Docket #: S14-272

High-resolution, high DQE X-ray detector for imaging systems

This invention, the “Charge Cloud Tracker” is a fast, low-cost, strip geometry x-ray detector that is predicted to provide limiting resolution on the order of 5 microns, with very high x-ray detection efficiency. This system has a high-speed electronics and data acquisition system that is designed to process every single photon-created charge cloud to determine the photon's energy and position of interaction. The basic detector unit can be fabricated with standard semiconductor manufacturing techniques using one of several different materials, thereby enabling clinical applications at x-ray energies ranging from 15 keV to 50 keV. The detector has a range of clinical and preclinical applications, including phase-contrast imaging scanning-slot mammography, small-animal CT, breast CT and clinical CT.

Applications

- **X-ray detector for clinical and pre-clinical imaging systems** such as small animal imaging, mammography, phase-contrast x-ray imaging

Advantages

- **Ultra-high resolution** - goal of 5 micron resolution from high data transfer rates that provide 2D location of every photoelectric interaction (predict 50% MTF at 100 lp/mm at 25 keV)
- **High count rates** provided by unique geometry enables high quality in vivo and clinical resolution
- **Application to Phase Contrast imaging** - no phase stepping required, a single exposure provides 3 images with x-ray efficiency about twice that of conventional 3-grating systems

- **Standard semiconductor manufacturing** - simple basic unit with complexity shifted to the design and construction of the ASIC
- **Radiation** hard due to simplicity of basic detector

Patents

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