectors, which means that when X-rays are detected, they do not need to be converted into visible light, but can be directly converted into electrical signals. In order to absorb X-rays efficiently at room air temperature, a material with high density, large atomic number, and large band gap is generally required. Thallium bromide (TlBr) and cadmium telluride (CdTe), both of which are compound semiconductors, are promising materials for detectors because of their high density and large atomic number. On the other hand, their attenuation and response properties in objects are different. Therefore, it is expected that the response when operating as an image detector will be different between the two. In this study, we investigated the relationship between the image evaluation and response characteristics of the transmitted image captured by two X-ray image detectors, TlBr and CdTe.

Topics

Session C. Applied optics and engineering

Primary authors: Mr GOTO, Takeru (Shizuoka University); Dr HOTTA, Takumi (Shizuoka University); Dr TABATA, Kento (Shizuoka University); Dr NISHIZAWA, Junichi (Shizuoka University); Dr IMURA, Yukino (Shizuoka University); Dr TAKAGI, Katsuyuki (Shizuoka University); Prof. AOKI, Toru (Shizuoka University)

Presenter: Mr GOTO, Takeru (Shizuoka University)

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