

AbstractID: 5069 Title: Comparison of the dosimetric properties of standard MOSFET and microMOSFET with home made phantom

Purpose: To evaluate dosimetric properties of a standard MOSFET in comparison with a microMOSFET

Method and Materials: We developed the phantoms to perform a calibration and to analyze characteristics of standard MOSFET and microMOSFET. The phantoms are made of polystyrene, which have the shape of semi-sphere with 10cm diameters and flat slab of $30 \times 30 \text{cm}^2$ with 1cm thickness. The slab phantom was used for calibration and characterization measurements such as reproducibility, linearity and dose rate dependence. The semi-sphere phantom was used for angular and directional dependence on the types of MOSFETs. The measurements were conducted at a depth of 1.5cm under $10 \times 10 \text{cm}^2$ fields at 100cm SSD for reproducibility, linearity, and dose rate dependence. For calibration and reproducibility, five standard MOSFETs and microMOSFETs were repeatedly irradiated by 200cGy three times. Dose linearity was evaluated in the range of 10 to 600cGy. The effect of dose rate was also investigated by 200cGy from 100 to 600MU/min. For angular and directional dependence, the measurements were performed between 0° and 90° gantry angles, while MOSFETs were placed at the center of semi-sphere phantom. The 50cGy was irradiated repeatedly three times under same setup.

Results: The average calibration factor was 1.1 ± 0.95 for standard MOSFETs and 1.09 ± 0.50 for microMOSFETs. The response of reproducibility in the two types of MOSFETs was found to be maximum 0.5% variation. In linearity, the results showed good linear response with R^2 value of 0.997 and 0.999. The angular and directional dependence was found to be within $\pm 2 \sim 5\%$ and $\pm 7 \sim 8\%$.

Conclusion: Standard MOSFET and microMOSFET were compared by the dosimetric characteristics with the home-made phantom. For linearity, reproducibility and calibration factor, two types of MOSFETs showed similar results. On the other hand, standard MOSFET and microMOSFET were found to be remarkable difference due to its detection area size in angular and directional dependence.