Docket #: S20-018

Holographic X-ray Detection

Differential Phase Contrast (DPC) X-ray imaging measures both absorption and index of refraction of materials being imaged. This technique has several advantages compared to traditional absorption-only X-ray imaging. It can perform medical imaging with a substantially higher contrast to noise ratio for soft matter (such as tumor detection) and has many applications in security screening (such as explosive material identification).

The system uses a non-linear optical medium which forms a change in the index of refraction or the absorption of the material when exposed to X-ray radiation. After illumination, 2 ?m diffracted light is then analyzed to measure the magnitude and location of the changes in the index of refraction or absorption of the non-linear optical medium. The relative phases which reconstruct the pattern of X-ray illumination in visible light can then be digitized using a digital camera. Thus, an X-ray hologram is transformed into a digital signal, allowing for precise reconstruction of the interior of the object.

Stage of Research
Prototype

Related technologies:
S16-173 Fates - Compact, Sensitive X-ray Differential Phase Contrast Imaging System

S18-123
Next Generation Explosive Detection with Differential Phase Contrast (DPC) Imaging – Artifact Removal and Automated Analysis

Applications

- Medical & Security CT
- Dental X-ray imaging

- Mammography
- General X-ray imaging

Advantages

- 2.4um resolution while maintaining >80% quantum efficiency of incident x-rays

Patents

- Published Application: 20210247330
- Issued: 11,391,679 (USA)

Innovators

- Lambertus Hesselink
- George Herring

Licensing Contact

David Mallin

Licensing Manager, Physical Sciences

Email