11th International "Hiroshima" Symposium on the Development and Application of Semiconductor Tracking Detectors (HSTD11) in conjunction with 2nd Workshop on SOI Pixel Detectors (SOIPIX2017) at OIST, Okinawa, Japan

Contribution ID: **18** Type: **POSTER**

Feasibility Study of Si/CZT Compton Camera Imaging in Breast Cancer Detection using Monte Carlo Simulation

Sunday, 10 December 2017 21:03 (1 minute)

Recently, the Compton camera imaging system has increasingly becoming the subject of detection for breast cancer detection in the field of nuclear medicine [1, 2]. Among detector materials with Compton camera, Si and CZT can dramatically improve angular resolution and sensitivity. The purpose of this study was to design Si/CZT Compton camera imaging system with Monte Carlo simulation using Geant4 Application for Tomographic Emission (GATE) and to confirm above-mentioned system for the breast cancer detection. For that purpose, the Compton camera was designed using dual-head detection system using Si/CZT detector material. Also, two simulated breast cancer materials were chosen in medial region of the breast. According to the result, the SNR of 6.1, 4.3, 2.1, and 0.9 was calculated for 0, 1, 2, and 3 cm backward displacement of cancers at a 511 keV energy, respectively. In conclusion, our results demonstrated that feasibility of Compton camera imaging system for detection of breast cancer was confirmed.

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Session Classification: POSTER

Track Classification: Applications in biology, medicine, medical equipments