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MIXRAY: Microstructures for High Resolution X-Ray and Neutron Imaging

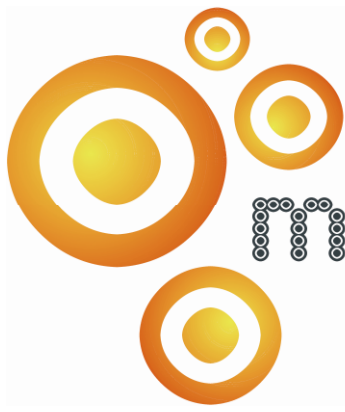
PROJECT DESCRIPTION

Most of X-ray imagers use scintillator layer for conversion of the x-ray photons into visible light that can be detected by standard photo sensors (CCD, CMOS and Flat Panel). This technique is quite common in medical imaging. Radiation dose is a major concern in medical imaging and thus the detection efficiency of the scintillator layer has to be maximal. Therefore, it is important to make the scintillator layer thick enough to absorb all the x-ray photons. The layer thickness is thus larger than the pixel dimensions, which means that scintillation light originating in one point spreads over several pixels of the photo sensor lowering the spatial resolution and the contrast in resulting radiograms..

The company Scint-x has a patented technology to solve this problem of light spread. This is based on trenches etched in an opaque substrate and filled with scintillator materials. The technique allows thick absorbing layers and the opaque trench walls eliminate the spread of light to neighbour pixels. Thus this technique allows lower radiation dose maintaining high spatial resolution.

The project will focus on development of a mirror wall structure which will increase the light output from the scintillating pixels by at least a factor of 3. This will make the resulting x-ray imaging detector very attractive as it allows a lower dose and high spatial resolution. This is a market need and we think that this resulting imaging detector will take over a major part of the market, not only in medical imaging but also in material analysis, non-destructive testing and scientific instruments.

The targeted innovation is to manufacture structured Scintillators with mirror walls. Besides the application as a structured scintillator film for CCD detectors, these can also be used for the detection of individual x-ray photons, as the efficiency of the collection of visible light photons is high enough that a digital pixel detector like Medipix2/3 can resolve the light pulse over the noise level. This means that an x-ray photon counting imager based on scintillation can be built and thus the contrast can be further increased by an order of magnitude. Another major benefit of such combination of structured scintillator with Medipix2 is complete suppression of dark current and nonlinearities which are always present in analogue CCD systems.



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PARTNERS

Project coordinator: Acreo AB, Sweden

Project partners: Scint-X AB, Sweden
Middec AB, Sweden
IEAP-CTU, Czech Republic

PROJECT DURATION AND TOTAL PROJECT COST:

Duration: 01/2011 – 12/2012

Cost: 560,000 Euro

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