The development of efficient X-ray conversion material for digital mammography

In mammography, detection of small attenuation differences is best achieved with low X-ray energies (approximately 20 keV), but at the same time these X-rays have a high absorption and therefore deliver a relatively high dose to the breast tissue. Detection of minute calcifications is also important, requiring a high spatial resolution. The need for enhanced low contrast detection, high spatial resolution and at the same time minimized radiation dose, means that mammographic equipment has very specific requirements. Therefore, in digital mammography, the direct x-ray conversion method offers high spatial resolution, which is critical for the visualization of micro calcifications and subtle breast abnormalities in mammography. In order to improve imaging performance of digital mammography at low doses and high spatial frequencies, the selection of x-ray conversion materials and structure can be important because high efficient x-ray conversion materials enable digital mammography to have wider dynamic range and improved contrast between dense and non-dense breast tissue. Therefore, in this study, we investigated the properties of x-ray conversion materials that can replace amorphous selenium which have been commercially used in the medical field.

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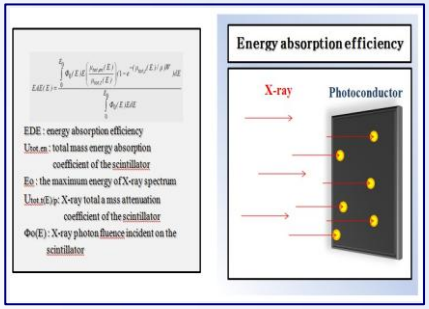
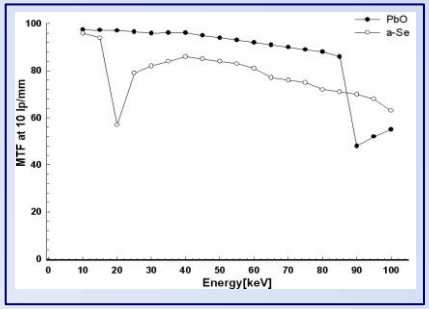
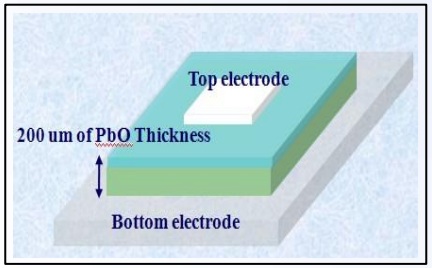


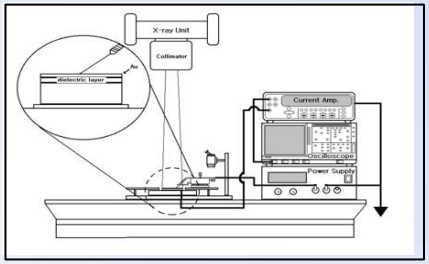
The formula of x-ray energy absorption efficiency



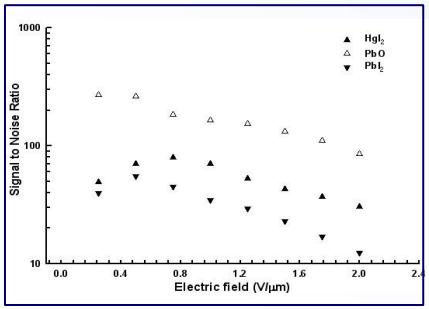
MTF of PbO and a-Se investigated at 10 lp/mm according to x-ray energy



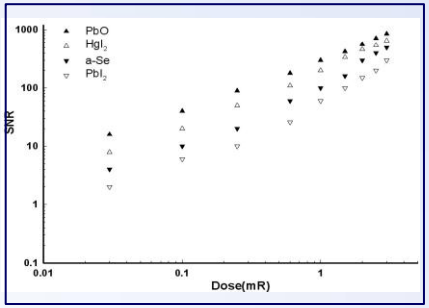
The structure of fabricated film sample



The scheme for the measurement of electrical properties of fabricated film sample



Signal to Noise Ratio



SNR comparison according to the x-ray dose

Figure. 5 The result of the electrical pro