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P2.69: Signal and noise analysis of a metal oxide transistor-based flat-panel detector

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Recently, a metal-oxide thin-film transistor (TFT)-based flat-panel x-ray detector has been paid attention to its fast readout time and low-noise characteristic. We analyze empirically the signal and noise characteristics of an indium gallium zinc oxide (IGZO) TFT-based detector in comparison with those of the conventional hydrogenated amorphous silicon (a-Si:H) TFT-based detectors. We compare the large-area transfer functions of the detectors as a function of air kerma at their entrance surface. We perform the mean-variance analysis to address the systems'gain and electronic noise. The signal and noise performances are evaluated by measuring the modulation-transfer function (MTF), noise-power spectrum (NPS), and detective quantum efficiency (DQE). The low-dose imaging capability of detectors is assessed by investigating the large-area or zero-frequency DQE, including a DQE reduction factor which is introduced in this study, as a function of air kerma. Throughout this study, we evaluate the value of the IGZO detector in terms of dose efficiency, in particular, compared to the conventional a-Si:H detectors.

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