Contribution ID: **105** Type: **Poster**

P2.7: Development and Evaluation of Relative QA Dosimeter for Electron Beam Based on CsPbBr3

Wednesday, 28 June 2023 16:46 (1 minute)

Medical linear accelerators are used to treat patients by irradiating X-rays and electron beams. Electron beams deliver most of their energy to the skin surface due to their short range. Radiation therapy uses these characteristics to treat superficial tumors such as skin cancer, breast cancer, and head and neck cancer. Since accurate dose delivery is required for such electron beam treatment, quality classification (QA) of electron beam must be performed regularly.
However, in clinical electron beam QA, it is recommended to cross-calibrate the Plane-parallel ionization chamber using the absorbed dose to water correction factor of the cylindrical ionization chambers to improve the accuracy in high-energy electron beam measurement. This complicates the measurement.
Therefore, in this study, a relative QA dosimeter for electron beams that can measure low and high energy electron beams without cross-calibration was developed by using CsPbBr3 material with excellent high-energy radiation detection efficiency. In addition, the detection performance was evaluated by analyzing the electrical response characteristics.
The CsPbBr3 dosimeter was manufactured as a unit cell type polycrystalline dosimeter. Electrical response characteristics were measured at energies of 6, 9 and 12 MeV, and reproducibility, linearity, and PDD were analyzed and evaluated by irradiating the dosimeter with a radiation dose of 100 MU at 500 MU/min.
In the reproducibility evaluation, the relative standard deviation (RSD) at 6, 9 and 12 MeV was analyzed to be 1.06%, 1.39% and 1.49%, respectively. In the linearity evaluation result, the coefficient of determination according to the linear regression analysis was analyzed to be 0.9997, 0.9997 and 0.9993 at 6, 9 and 12 MeV, respectively. The PDD evaluation was shown to show the correct Dmax point. As a result of the evaluation, the manufactured CsPbBr3 dosimeter was evaluated to have suitable performance for application as a dosimeter in various energy bands of 6 MeV, 9 MeV and 12 MeV.
As a future study, if a large-area flat-panel dosimeter is manufactured by analyzing the dependence characteristics according to the dosimeter area and field size, QA of electron beam treatment will be possible with a more simplified procedure. This is a basic study of the development of the electron beam QA dosimeter, indicating the potential use.

Primary authors: Prof. CHO, Heunglae (Department of Radiation Oncology, Busan Paik Hospital, Inje University, Republic of Korea); Mr JUNG, Jaehoon (Department of Next Generation bio-health industry Innovation Talent Training Program group, Pusan National University, Republic of Korea); Mr YANG, Seung-woo (Department of Radiation Oncology, Collage of Medicine, Inje University, Republic of Korea); SHIN, Yohan

Co-author: Prof. PARK, Sungkwang (Department of Radiation Oncology, Busan Paik Hospital, Inje University, Republic of Korea)

Presenter: Mr YANG, Seung-woo (Department of Radiation Oncology, Collage of Medicine, Inje University, Republic of Korea)

Session Classification: Poster (incl. coffee)