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Advancing the Arizona State University Knowledge Enterprise

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Solution Processed Scintillator Incorporated into X-Ray Detector Backplane

Radiography is currently the most common medical imaging procedure performed in the world, and the demand for radiography is expected to increase in the coming years. Particularly in less developed countries where there is a demand for a much more ruggedized technology, the market may skip conventional x-ray film technology in lieu of digital radiography. Furthermore, radiography has seen expansive growth into non-medical applications, such as security imaging and non-destructive testing for integrity analysis, where there is a need for more portable, flexible, rugged, and lightweight equipment. However, some materials and components, such as the scintillator phosphor film which converts incident x-ray into visible photons, continue to present a challenge to truly flexible x-ray technology. Therefore, there is a need to improve the flexibility and ruggedness of x-ray technology.

Researchers at Arizona State University have improved the design and functionality of x-ray sensors by incorporating the scintillator material directly into the backplane of the device. This solution provides improved flexibility, higher resolution, and reduced packaging requirements. Minimal separation between the scintillator material and the detector layer improves the modulation transfer function of the detector, thereby providing better accuracy in reproducing detail in an image. Additionally, this solution eliminates the bending and flexing limitations of the scintillator as the suspension may be applied directly to a flexible photodetector backplane or substrate using various coating methods. Elimination of traditional scintillator adhesives and thick inflexible backings allows the entire x-ray imaging or detecting device to remain as thin, light weight, and flexible as possible.

Potential Applications

- X-rays
- Radiography
- Medical imaging
- Flexible imaging

Benefits and Advantages

- Improved Performance –
  - By incorporating the scintillator on both sides of the photodiode, the efficiency of incident x-ray capture is increased, which results higher resolution detectors.
  - Minimal separation between the scintillator material and the detector layer improves the modulation transfer function of the detector, thereby providing better accuracy in reproducing detail in an image.

- Flexible - Incorporating the scintillator directly into the backplane eliminates the needs for scintillator films and allows for more flexibility.
- Enhanced Design – Elimination of traditional scintillator adhesives and thick inflexible backings allows the entire x-ray imaging or detecting device to remain as thin, light weight, and flexible as possible.
- Less Expensive - This method eliminates the costs associated with the ruggedization of conventional display glass x-ray technology.

For more information about the inventor(s) and their research, please see

Xan Henderson's directory webpage