
Contribution ID: **143** Type: **Poster**

# P2.43: Application and image characterization of the deconvolution algorithm in an indirect X-ray imaging detector with scintillators

*Wednesday, 28 June 2023 17:24 (1 minute)*

In recent years, X-ray imaging detectors in combination with scintillator screens have been widely used in digital x-ray imaging applications. These indirect X-ray imaging detectors are incorporated in the combination of a TFT or CMOS back plane array with different scintillation screens such as typical CsI and GOS materials. Some detectors can be applied with different scintillators in order to optimize the sensitivity and spatial resolution for a dedicated application. The intensity and scattering of visible light generated in the scintillator layer of indirect conversion detector is primarily determined by the X-ray absorption efficiency and light conversion efficiency of the used material.
In this work, we have employed efficient Gd2O2S:Tb(GOS) scintillator film with high atomic number and different thickness for X-ray imaging detectors. A large-area image detector consists of CMOS array with a 204mm x 200mm active area with 2048x2000 pixel array and 100um pixel pitch. A mount of light generated by incident x-ray energy is rapidly scattered before it is sensed on photodiode arrays. Thick GOS screens, which are better at absorbing high-energy x-rays, show strong light blurring and can't be used for high-resolution imaging tasks. In order to solve this severe problem, different deblurring algorithms such as a simple deconvolution using the estimated PSF (point spread function) and special blind deconvolution were applied in indirect X-ray imaging detector and its imaging characterization and the effect in performance was also investigated.
The relative sensivity to X-ray dose, signal to noise ratio (SNR), and spatial resolution in terms of the modulation transfer function (MTF) of different scintillator screens were measured to analyzed the imaging performance. The experiment imaging characerization in accordance with dfferent debluring technique were compared and analyzed. The initial results demonstrated its ability to achieve a high-spatial resolution imaging under low X-ray exposure condition.

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**Session Classification:** Poster (incl. coffee)