

A NOVEL SOLID STATE DETECTOR FOR MAMMOGRAPHY

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INTRODUCTION: The Medipix2 chip is a photon counting X-ray pixel detector, which was developed by the Medipix Collaboration [1] at the European Centre for Nuclear Research (CERN). It consists of a 700 μ m silicon detector layer with 256 \times 256 square pixels of 55 μ m size (Fig.1) which is bump bonded to an equally dimensioned pixel read-out chip [2]. The chip is suitable for mammographic applications due to increased relative efficiency at the low kV values involved. This initial study investigates the dose reductions achieved over conventional mammographic screen-film techniques and evaluates image quality.

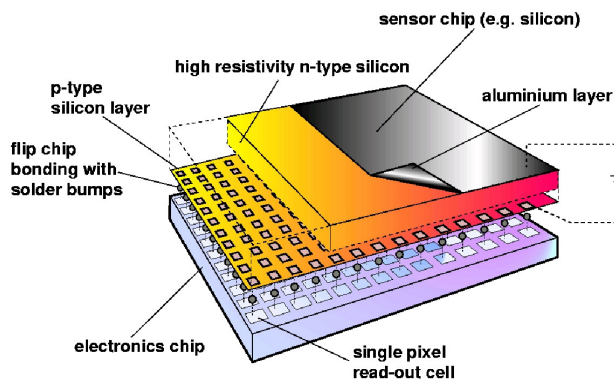


Fig. 1: Schematic of the Medipix2 detector.



Fig.2: Detector inside magnification table.

METHODS: The chip is used in the first clinical study of mammographic applications, comparing Medipix images of lumpectomies to conventional film images. The detector sits in a magnification table (Fig. 2) above the film housing with simple translation used to build up tiled images.

RESULTS: Fig.3 shows film (a,c) and initial chip (b,d) lumpectomy images, there is a hook wire for localisation and several faulty pixel lines. Calcifications and a lesion are clearly seen; the locations are slightly altered due to repositioning of the excised sample.

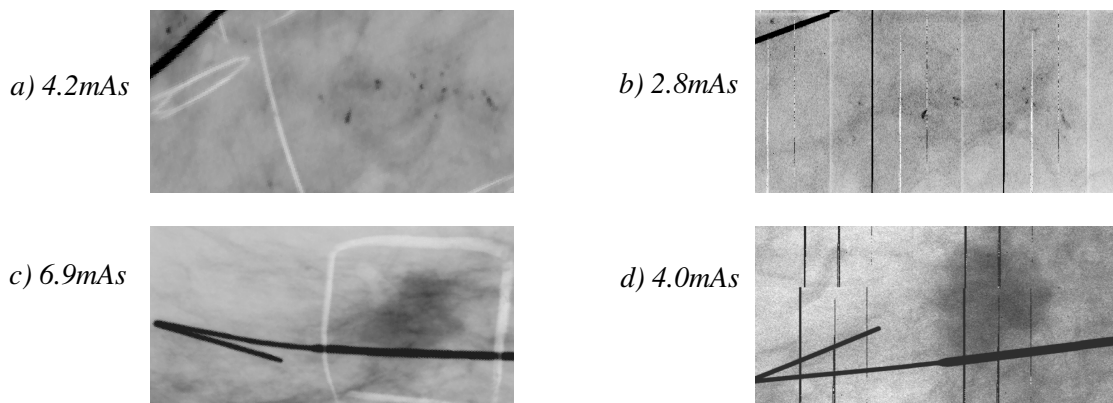


Fig. 3: Breast lumpectomy images with dose, all taken at 26kVp.
a) film calcifications b) Medipix2 calcifications c) film lesion d) Medipix2 lesion.

DISCUSSION & CONCLUSIONS: We have shown that breast excision calcifications and lesions are identifiable using Medipix2 at lower than normal dose. The detector's limiting resolution is 10 lp/mm, compared to \sim 15 lp/mm for film. However, the greater latitude and post-processing available with Medipix2 should allow us to develop useful breast imaging technology.

REFERENCES:

¹ <http://medipix.web.cern.ch/MEDIPIX/>

² K.F.G.Pfeiffer, J.Giersch, G.Anton, (2004), *Nuc Instr Meth Phys Res A*, 531: 246-250