Contribution ID: **59** Type: **Oral Presentation**

The application of Large Area Active Pixel Sensor to high resolution Nuclear Medicine imaging

Thursday 15 September 2011 09:30 (20 minutes)

A large area CMOS active pixel sensor(LAS)has been investigated to study its potential application to Nuclear Medicine imaging. LAS consisted of 1350 x 1350 40 micron pixels with noise levels of ˜40e. The sensor was coupled directly to both segmented and unsegmented 2mm thick CsI(Tl) crystals. The segmented crystal contained 400 micron x 400 micron pixels seperated by ˜100 microns of reflective material. The quantum efficiency at these wavelengths is only ˜20%. The system was interfaced to a PC via an FPGA-based DAQ and optical link enabling imaging rates of of up to 20 frames per sec.

Imaging tests were performed using 99mTc sources emitting 140 keV gamma rays together with various lead collimators. The majority of the system noise was found to be fixed pattern in nature caused largely by the reset signals. Importantly this means that much of the noise can be accurately removed if the sensors are held under consistent environmental conditions

The intrinsic spatial resolution of the sensor coupled to the segmented scintillator was measured as ˜80 microns. Results show that the signals in the sensor pixels from 140 keV gamma rays are small as the light from the scintillator is spread over a large number of pixels. In spite of this the sensor can be used to produce images with 140keV gamma rays when coupled to both types of scintillators. Measurements of the MTF made using the unsegmented crystal show values of 0.68, 0.55, 0.43 and 0.26 and spatial frequencies of 0.1, 0.17, 0.25 and 0.5 lp/mm. The system can easily resolve objects 1-2mm in diameter and with a segmented crystal sub-mm resolution is possible. A new much larger sensor is presently being manufactured.

Preferred medium (Oral/poster)

Oral

Author: Prof. OTT, Robert (Institute of Cancer Research)

Co-authors: Mr CLARK, Andrew (Rutherford Appleton Laboratories); Dr OSMOND, John (Institute of Cancer Research); Prof. EVANS, Philip (Institute of Cancer Research); Dr TURCHETTA, Renato (Rutherford Appleton Laboratories)

Presenter: Prof. OTT, Robert (Institute of Cancer Research)

Session Classification: Applications in Medicine, Life Sciences and Biology

Track Classification: Applications in Medicine