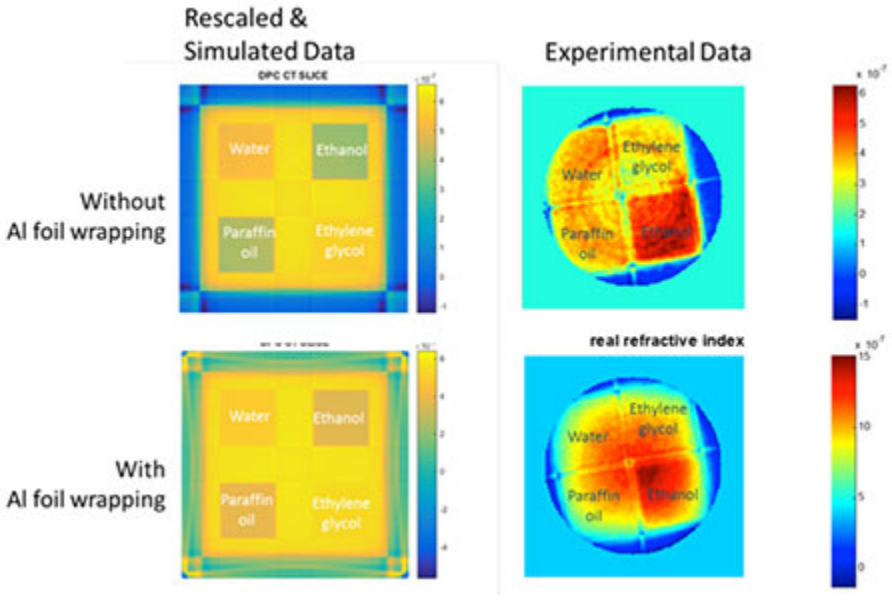
Docket #: S15-291

Photonic Channeled X-Ray Detector Array

Stanford researchers have built and tested a Photonic Channeled X-Ray Detector Array (PcXDA). The detector array transforms an X-ray pattern into a visible wavelength optical pattern, and eliminates an expensive analyzer grating from conventional X-ray fringe detection systems. The dual phase contrast X-ray prototype has high resolution and contrast, a large field of view, and new X-ray imaging modalities compared to current methods. The improved contrast makes it ideal for baggage and industrial inspection, and soft tissue imaging.

Stage of Research
Researchers have incorporated the detector array into a dual phase contrast X-ray prototype.



Four color-scale images comparing the real portion of the index of refraction of simulated and experimental data.

The left two images are CT slice reconstructions of the signals created by the simulation. The right two images are CT slice reconstructions of the same materials

and geometries from a differential phase contrast experimental setup. The lower two images show four chemicals in a cuvette, surrounded by aluminum. The upper two images show four chemicals in a cuvette without any aluminum.

Applications

- X-ray imaging for Low Contrast Materials:
  - Cargo and industrial inspection - Differential phase contrast (DPC) imaging of baggage for DHS applications, non-destructive testing and other industrial inspection applications.
  - DPC imaging for medical applications, X-ray spectroscopy with nano-sized spatial resolution, potential X-ray beam steering, coherent X-ray imaging and metrology.

Advantages

- Improves upon current Differential Phase Contrast methods:
  - Easy to fabricate array eliminates expensive analyzer grating in front of conventional X-ray sources.
  - Large field of view
  - High resolution and contrast
  - New features enables new X-ray imaging modalities

Publications

- Cheng, Yao-Te, et al.,"Photonic Channeled X-Ray Detector Array," U.S. Patent Application 15/230,199, filed August 5, 2016.

Patents

- Published Application: 20170038481
- Issued: 9,772,407 (USA)

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